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PRELIMINARY DESIGN NEW ITASET SHOP
KIWENGWA [ZANZIBAR]

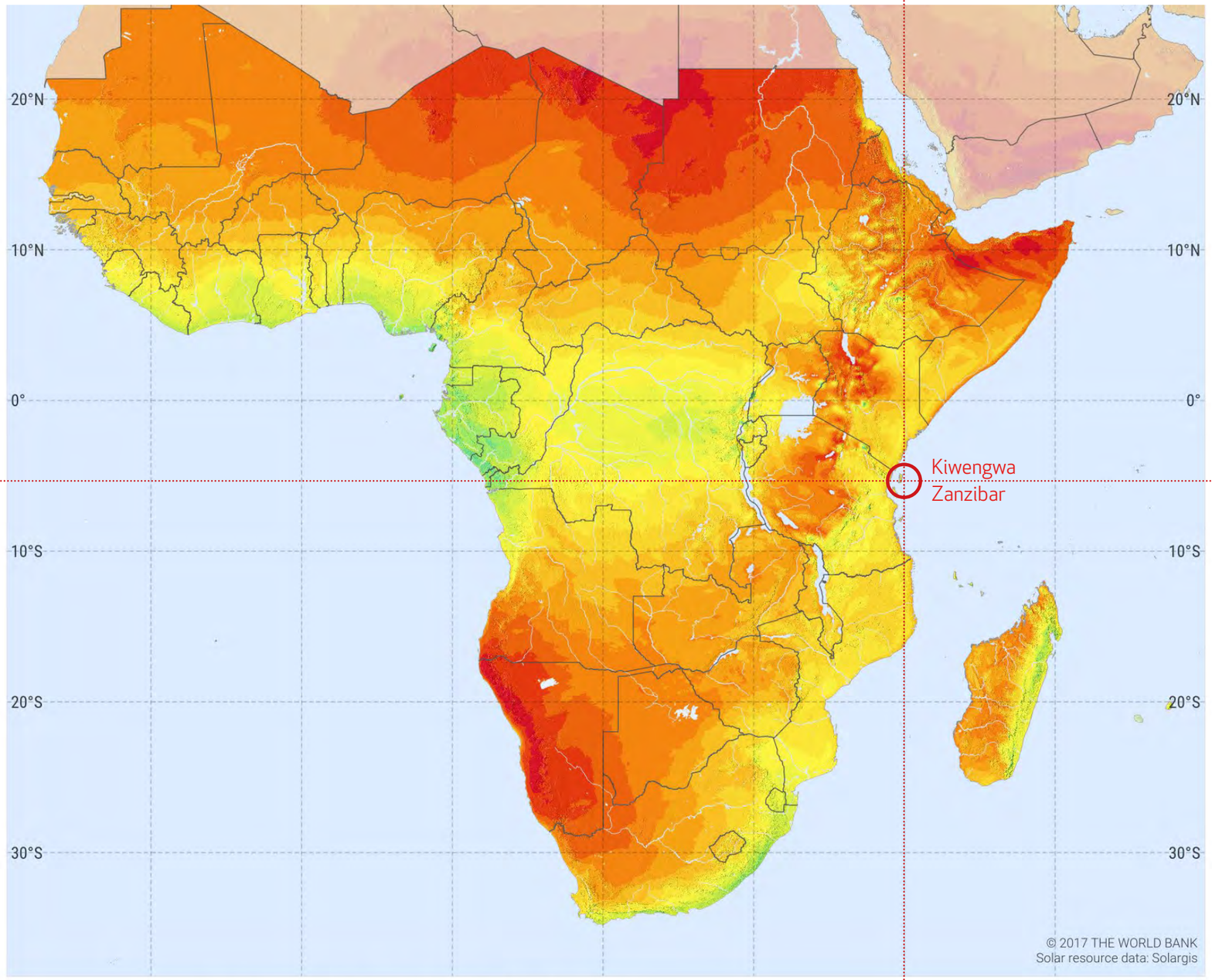
Architecture Firm - CANALGRANDE 90

Arch. Giambattista Brizzi & Arch. Gabriele Convertino
Corso Canalgrande 90, Modena 41121
Italy

Context.

Climatic Framework of Zanzibar, Africa

Global warming map of the African continent

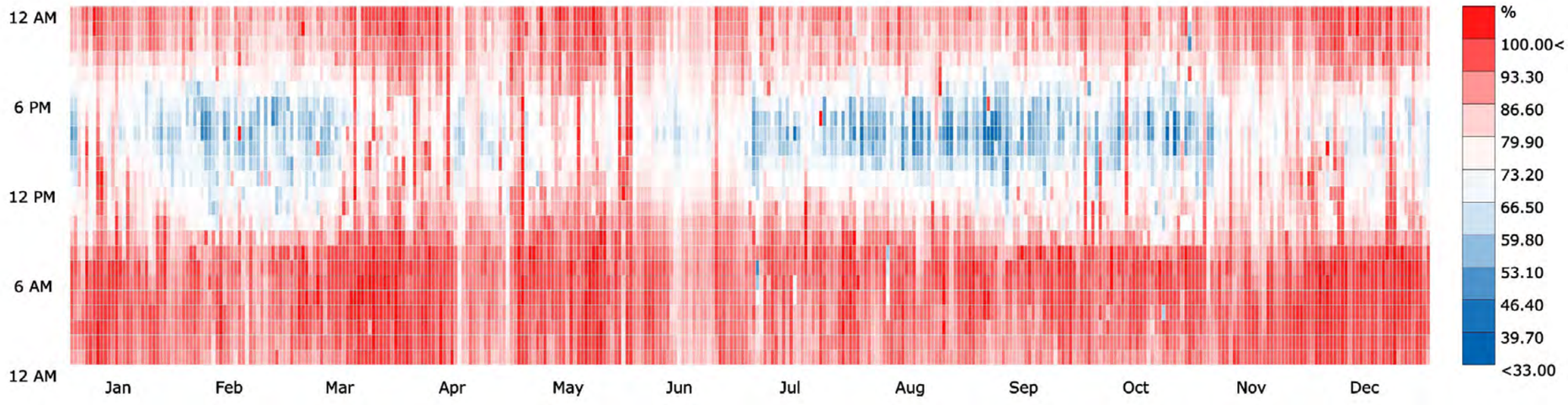


Long term average of GHI, period 1994-2015

Daily totals:	4.2	4.6	5.0	5.4	5.8	6.2	6.6	7.0 kWh/m²
Yearly totals:	1534	1680	1826	1972	2118	2264	2410	2556

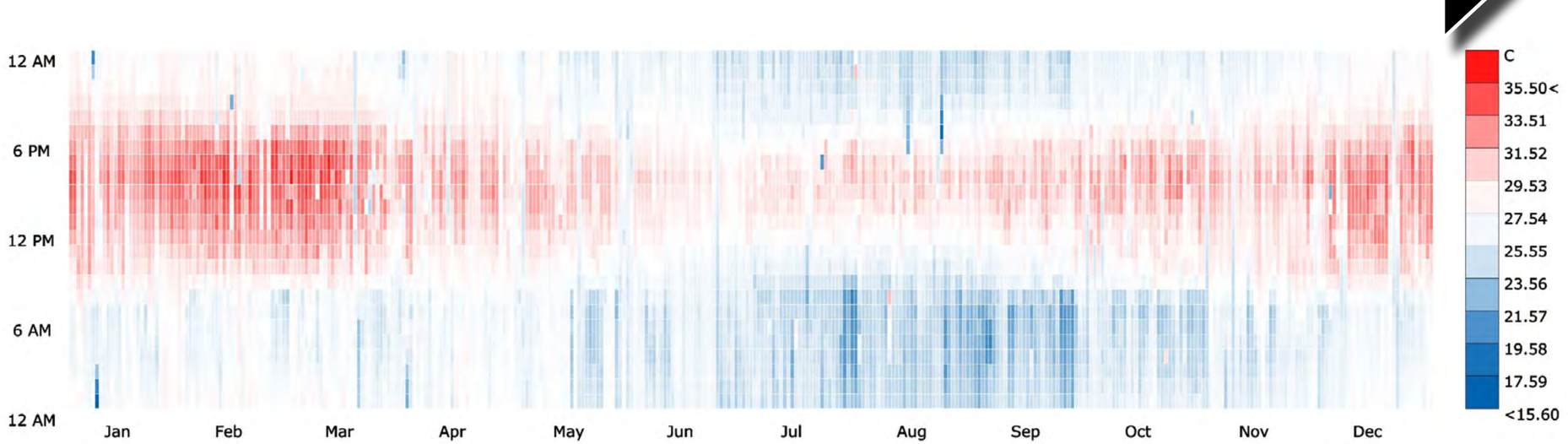
Climatic Chart of Zanzibar, Africa

Relative Bumidity and Dry Bulb Temperature Charts



Relative Humidity (%) - Hourly
Karume Intl AP-Zanzibar Island_ZW_TZA
1 JAN 1:00 - 31 DEC 24:00

Temperatures in Zanzibar are relatively warm throughout the year.
(Annual average of 26.64 ° C)

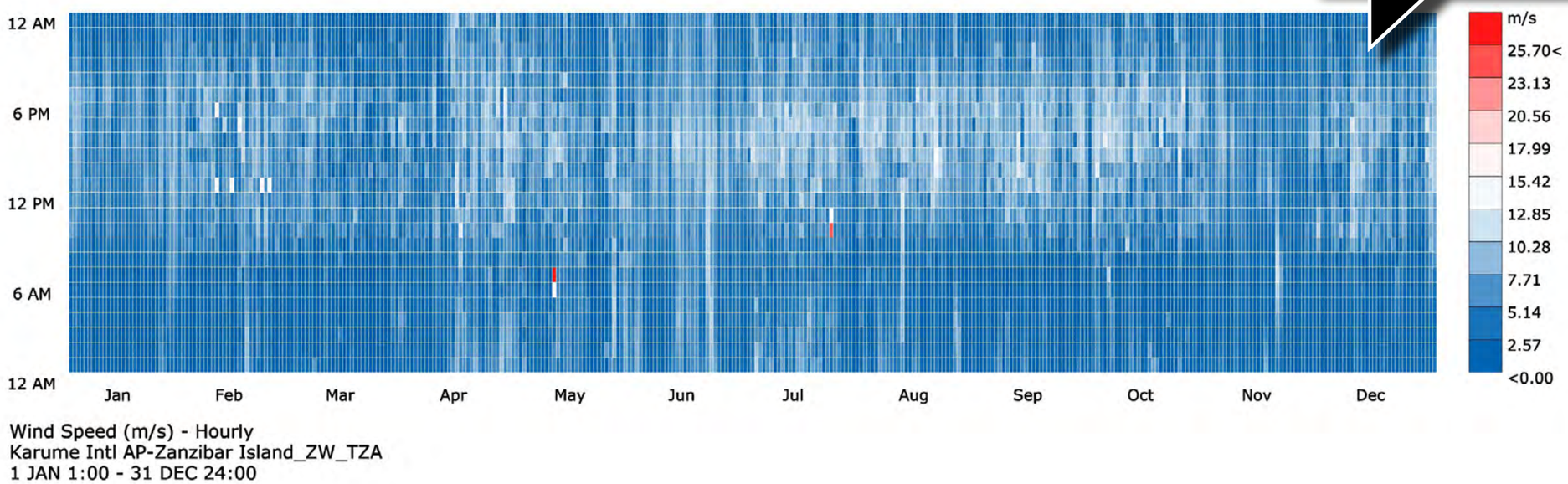


Dry Bulb Temperature (C) - Hourly
Karume Intl AP-Zanzibar Island_ZW_TZA
1 JAN 1:00 - 31 DEC 24:00

