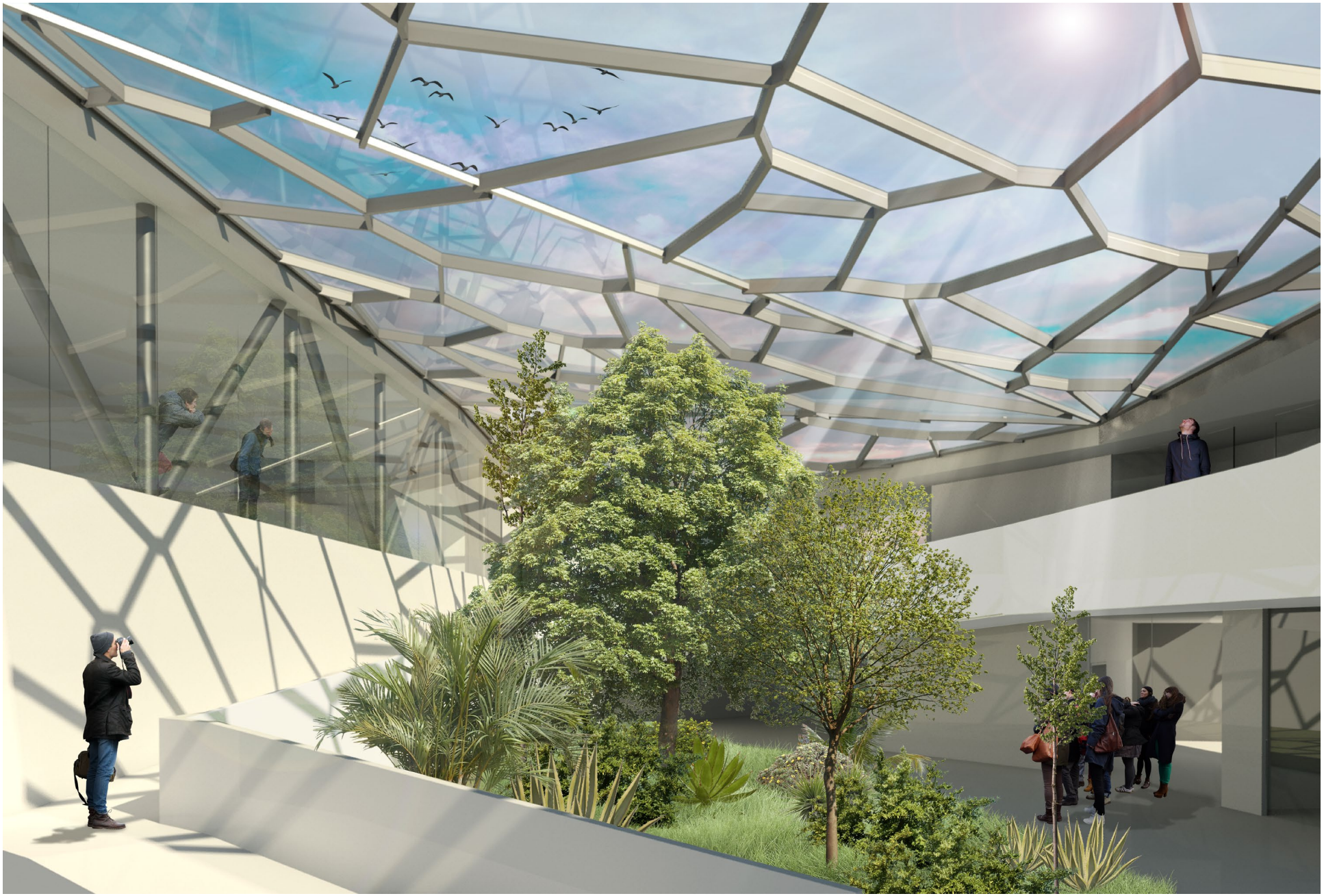
RENOVATIO

Architecture at zero _ 2017



The building is completely zero impact thanks to several smart solutions and choices aimed at the attainment of the objective of total sustainability. The shape originates from the terrain orography and is designed to become a natural continuation of the hill, indeed the architecture is inserted into the slope. In this way the building is almost invisible and the area seems to be completely pristine; artificial elements blend totally with natural elements and the project is a perfect example of naturalistic architecture.
Finally the edifice is totally self sustaining: heat loss is very low and there are various systems of energy and heat production.