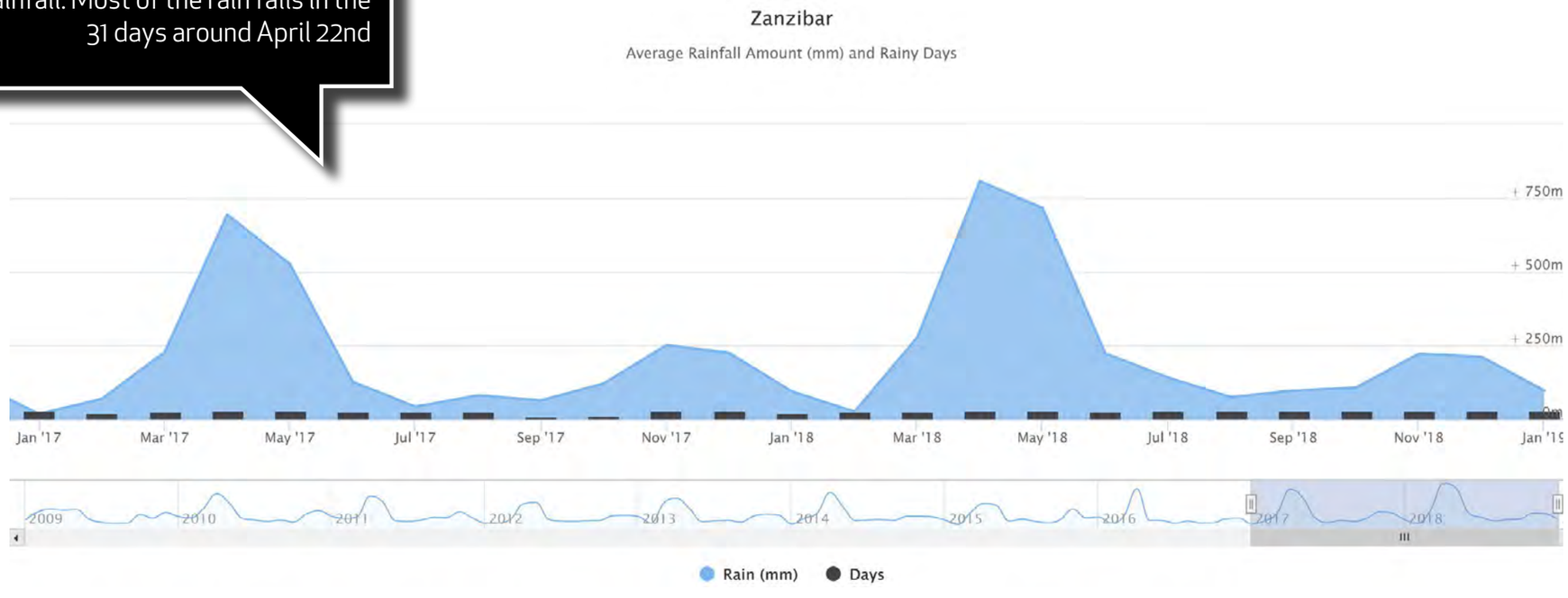
Climatic Chart of Zanzibar, Africa

Wind Speed and Average Rainfall Amount

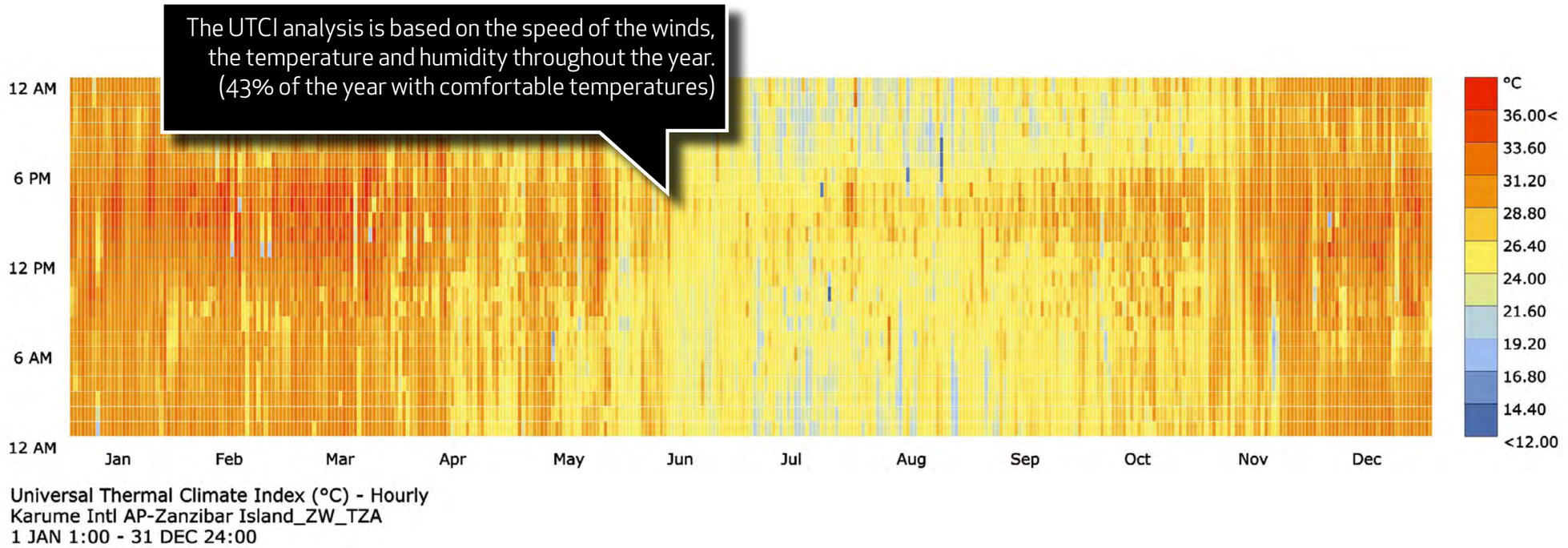
The average hourly wind speed in Zanzibar undergoes significant variations during the course of the single day.



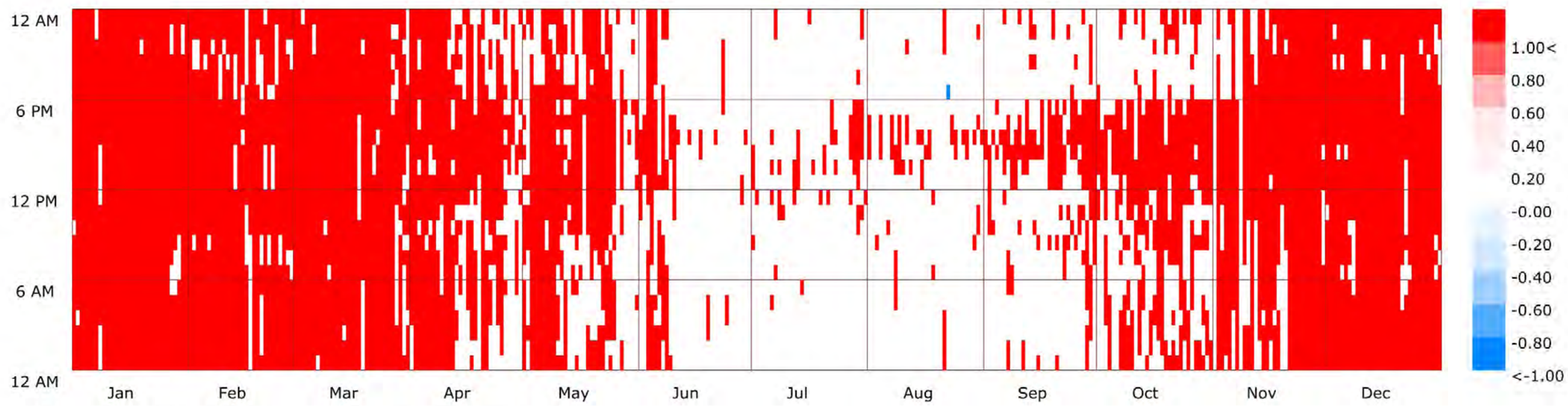
Zanzibar has extreme seasonal variations of monthly rainfall. Most of the rain falls in the 31 days around April 22nd



UTCI (Universal Thermal Climate Index) - Heatstress / comfortable / Coldstress



Universal Thermal Climate Index (°C) - Hourly
Karume Intl AP-Zanzibar Island_ZW_TZA
1 JAN 1:00 - 31 DEC 24:00



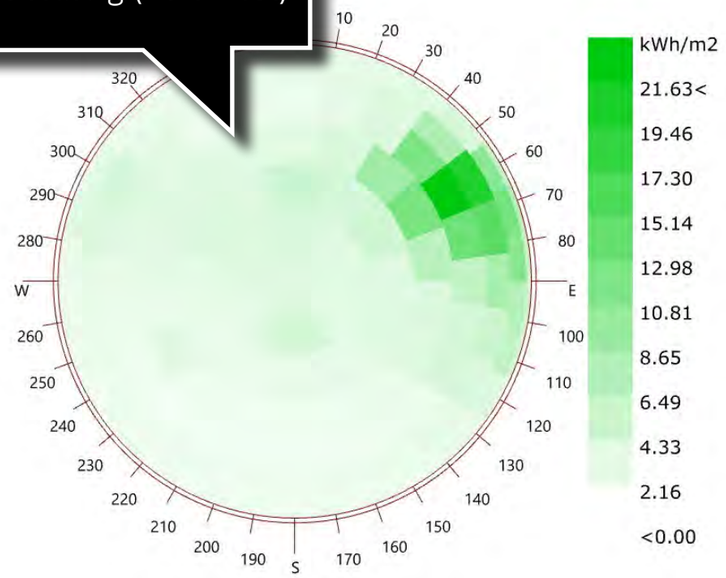
Thermal Stress (-1 = Cold | 0 = Comfort | 1 = Hot) - Hourly
Karume Intl AP-Zanzibar Island_ZW_TZA
1 JAN 1:00 - 31 DEC 24:00

Universal Thermal Climate Index

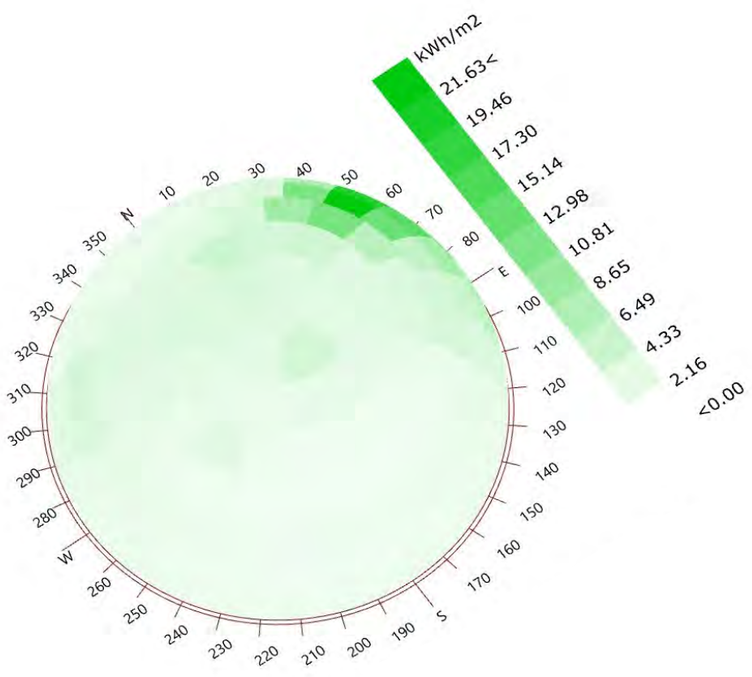
- Heatstress (temperatures above 26 degree celcius / 78,8 Fahrenheit
- No Thermal Stress (temperatures between 9 and 26 degree Celcius / 48,2 and 78,8 Fahrenheit
- Coldstress (temperatures below 9 degree celcius / 48,2 Fahrenheit

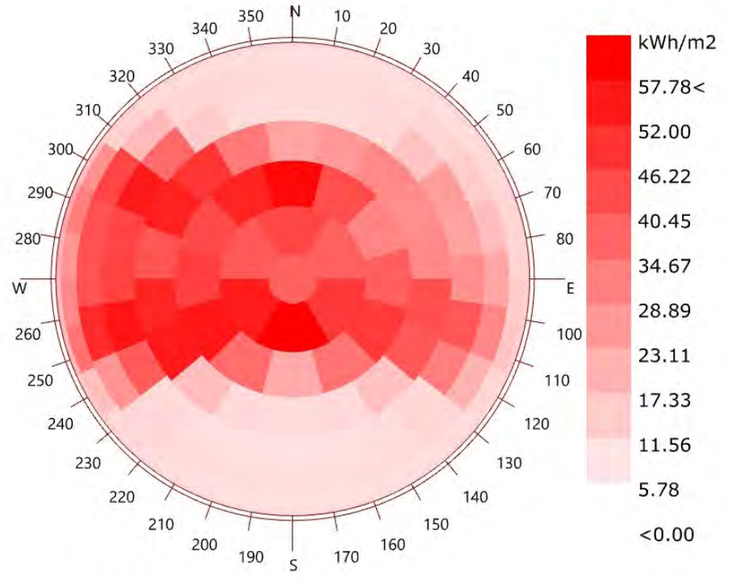
Annual Total Radiation

The dark green part of the solar cap is the part where the radiation brings the greatest annual benefit to the building. (North East)



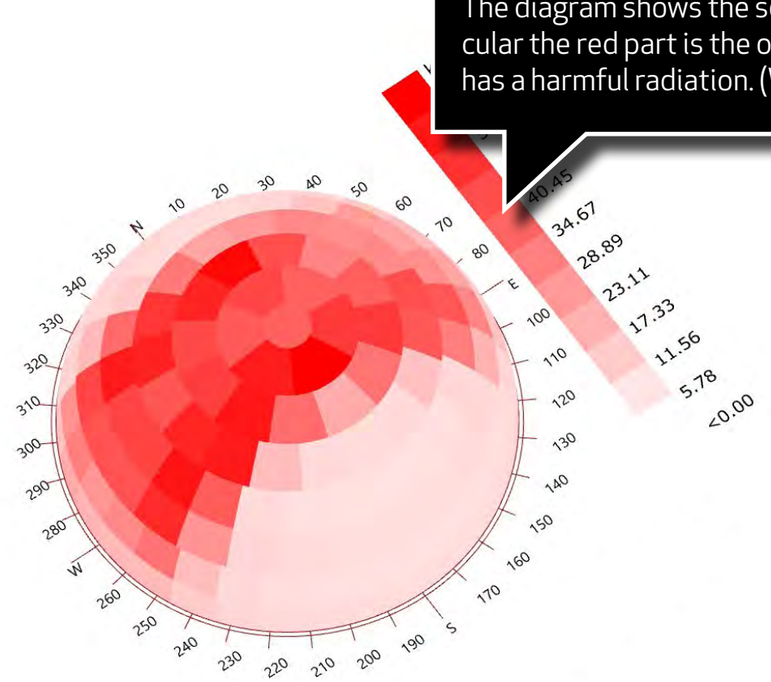
Total Radiation(kWh/m2)
Karume_Intl_AP_Zanzibar_Island_ZW_TZA_2011
1 JAN 6:00 - 31 DEC 6:00





Total Radiation(kWh/m2)
Karume_Intl_AP_Zanzibar_Island_ZW_TZA_2011
1 JAN 7:00 - 31 DEC 17:00