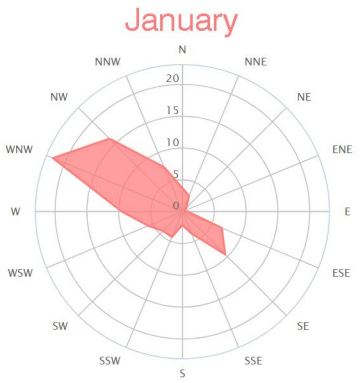
CONTENTS

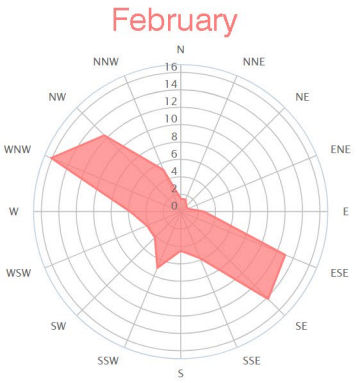
PART 1

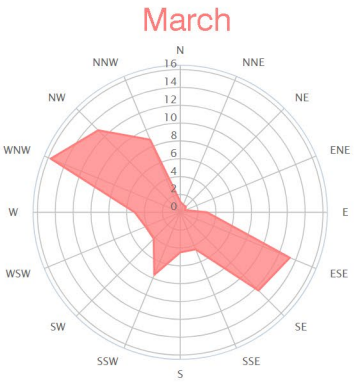
Preliminary Analysis

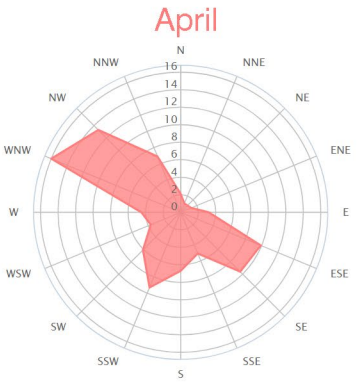
ANALYSIS OF THE WIND

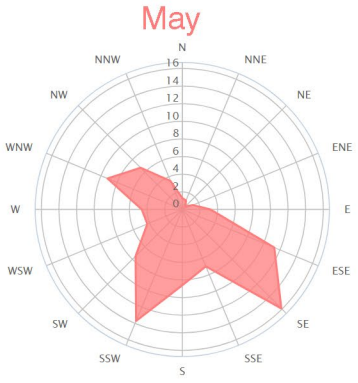
Wind direct distribution (%)