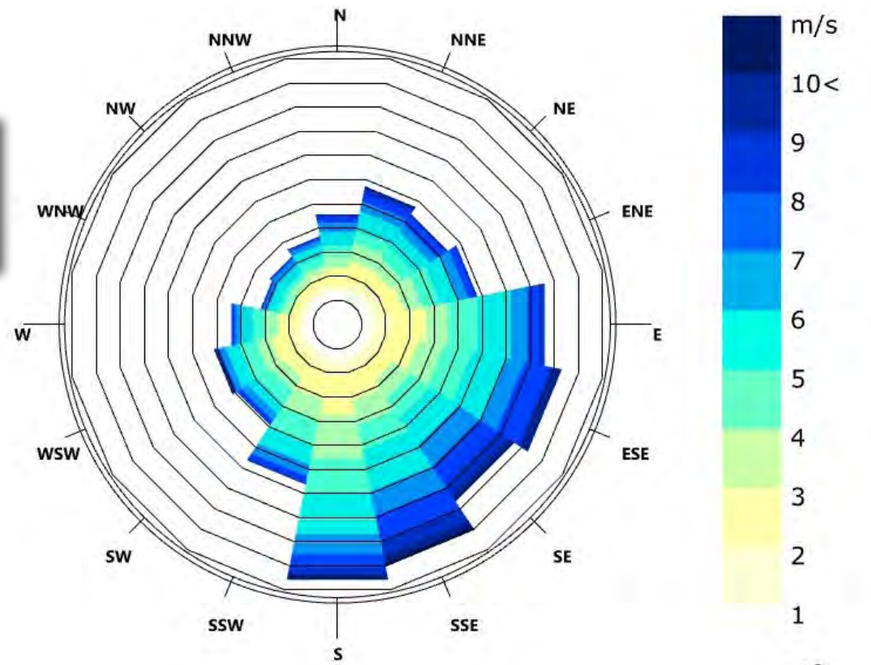
The diagram shows the solar cap, in particular the red part is the one where the sun has a harmful radiation. (West)



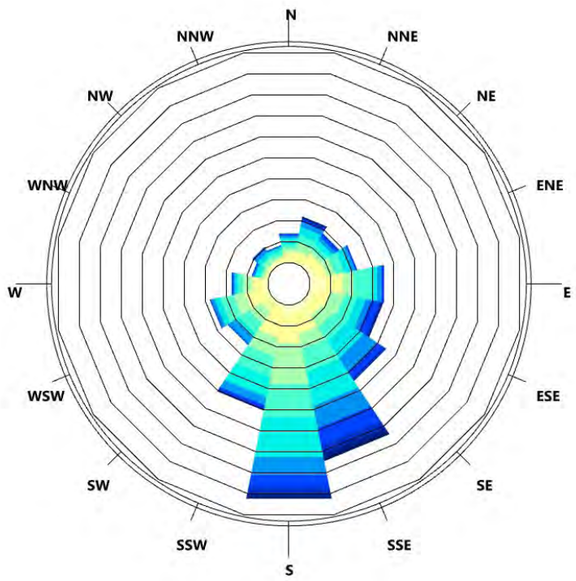
Wind Rose Diagram of Zanzibar, Africa

Winds prevalent from the South, South-East most of the time. Winds from the North-East during the Summer Season

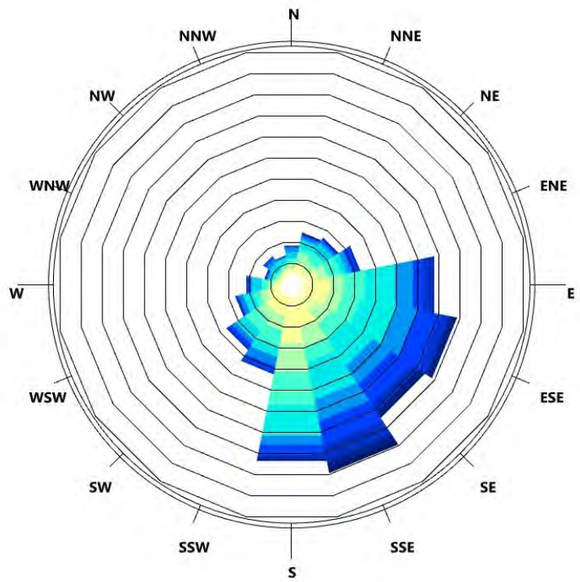
Annual Average



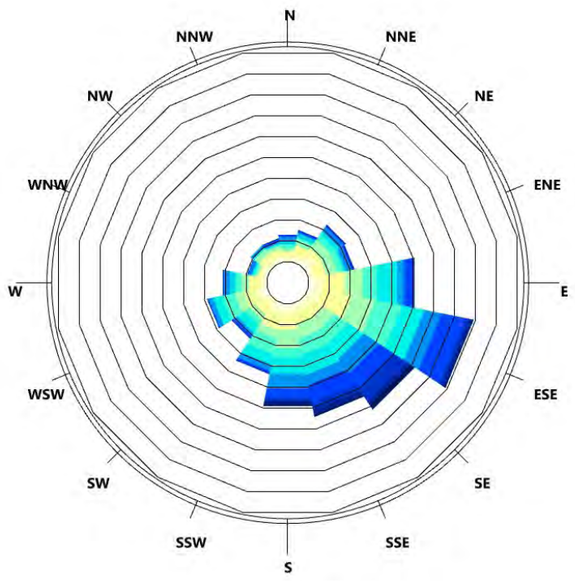
Autumn
(Mar, Apr, May)



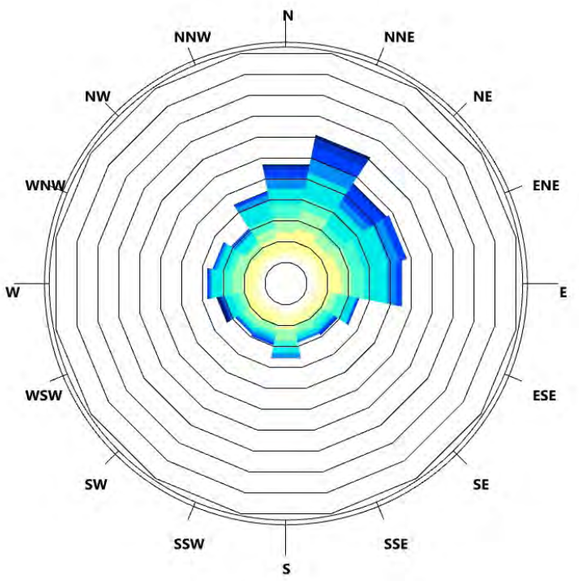
Winter
(Jun, Jul, Aug)



Spring
(Sep, Oct, Nov)

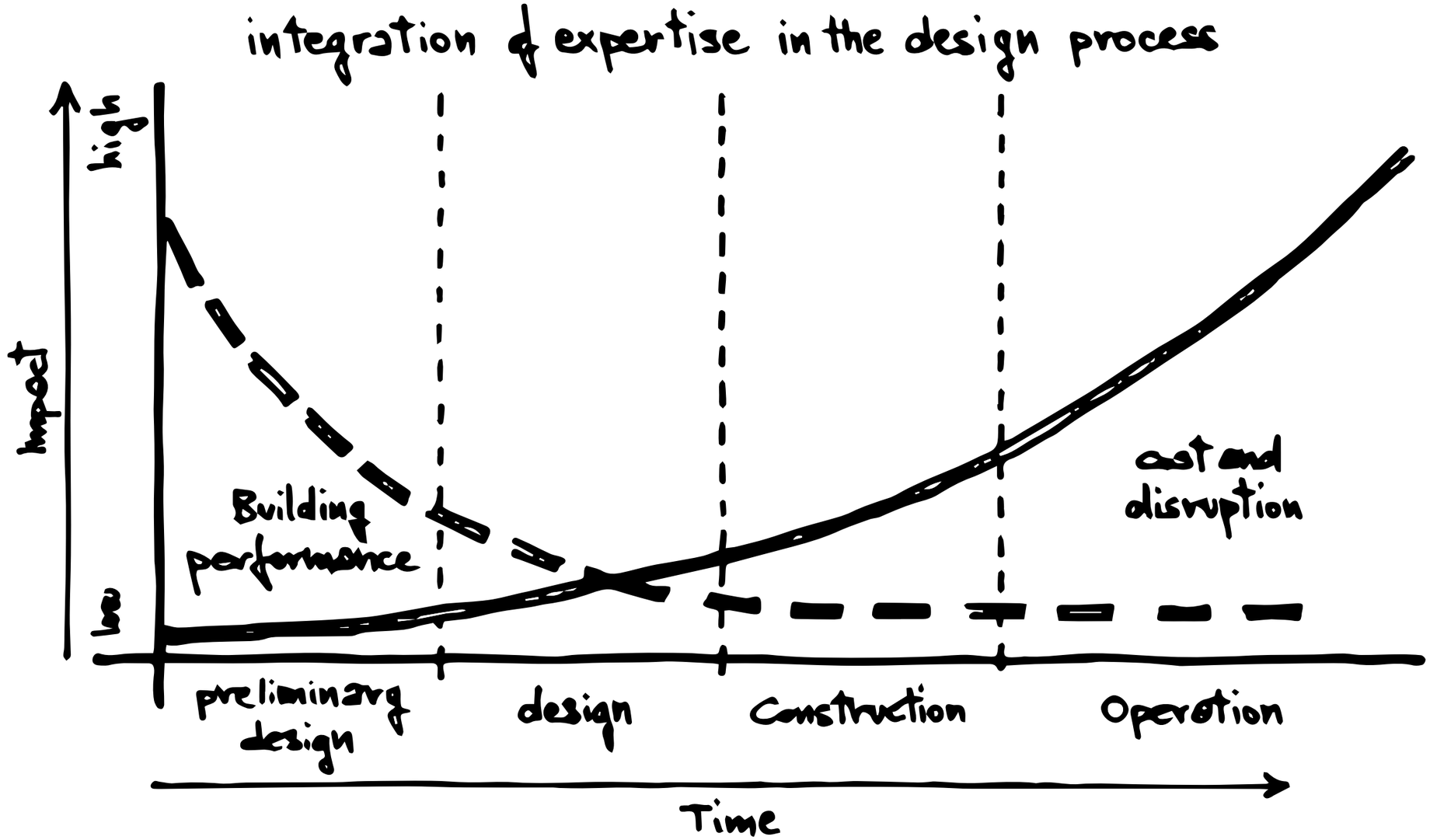


Summer
(Dic, Jan, Feb)



Bioclimatic strategies.

Integrative Design to reduce future construction costs



Psychrometric Chart

Adaptive Comfort

PSYCHROMETRIC CHART
Adaptive Comfort

LOCATION: **Karume Intl AP-Zanzibar Island, ZW, TZA**
Latitude/Longitude: 6.222° South, 39.225° East, **Time Zone from Greenwich** 3
Data Source: ISD-TMYx 638700 WMO Station Number, **Elevation** 16 m

LEGEND

COMFORT INDOORS
64% COMFORTABLE
36% NOT COMFORTABLE

M... ADAPTIVE COMFORT ONLY

PLOT: COMFORT INDOORS

Hourly / Daily Min/Max

All Hours / Select Hours
1 a.m. through 12 a.m.

All Months / Select Months
JAN through DEC
1 Mo... JAN Next
1 Day 1 Next
1 Hour 1 a.m. Next

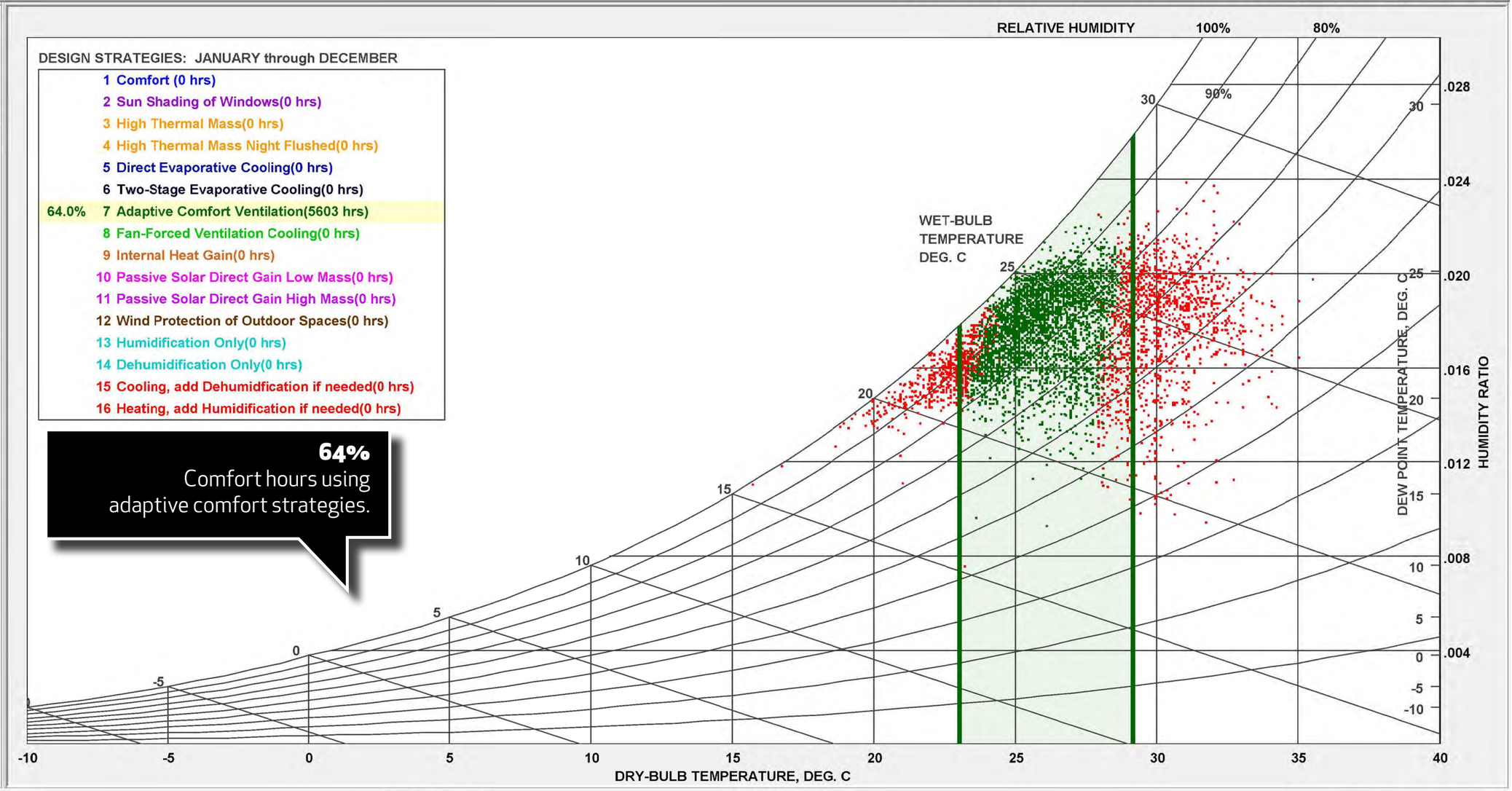
TEMPERATURE RANGE:
-10 to 40 °C / Fit to Data

Display Design Strategies
Show Best set of Design Strateg...

DESIGN STRATEGIES: JANUARY through DECEMBER

1 Comfort (0 hrs)
2 Sun Shading of Windows(0 hrs)
3 High Thermal Mass(0 hrs)
4 High Thermal Mass Night Flushed(0 hrs)
5 Direct Evaporative Cooling(0 hrs)
6 Two-Stage Evaporative Cooling(0 hrs)
64.0% 7 Adaptive Comfort Ventilation(5603 hrs)
8 Fan-Forced Ventilation Cooling(0 hrs)
9 Internal Heat Gain(0 hrs)
10 Passive Solar Direct Gain Low Mass(0 hrs)
11 Passive Solar Direct Gain High Mass(0 hrs)
12 Wind Protection of Outdoor Spaces(0 hrs)
13 Humidification Only(0 hrs)
14 Dehumidification Only(0 hrs)
15 Cooling, add Dehumidfication if needed(0 hrs)
16 Heating, add Humidification if needed(0 hrs)

64%
Comfort hours using adaptive comfort strategies.



Click on Design Strategy to select or deselect.

Back Next

Psychrometric Chart

Adaptive Comfort + California Energy Code

PSYCHROMETRIC CHART
Adaptive Comfort

LOCATION: **Karume Intl AP-Zanzibar Island, ZW, TZA**
Latitude/Longitude: 6.222° South, 39.225° East, **Time Zone from Greenwich** 3
Data Source: ISD-TMYx 638700 WMO Station Number, **Elevation** 16 m

LEGEND

COMFORT INDOORS
94% COMFORTABLE
6% NOT COMFORTABLE

M... PLUS California Energy Code

PLOT: COMFORT INDOORS

Hourly / DailyMin/Max

All Hours / Select Hours
1 a.m. through 12 a.m.

All Months / Select Months
JAN through DEC
1 Mo... JAN Next
1 Day 1 Next
1 Hour 1 a.m. Next

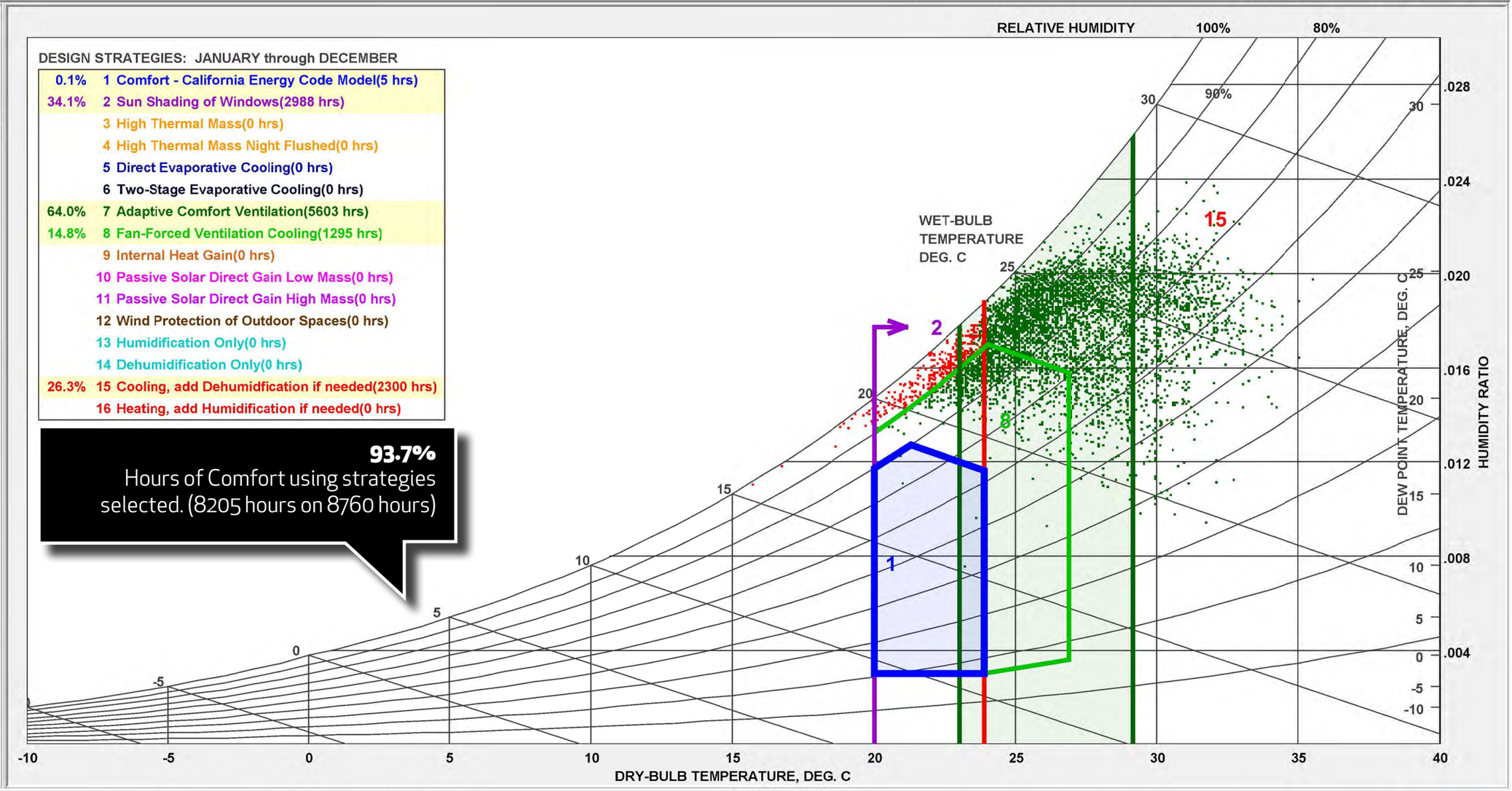
TEMPERATURERANGE:
-10 to 40 °C / Fit to Data

Display Design Strategies
Show Best set of Design Strateg...

DESIGN STRATEGIES: JANUARY through DECEMBER

0.1%	1 Comfort - California Energy Code Model(5 hrs)
34.1%	2 Sun Shading of Windows(2988 hrs)
	3 High Thermal Mass(0 hrs)
	4 High Thermal Mass Night Flushed(0 hrs)
	5 Direct Evaporative Cooling(0 hrs)
	6 Two-Stage Evaporative Cooling(0 hrs)
64.0%	7 Adaptive Comfort Ventilation(5603 hrs)
14.8%	8 Fan-Forced Ventilation Cooling(1295 hrs)
	9 Internal Heat Gain(0 hrs)
	10 Passive Solar Direct Gain Low Mass(0 hrs)
	11 Passive Solar Direct Gain High Mass(0 hrs)
	12 Wind Protection of Outdoor Spaces(0 hrs)
	13 Humidification Only(0 hrs)
	14 Dehumidification Only(0 hrs)
26.3%	15 Cooling, add Dehumidfication if needed(2300 hrs)
	16 Heating, add Humidification if needed(0 hrs)

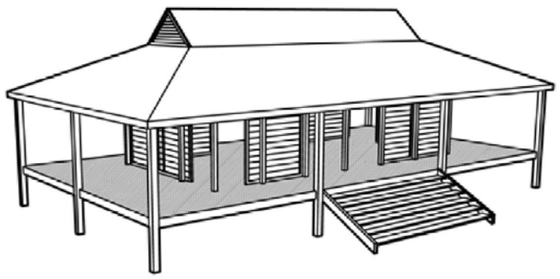
93.7%
Hours of Comfort using strategies selected. (8205 hours on 8760 hours)



Click on Design Strategy to select or deselect.

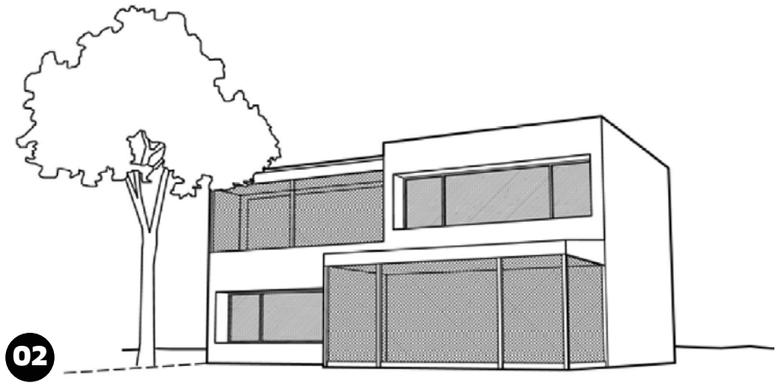
Back Next

Bioclimatic strategies



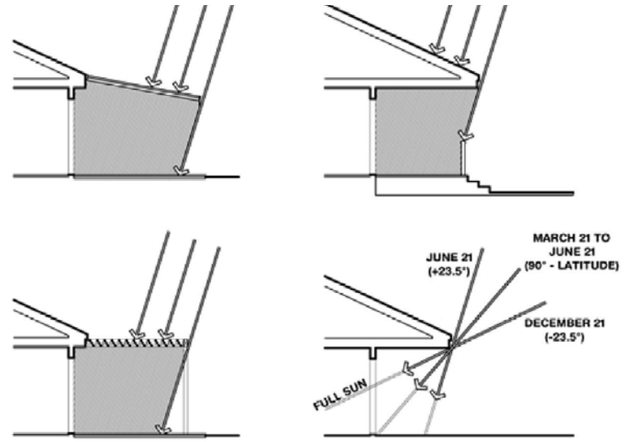
01

Traditional passive homes in hot humid climates used light weight construction with openable walls and shaded outdoor porches, raised above ground



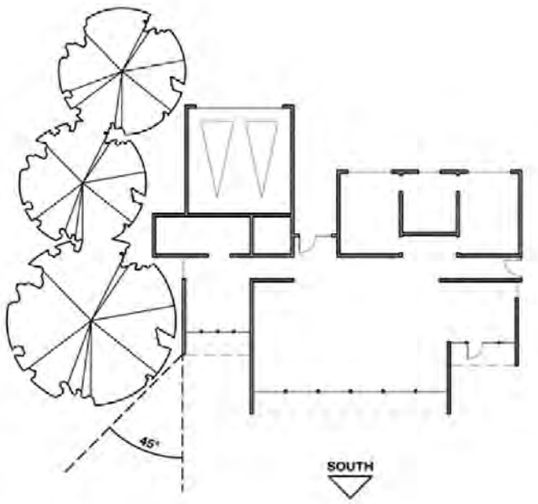
02

Screened porches and patios can provide passive comfort cooling by ventilation in warm weather and can prevent insect problems



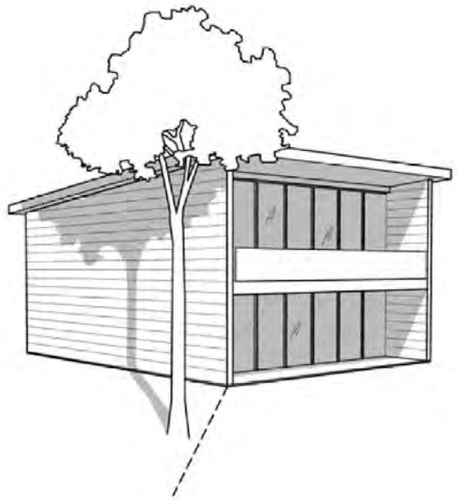
03

Window overhangs (designed for this latitude) or operable sunshades (awnings that extend in summer) can reduce or eliminate air conditioning



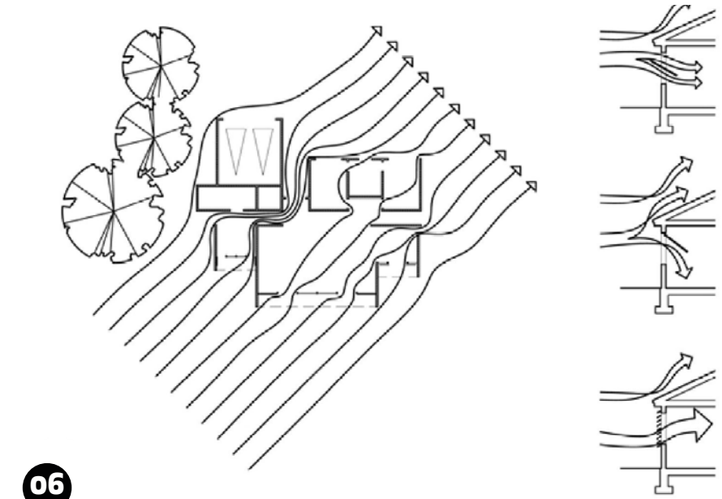
04

Use plant materials (bushes, trees, ivy-covered walls) especially on the west to minimize heat gain (if summer rains support native plant growth)