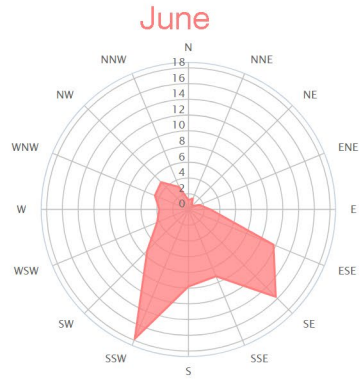


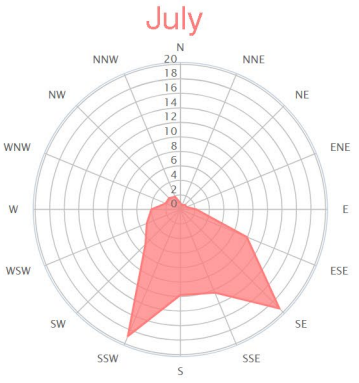


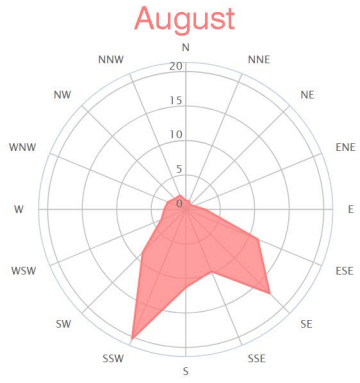


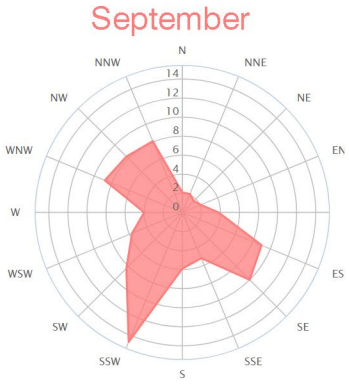


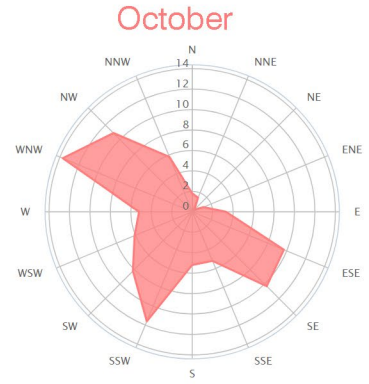


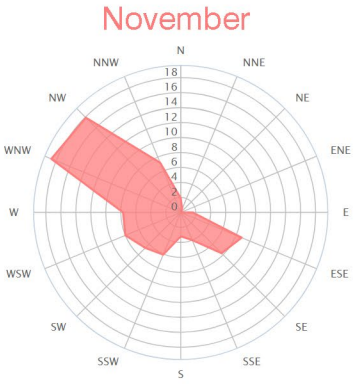


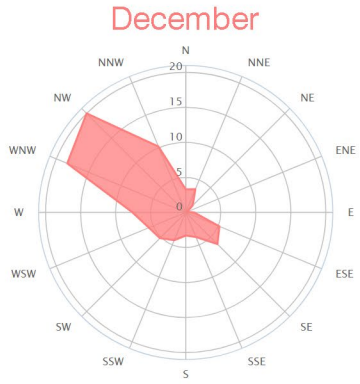












ANALYSIS OF TEMPERATURES AND PRECIPITATIONS

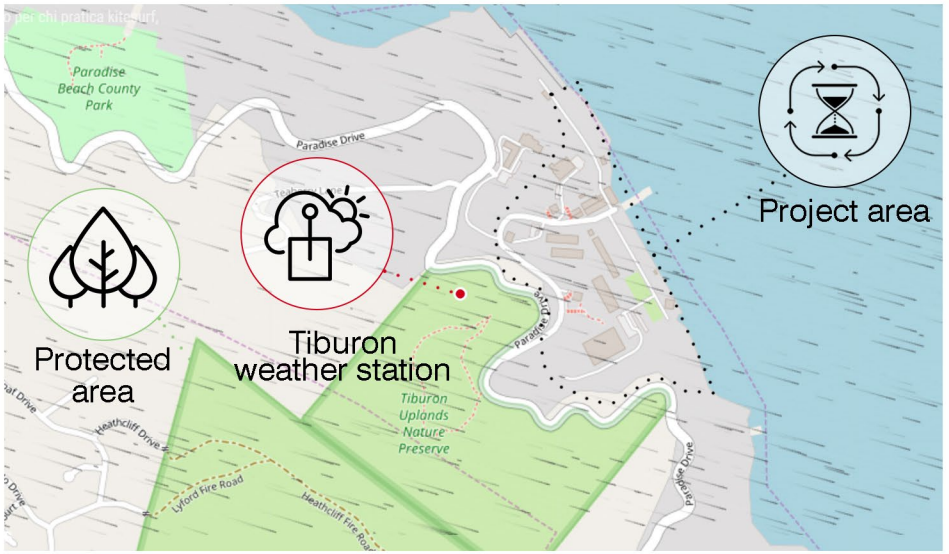
Altitude: 19 m

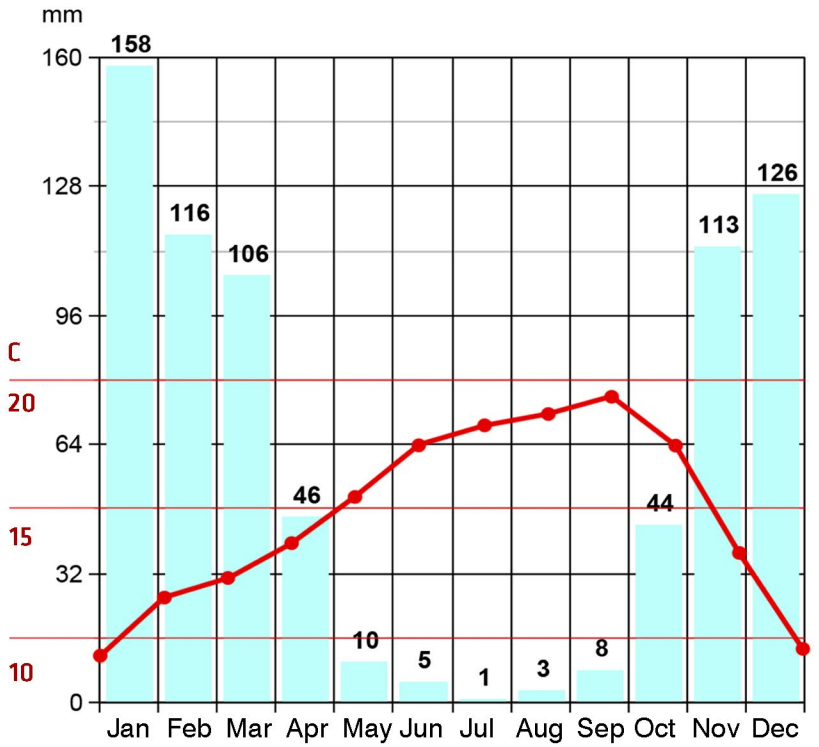
Average annual temperature: 14.2° C

Annual total precipitations: 736 mm