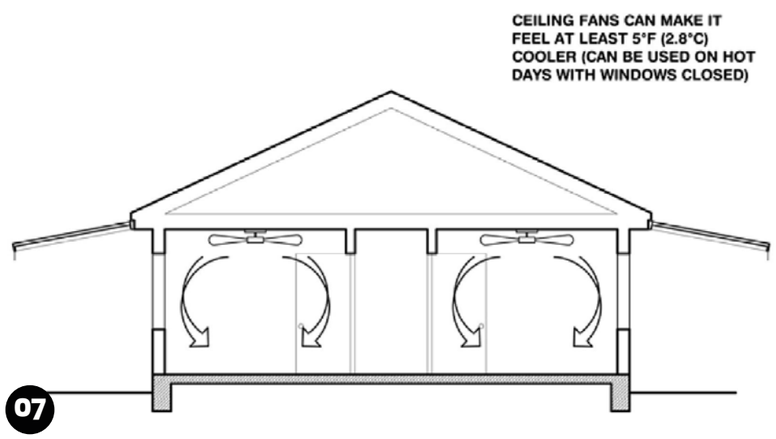
05

Minimize or eliminate west facing glazing to reduce summer and fall afternoon heat gain



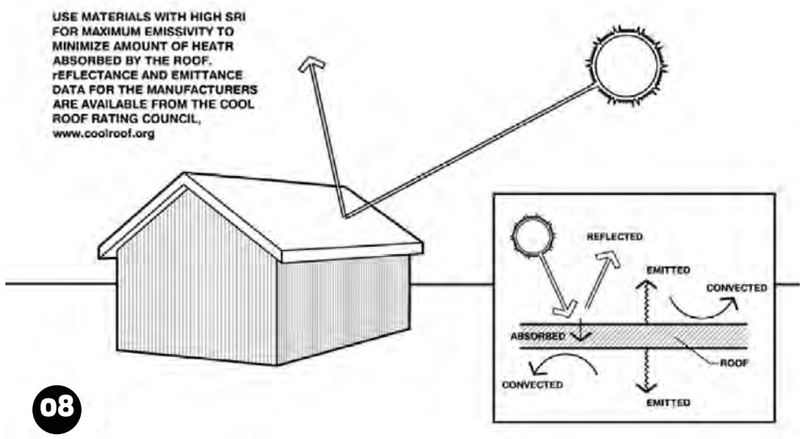
06

To facilitate cross ventilation, locate door and window openings on opposite sides of building with larger openings facing up-wind if possible



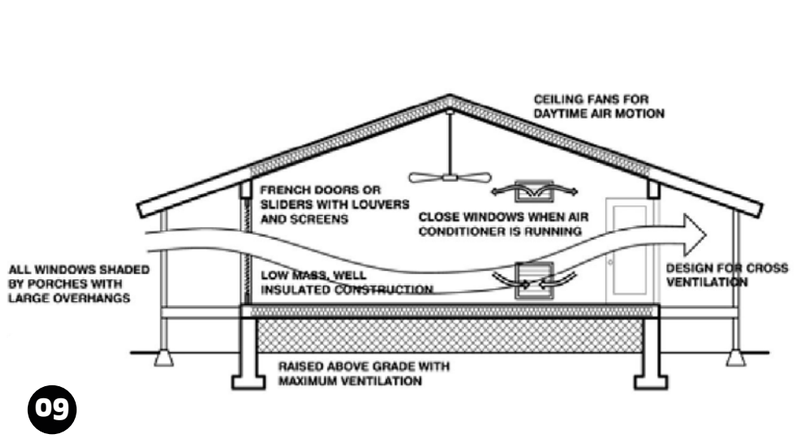
07

On hot days ceiling fans or indoor air motion can make it seem cooler by 5 degrees F (2.8C) or more, thus less air conditioning is needed



08

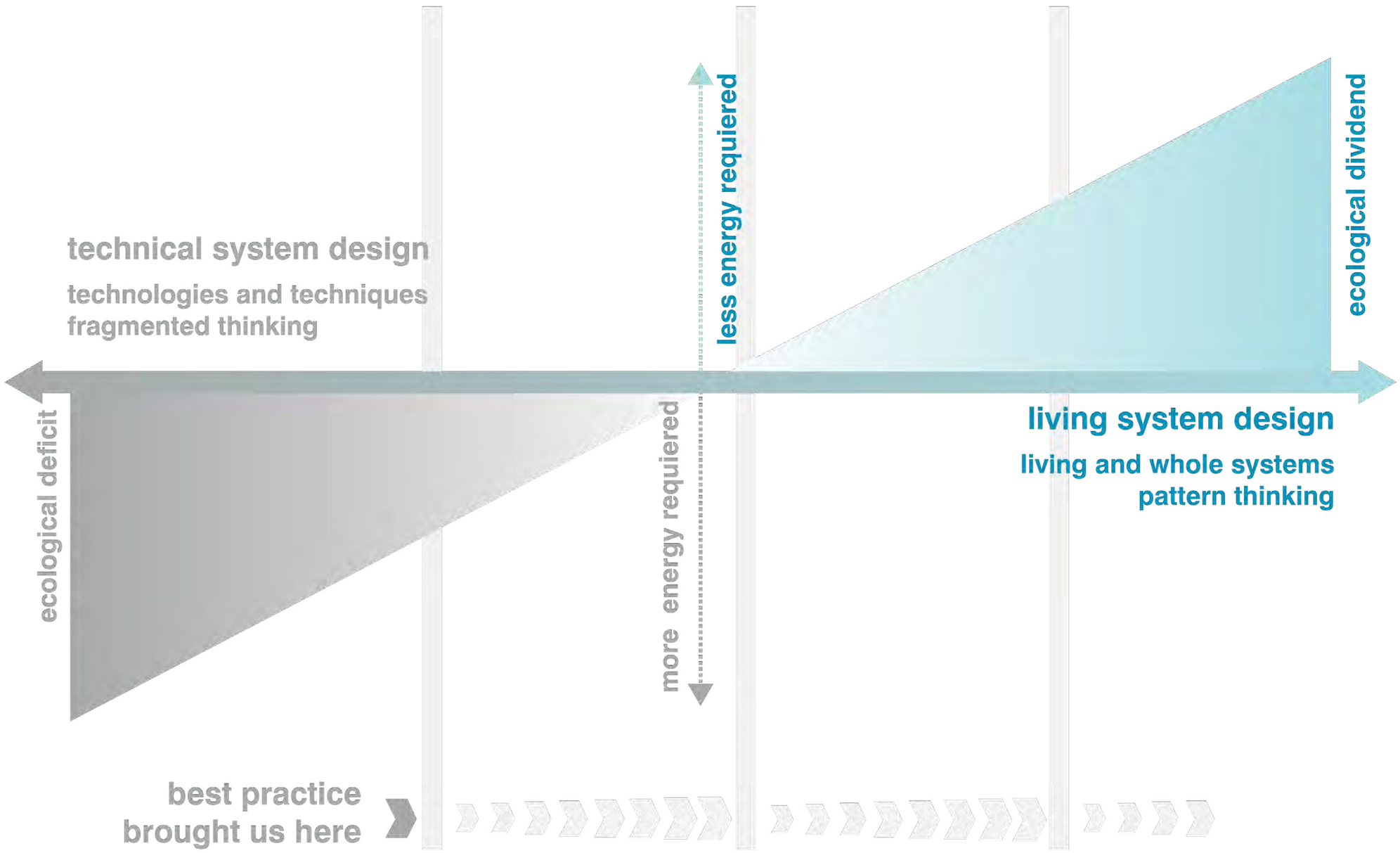
Use light colored building materials and cool roofs (with high emissivity) to minimize conducted heat gain



09

In this climate air conditioning will always be needed, but can be greatly reduced if building design minimizes overheating

Restorative design diagram



EFFICIENCY

Energy
Daylight
Natural Ventilation
Renewables

RESILIENCE

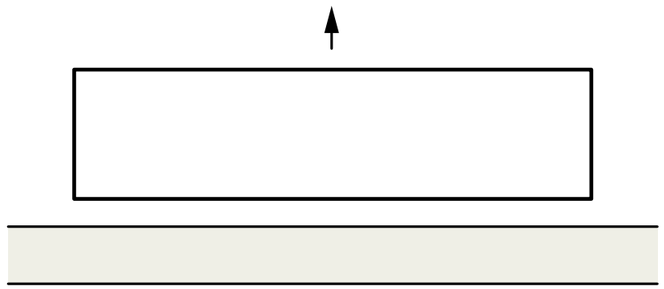
Response to heavy rains
Flooding emergency control

LIFE QUALITY

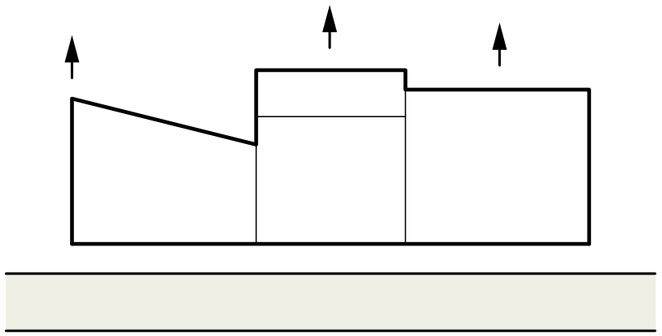
Relax and social spaces
Green spaces
Privacy
Outdoor Comfort

Concept Itaset Shop.

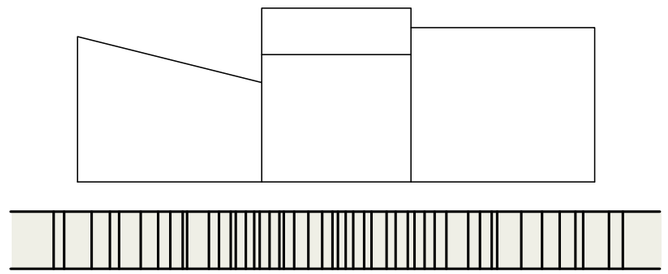
Concept Design



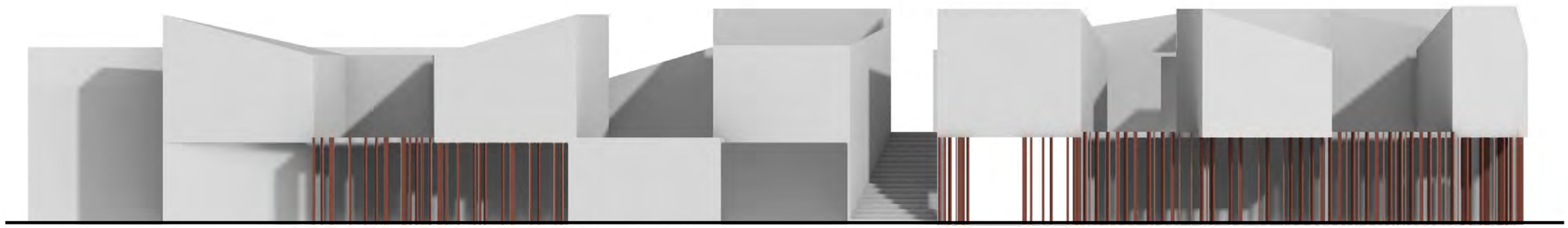
01
Elevation as a new
urban landmark



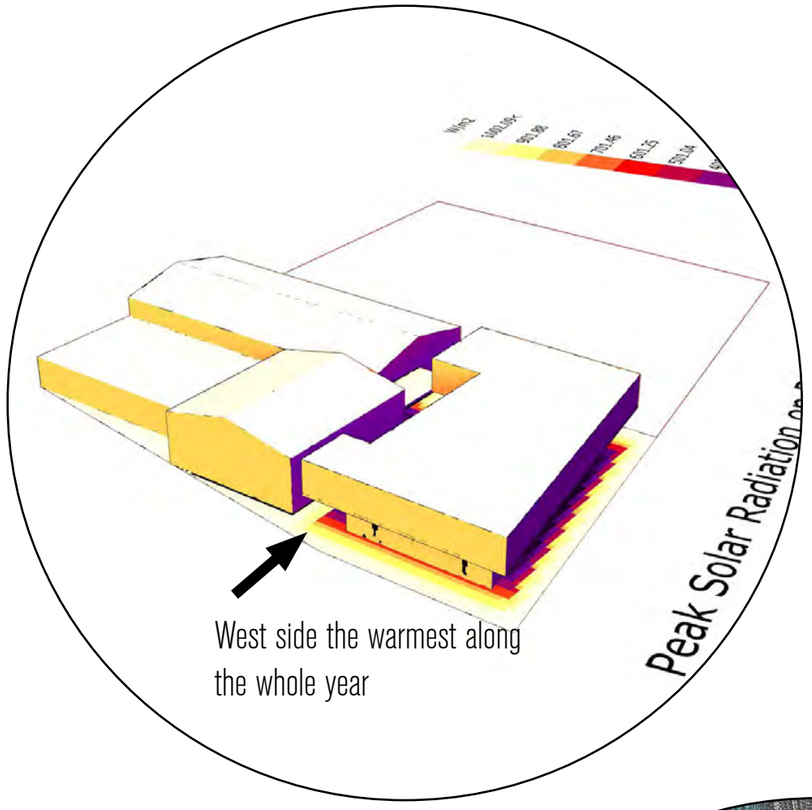
02
Edges as a symbol
of a new citadel
adaptive to climatic conditions