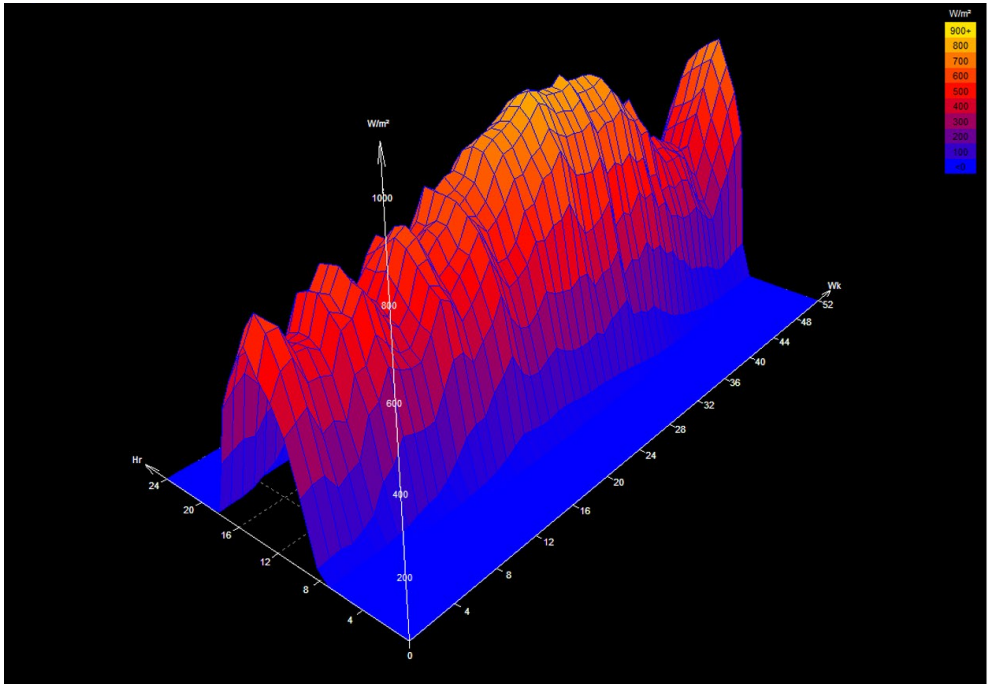
- With an average temperature of 17.9 °C, September is the hottest month of the year.
- With an average temperature of 9.9 °C, January is the coldest month of the year

Comparing the driest with the rainiest month it is clear that there is a difference of preticipations of 157 mm.
Variation of average temperature during the year is 8.0 °C.
1 mm is the amount of precipitations during the mounth of July that is the driest month of the year.
The rainiest mounth is January with an average of 158 mm of precipitations.