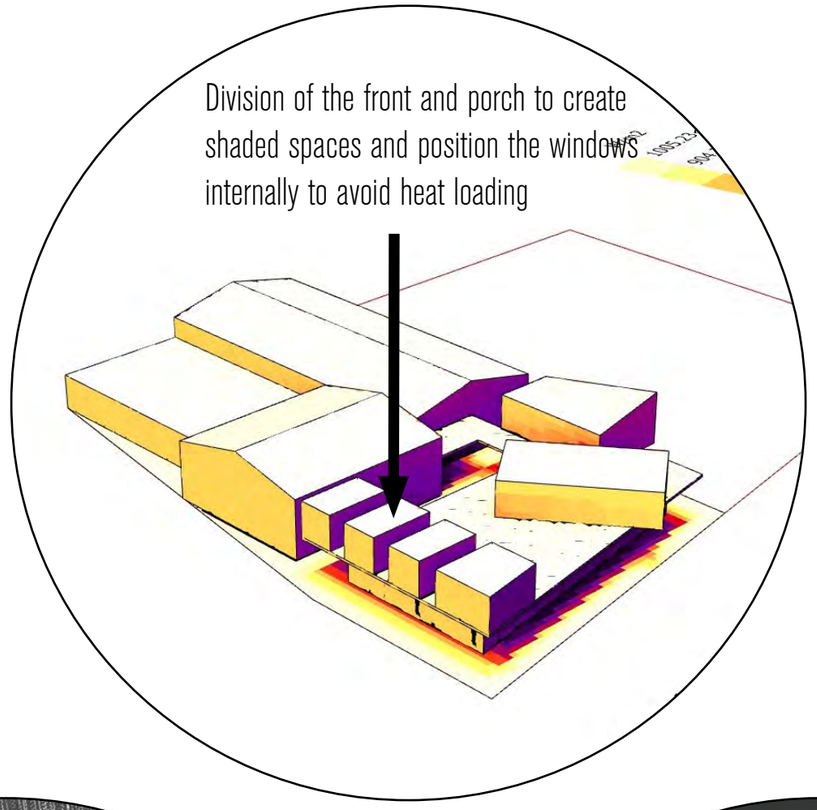
03
Contemporary reinterpretaion
of the portico as protection
from sun and rain



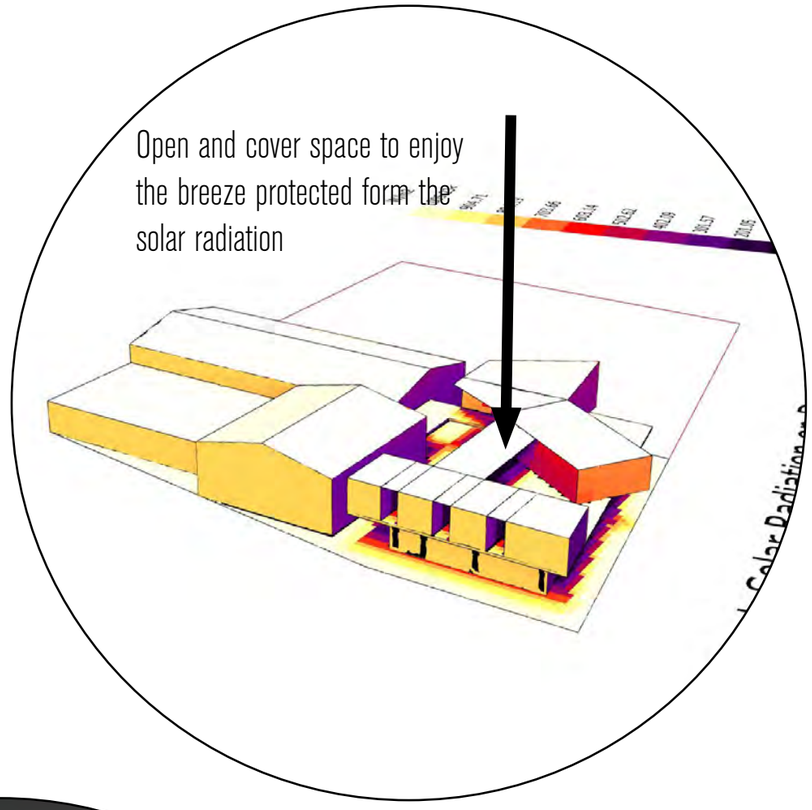
Evoultion of the bioclimatic studies



West side the warmest along the whole year

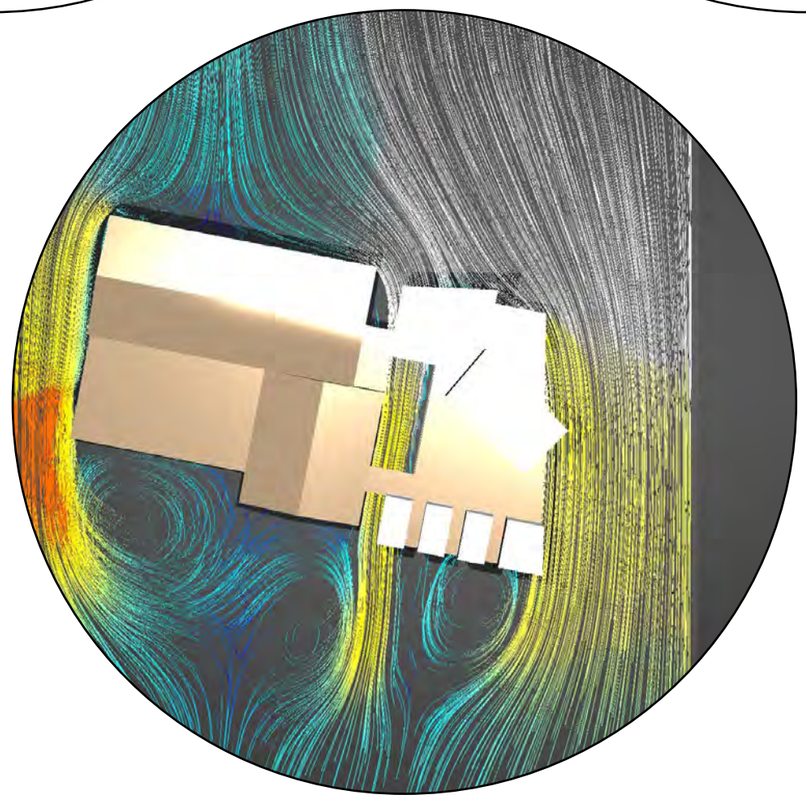


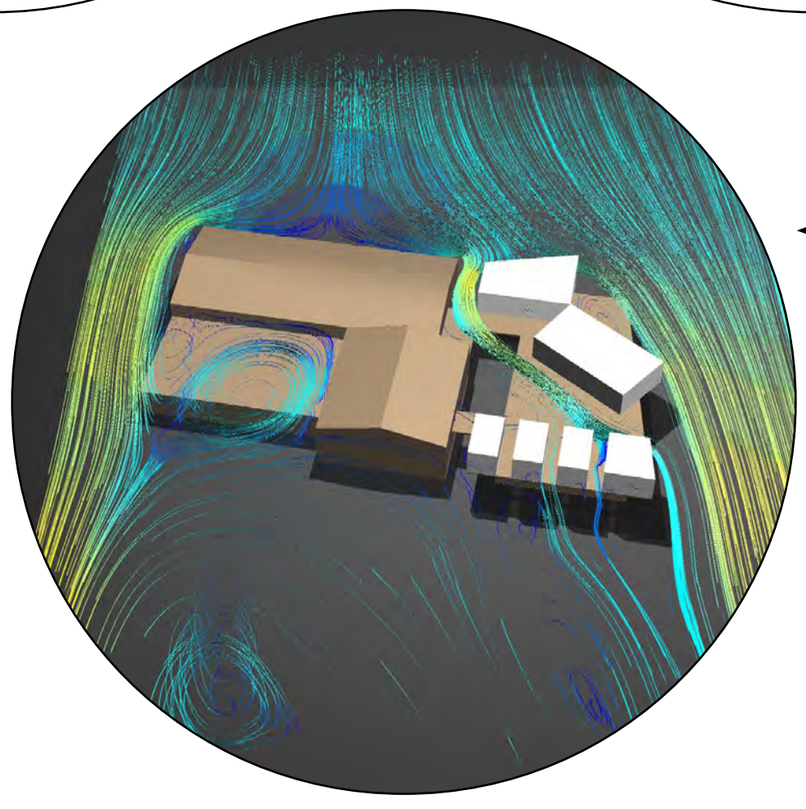
Division of the front and porch to create shaded spaces and position the windows internally to avoid heat loading



Open and cover space to enjoy the breeze protected form the solar radiation

Design of a large tunnel to facilitate the flow of winds from the East and North-East