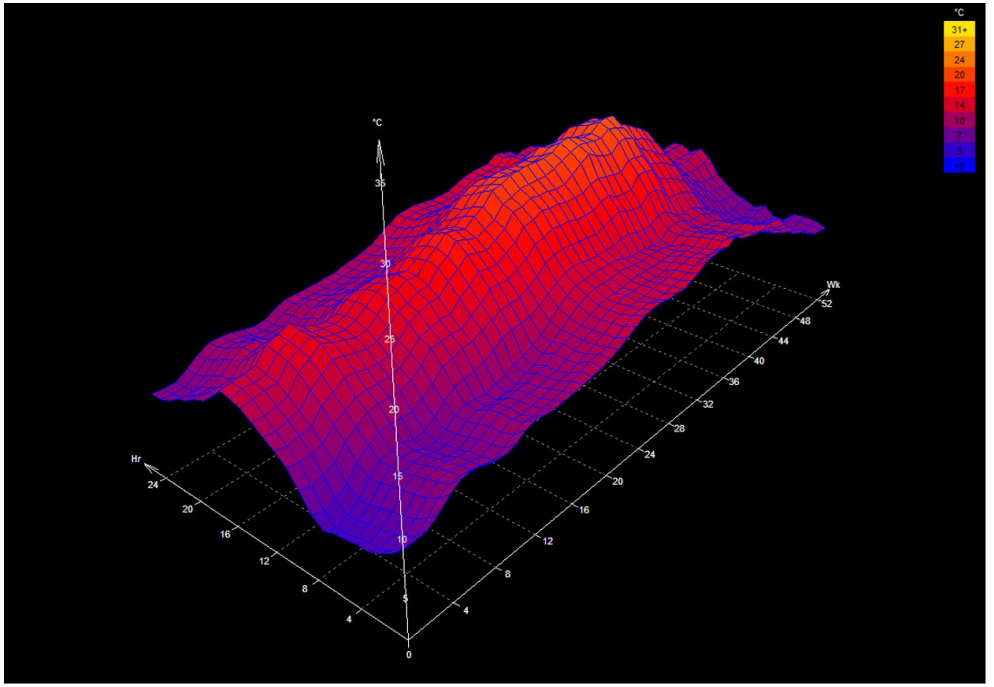




DIRECT SOLAR RADIATION (W/sm)
Weekly Summary
Location: San Francisco, California - USA (°122.4- ,°37.6)



AVERAGE TEMPERATURE (°C)
Weekly Summary
Location: San Francisco, California - USA (°122.4- ,°37.6)

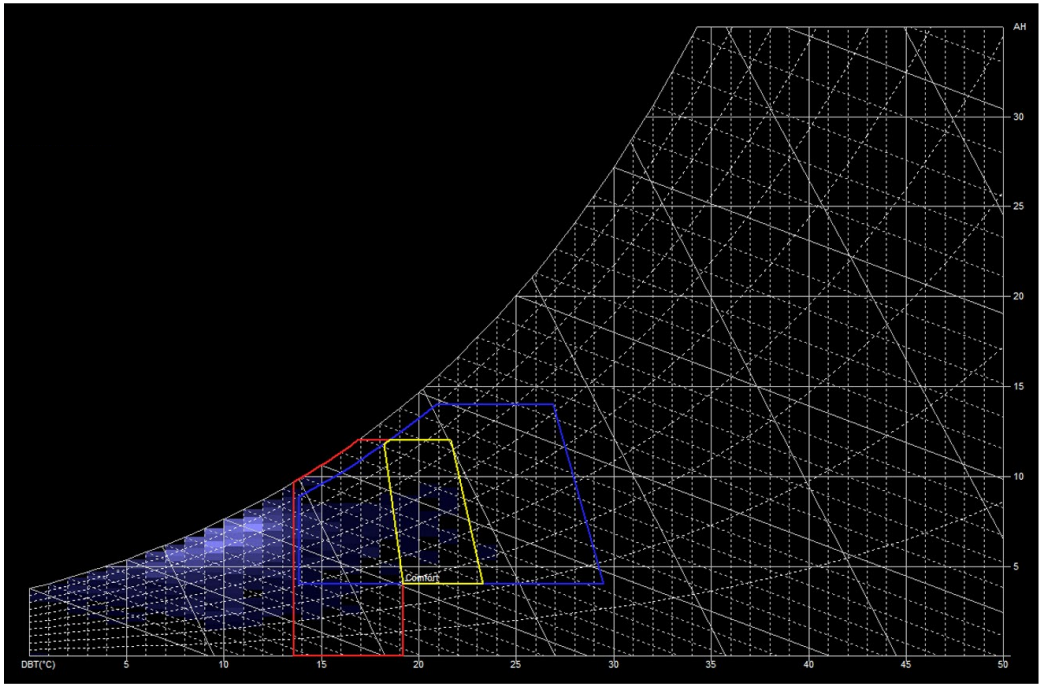


WINTER SEASON

PSYCHROMETRIC CHART

Location: San Francisco, California - USA
Frequency: 1st December to 1st March
Weekday Times: 00:00-24:00 Hrs
Weekend TImes: 00:00-24:00 Hrs
Barometric Pressure: 101.36 kPa