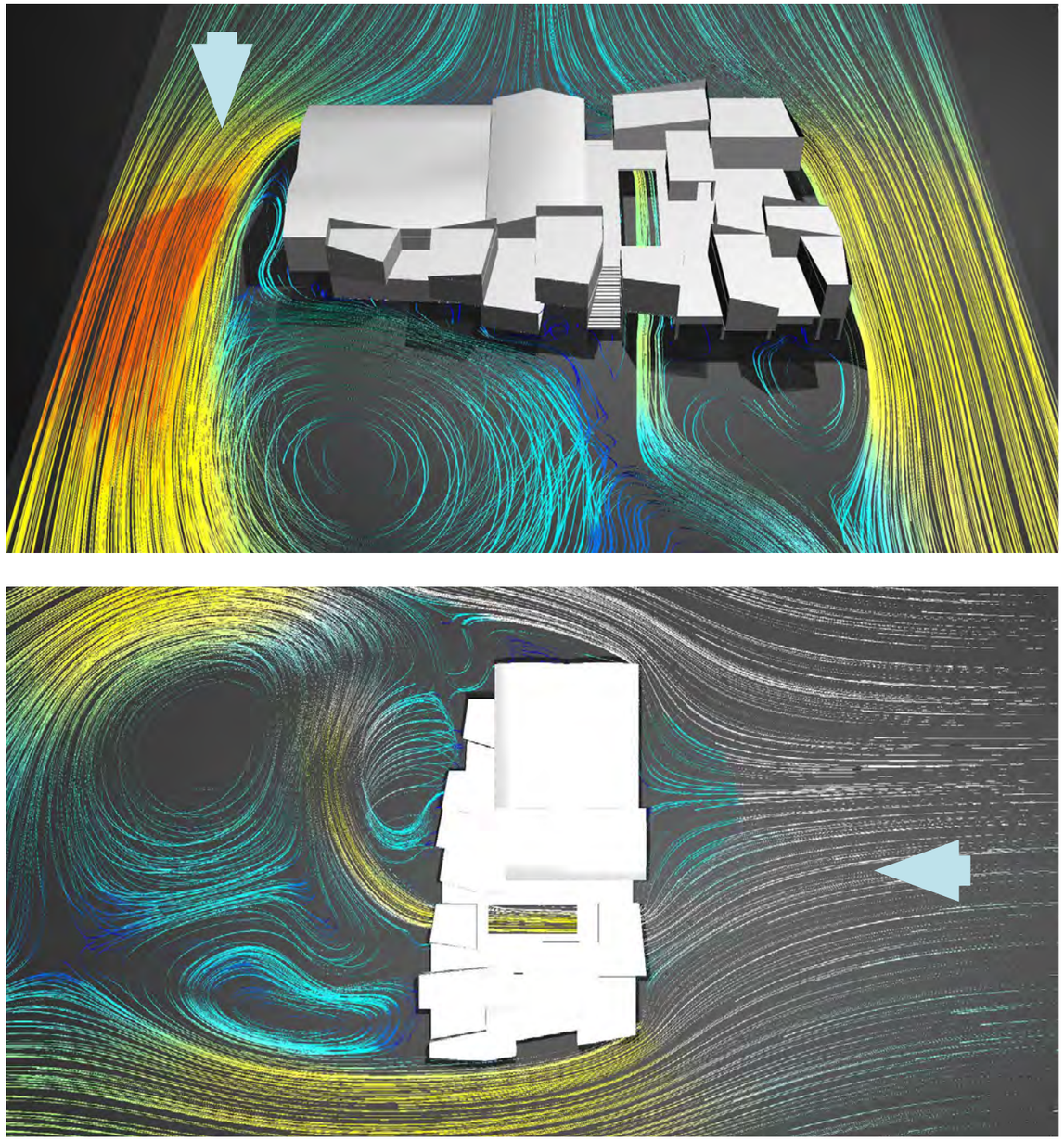




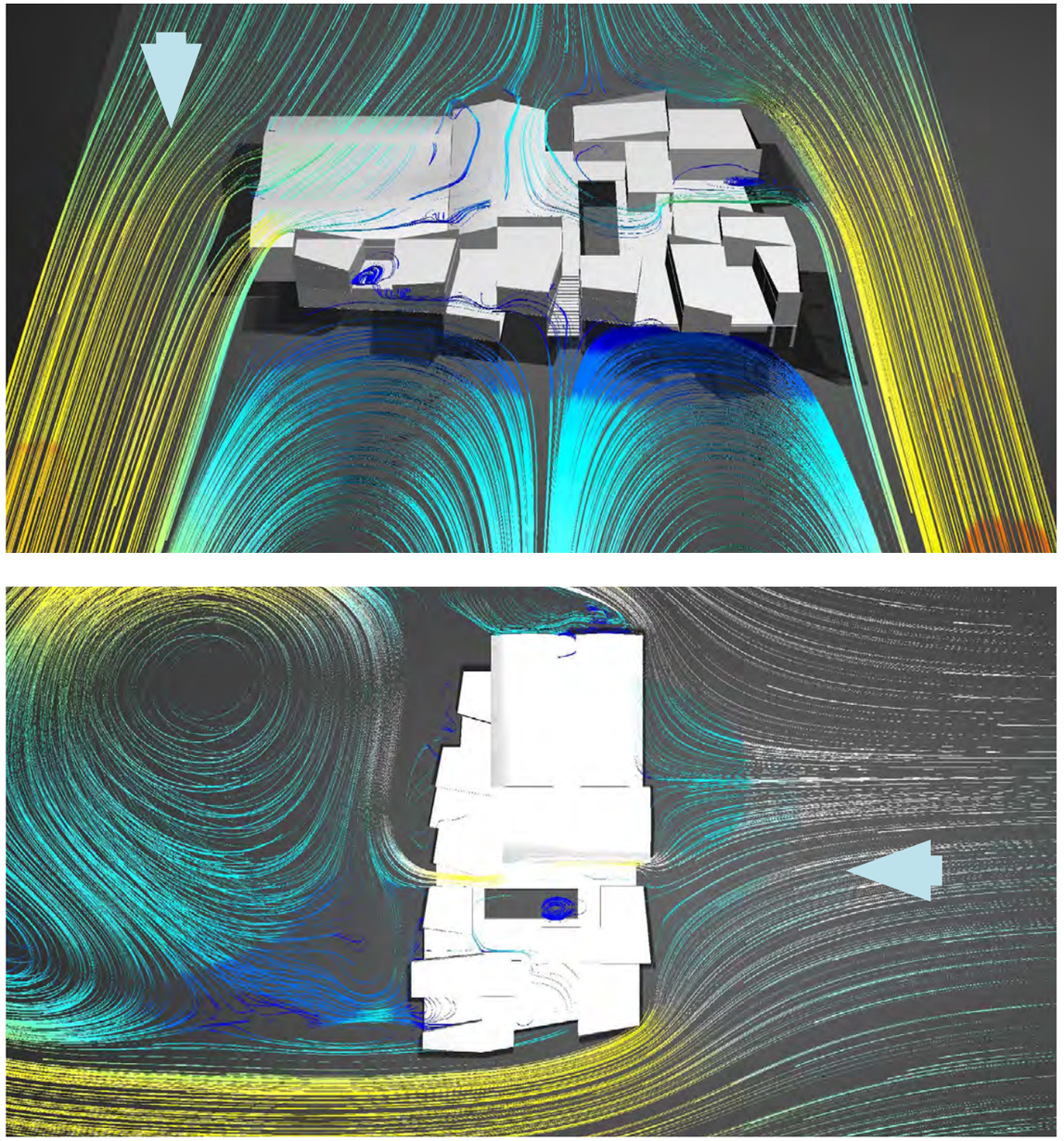
The opening of the West front facilitates the passage of the breeze coming from the sea, East and North-East. This creates a pleasant resting space on the first floor.

CFD studies of the volumetric mass

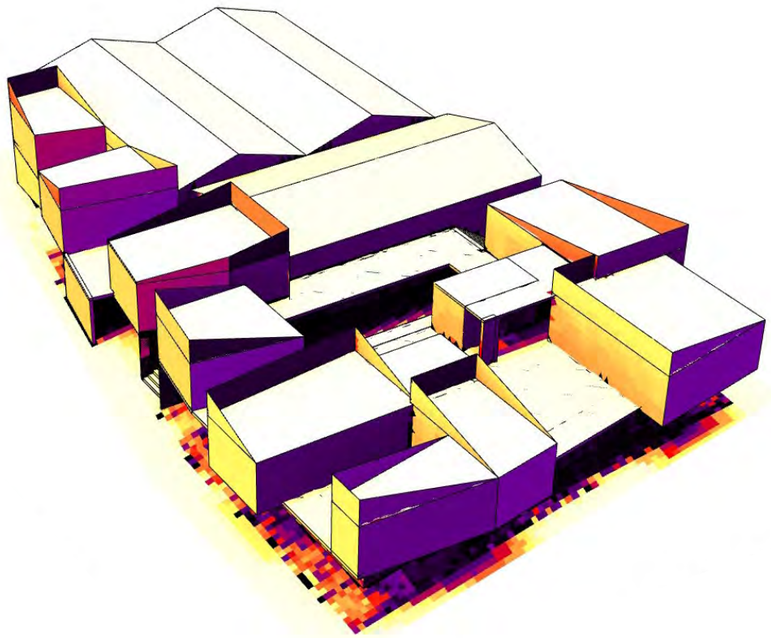
Ground Floor
Gallery natural ventilation



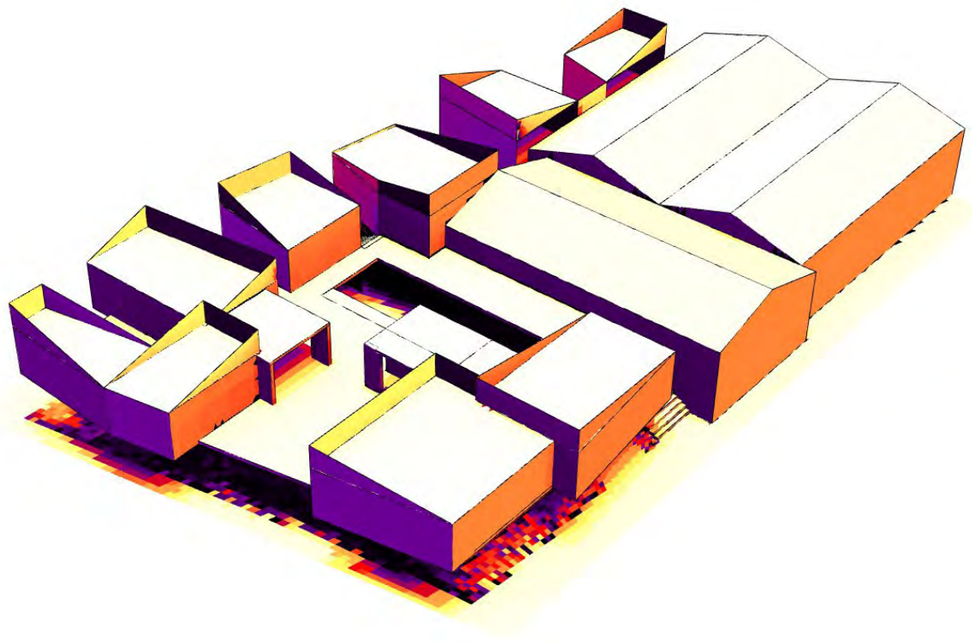
Firt Floor
Ventilation in open space and beneficial turbulence between volumes



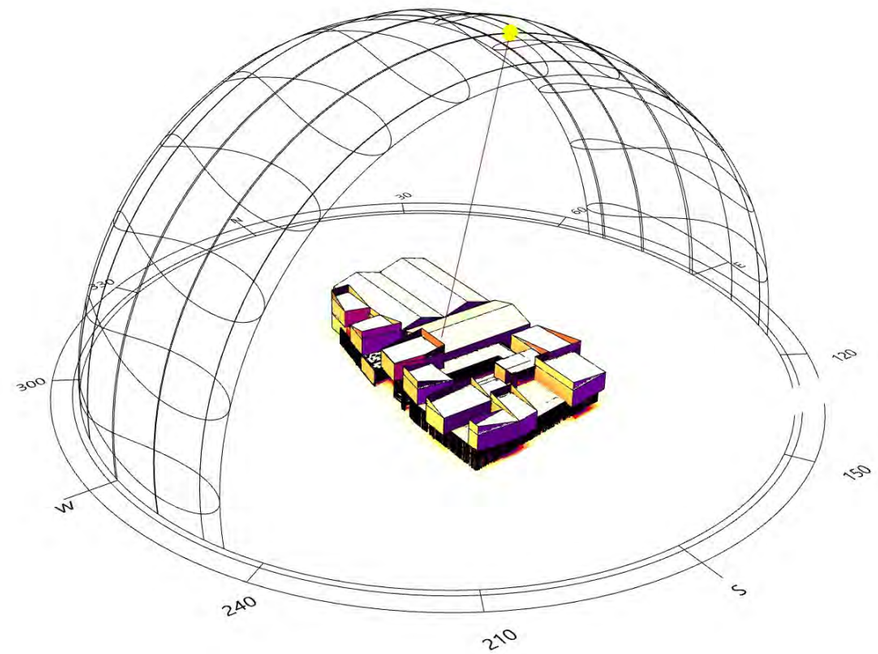
Study of solar radiation on the day of maximum heat