SELECTED DESIGN TECHNIQUES:
1. passive solar heating
2. thermal mass effect

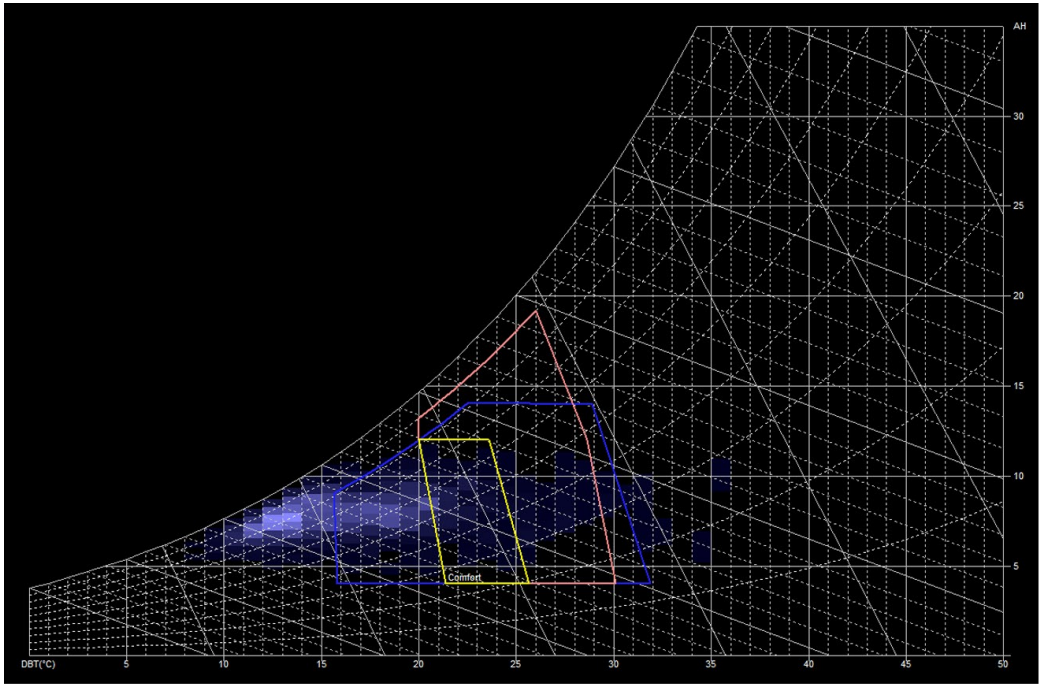


SUMMER SEASON

PSYCHROMETRIC CHART

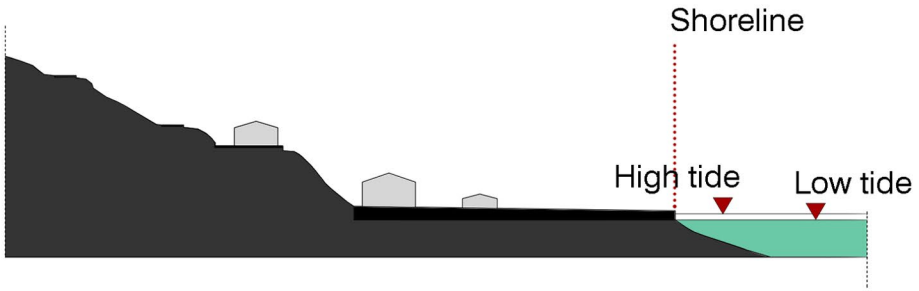
Location: San Francisco, California - USA
Frequency: 1st December to 1st March
Weekday Times: 00:00-24:00 Hrs
Weekend TImes: 00:00-24:00 Hrs
Barometric Pressure: 101.36 kPa