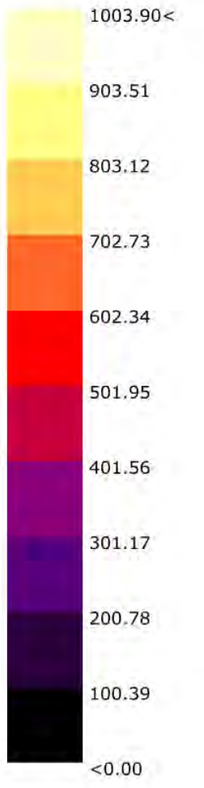
West Side - Solar Radiation Analysis



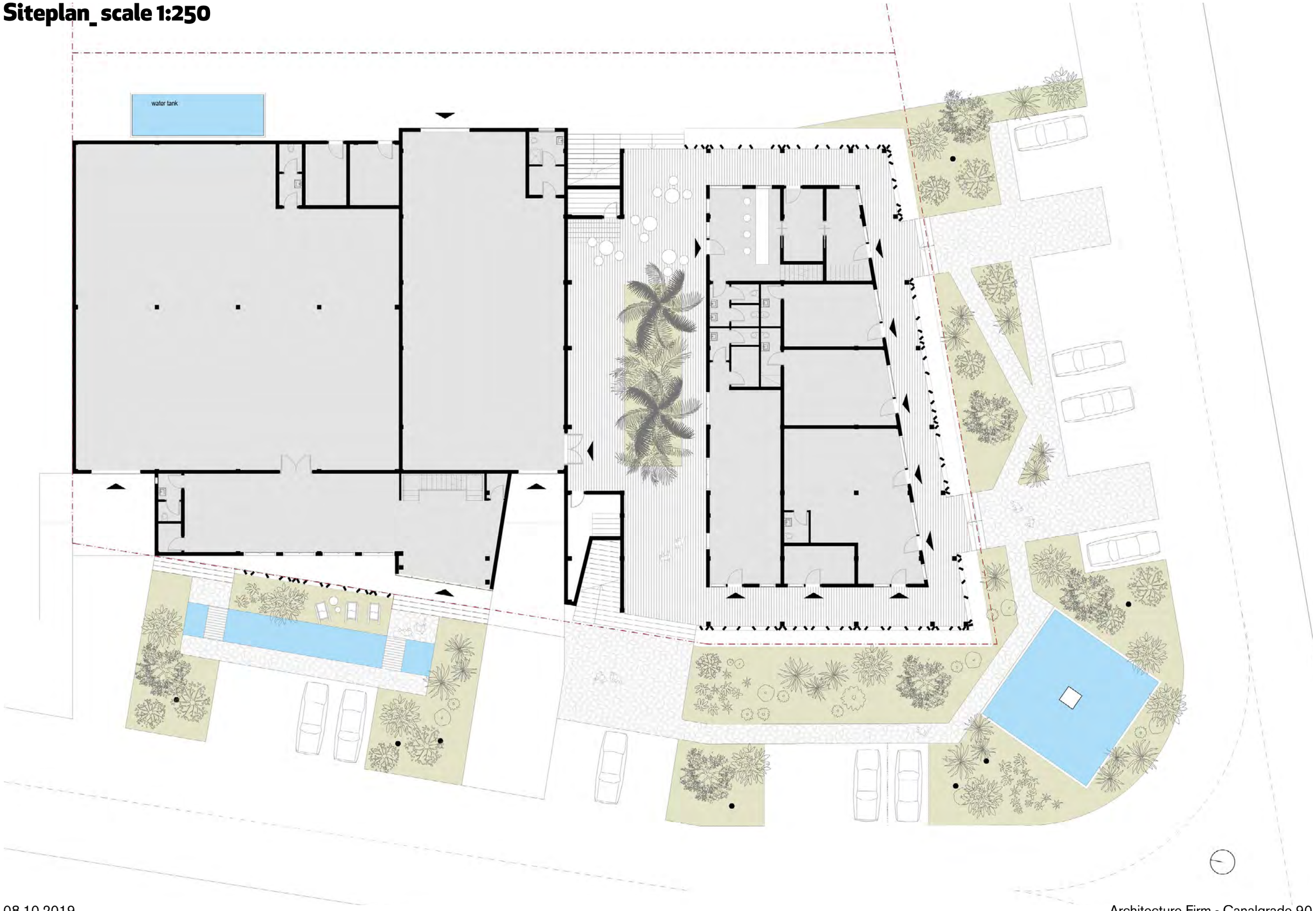
East Side - Solar Radiation Analysis



W/m2



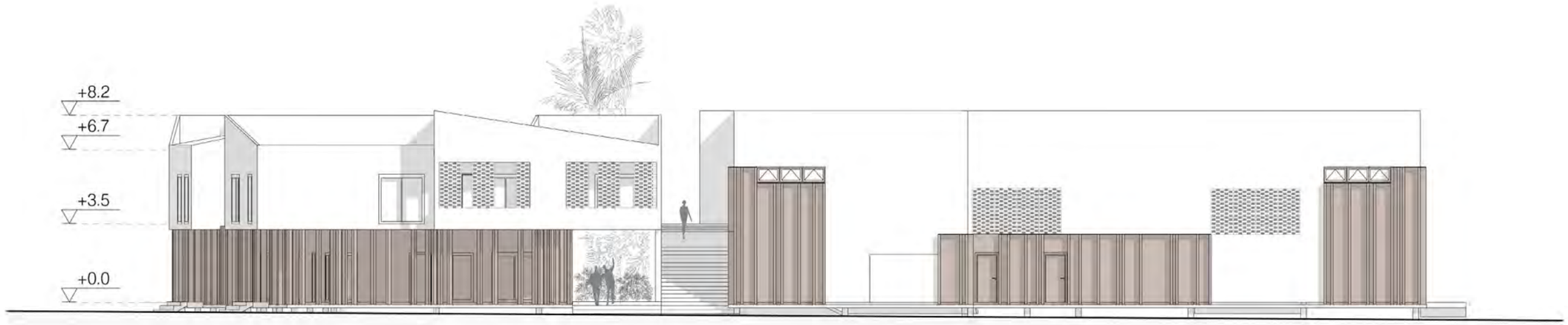
Siteplan_ scale 1:250



Ground Floor_scale 1:200

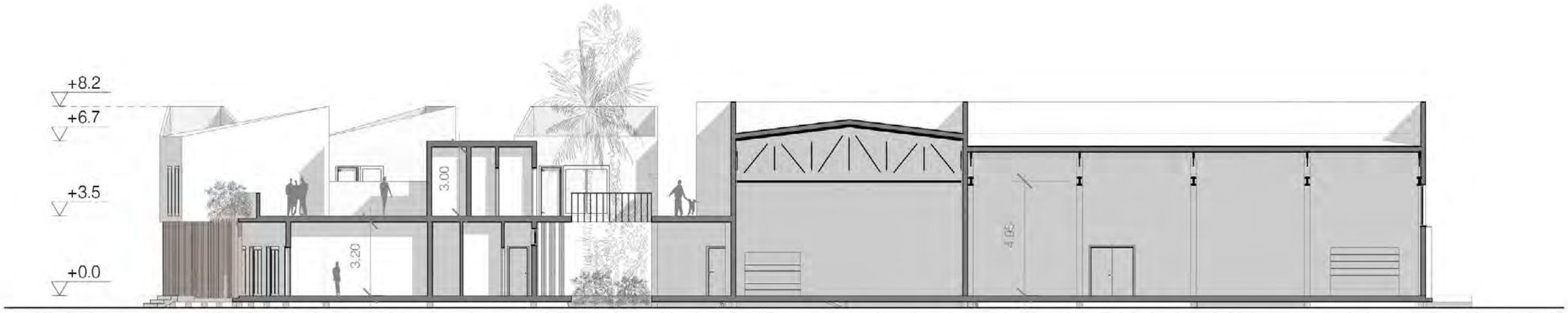
First Floor_scale 1:200

Elevation and Section_scale 1:200



1 East Elevation

1 : 200



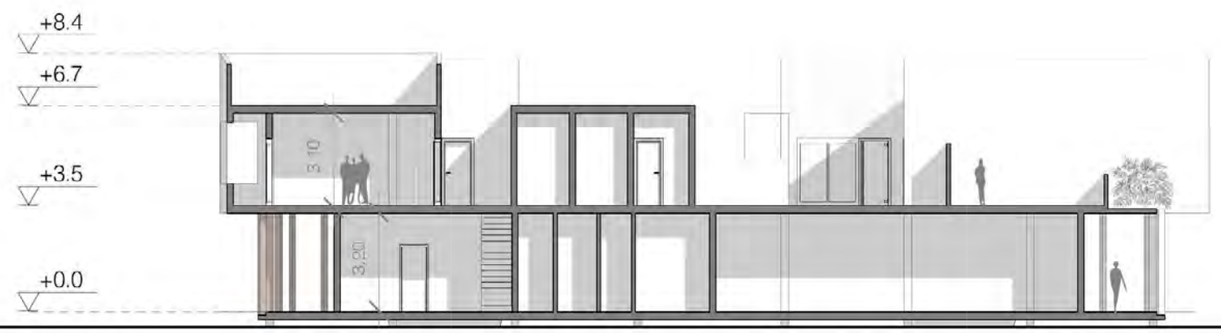
2 Lenghtwise Section AA

1 : 200

Elevation and Section_scale 1:200

1 Elevation West

1 : 200



2 Cross Section BB

1 : 200

Elevation and Section_scale 1:200

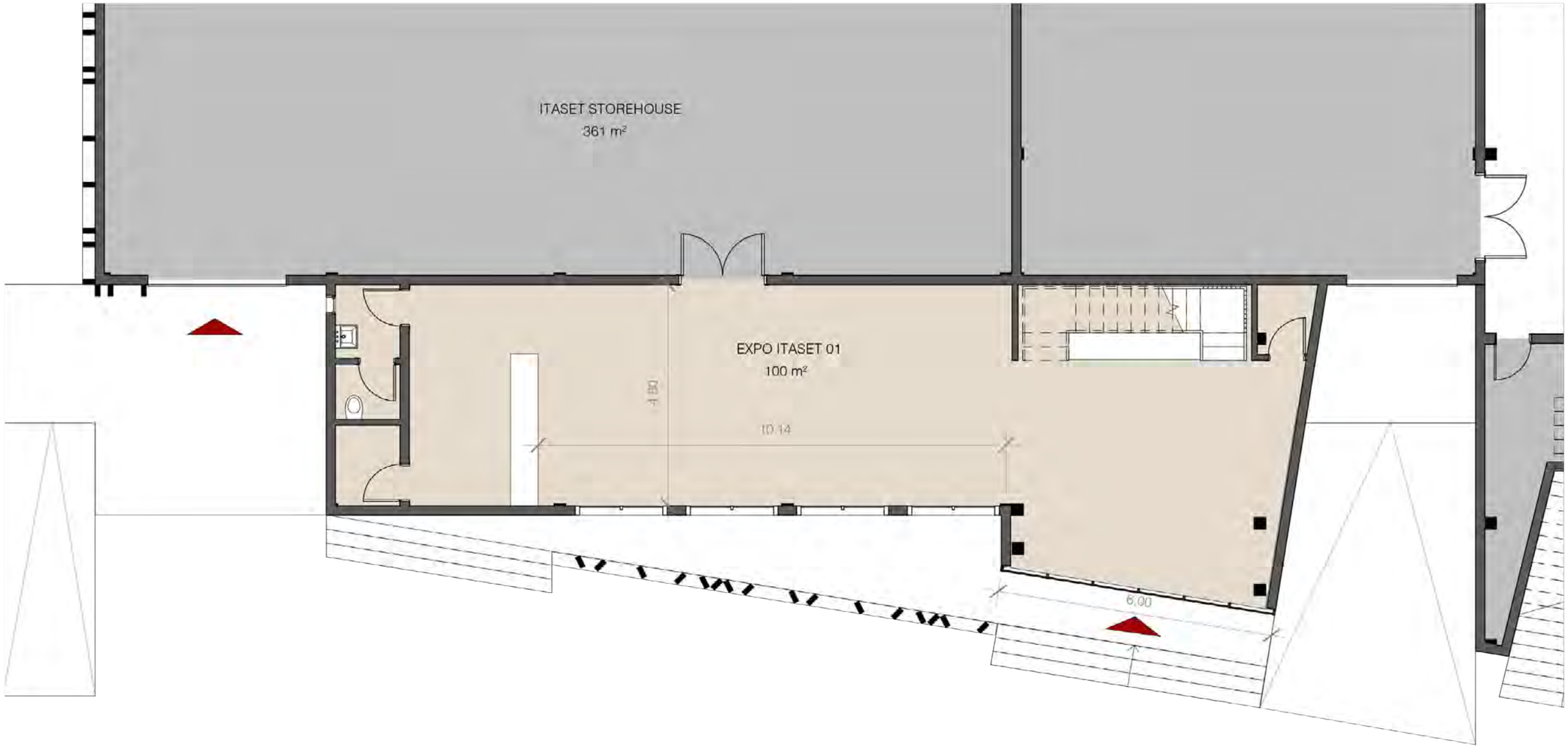
1 Elevation South

1 : 200

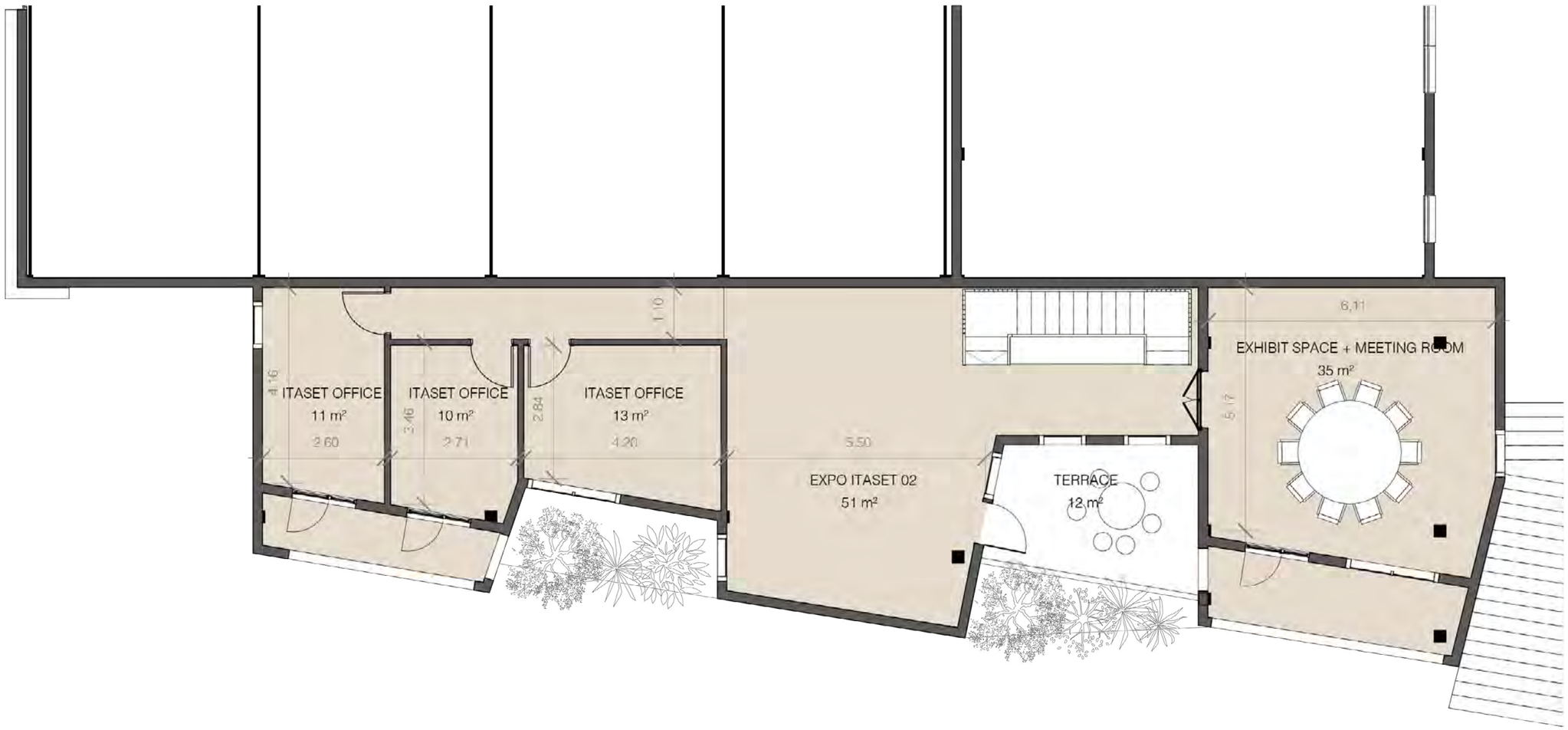
2 Cross Section CC

1 : 200

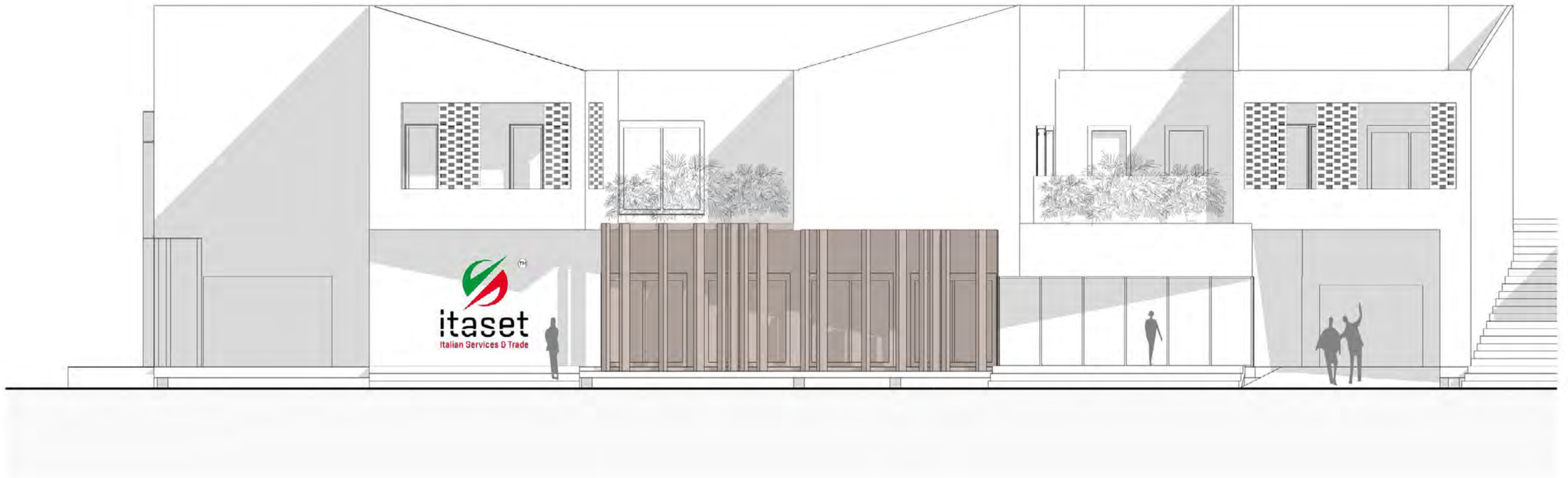
Focus Itaset Ground Floor_scale 1:100



Focus Itaset First Floor_scale 1:100



Focus Itaset Elevation_scale 1:100




Itaset