SELECTED DESIGN TECHNIQUES:
1. thermal mass effect
2. natural ventilation

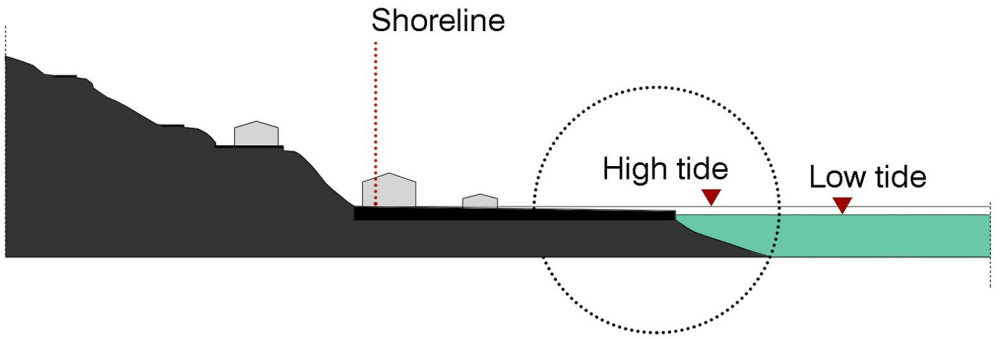


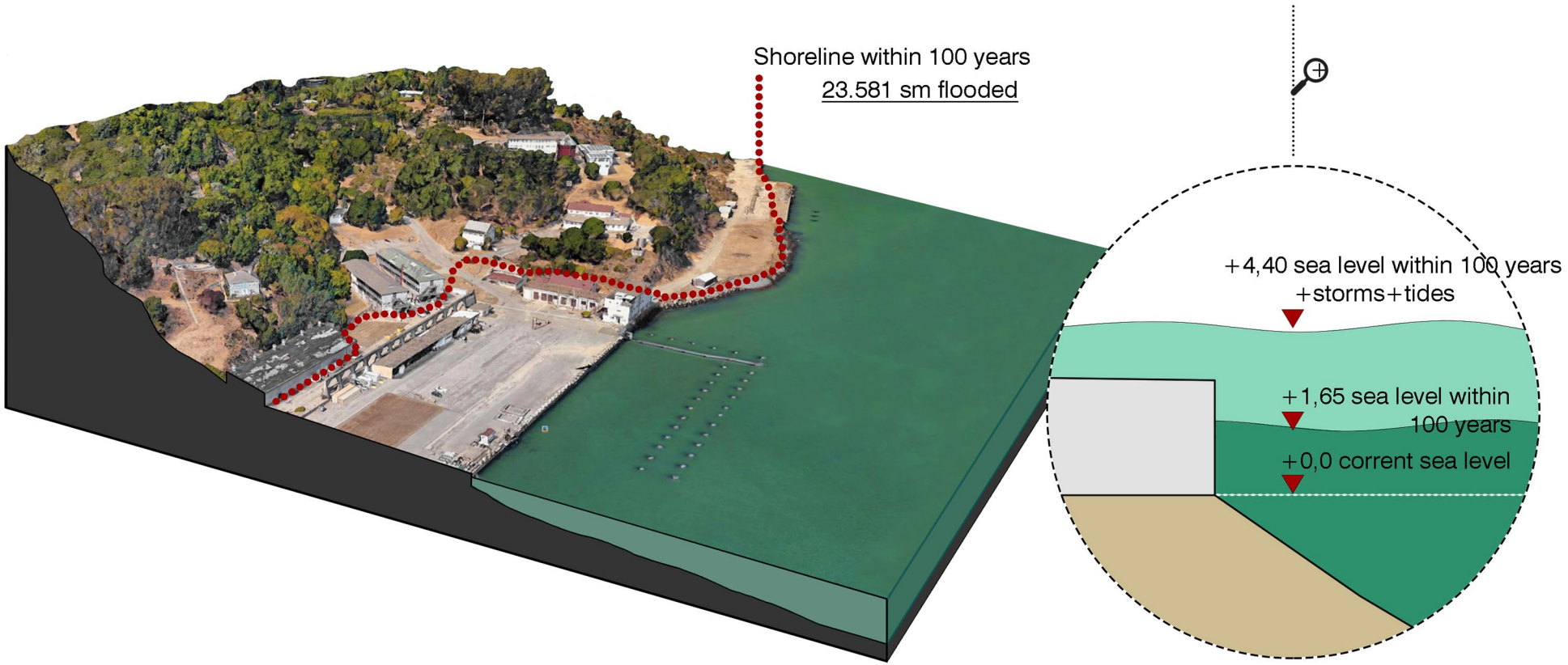
SEA LEVEL RISE IN 100 YEARS

Current state



Within 100 years





PART 2

Concept

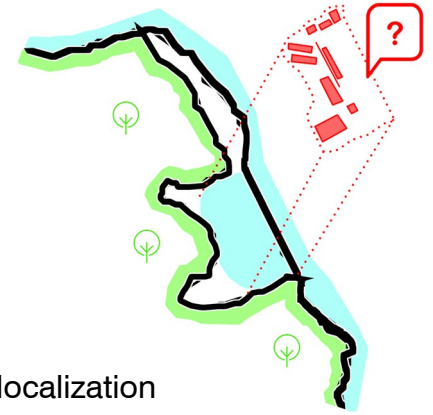
URBAN CONCEPT

“Renovatio” is a Latin word that means innovation and is the perfect way to underline the intention of the project: a very deep renovation of the appearance and the functioning of the Tiburon Centre. Nevertheless it is very important to keep the positive features of the area, despite the natural twistings that will happen during next decades are actually threatening all the West Coast. The most dangerous problems of the site are basically two: the development of vegetation towards the coast and the sea level rise. By fifty years these natural phenomena will progressively compromise all the existing establishment and, furthermore, they may threaten any new building designed without complete consciousness of the site criticalities.
Aware of the fact that every edifice fabricated in this area will be damaged by the natural evolution of the coast, the project want to integrate itself with the surrounding scrubland, becoming at the same time a way to contrast the coast erosion.

1.Current state

2.Total flood

3.Complete sea invasion



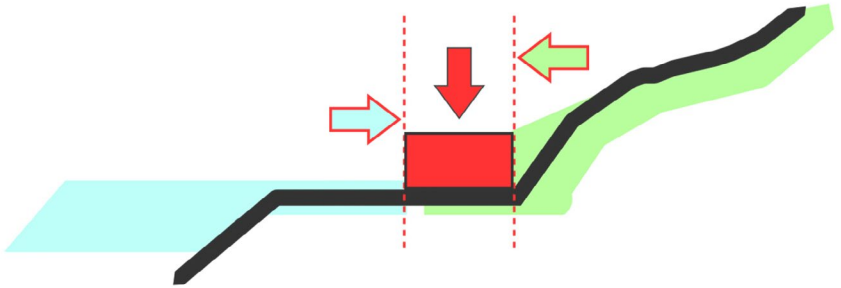
4.Delocalization

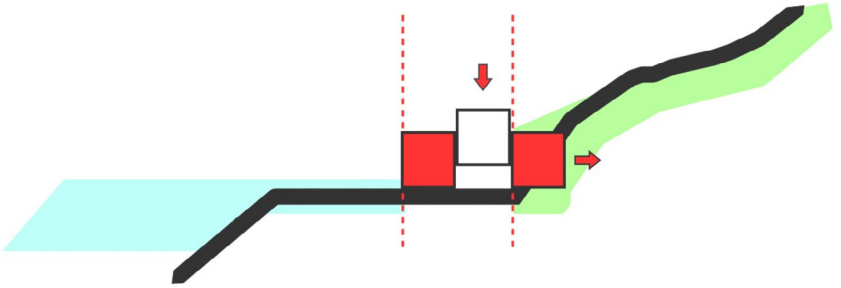
5.Forces of nature

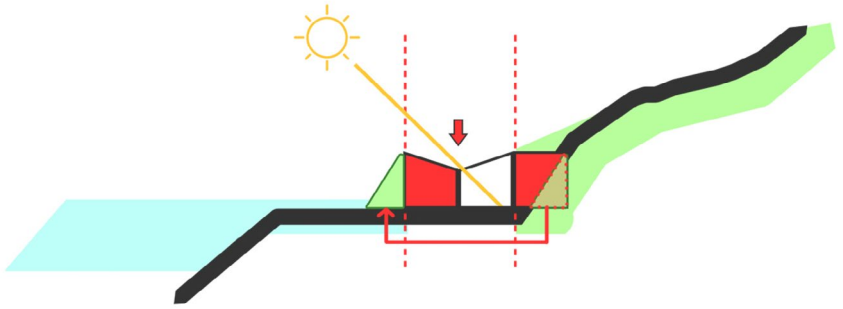
6.Intervention belt

ARCHITECTURAL CONCEPT

Plans organization is based on the idea of a central nucleus, the inner courtyard, surrounded by a big number of locations. The most part of the polygonal court is occupied by lots of vegetation scrupulously curated; this charateristic underlines well the difference between outside nature, free to grow wildly, and inside supervised nature. Another important element of this innovative architecture is the large path that twist and turn from the court to the inner locals, givig always to the visitor new views to admire, sometimes toward the sea, other time toward the wild nature outside.





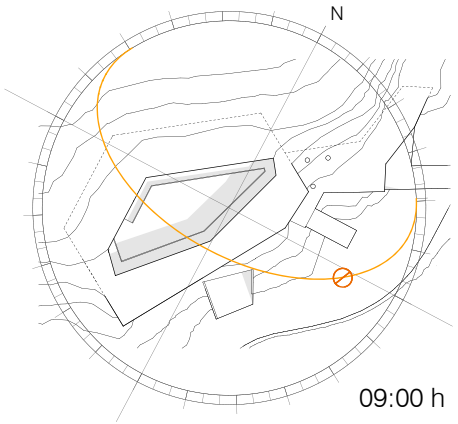


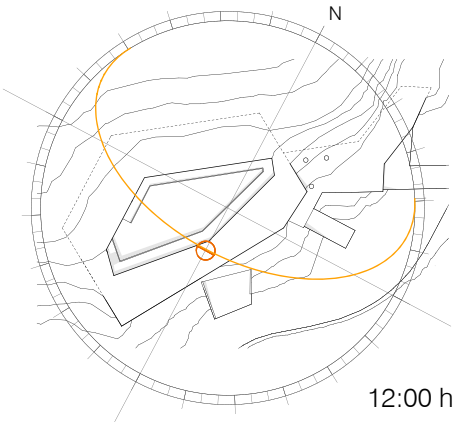
PART 3

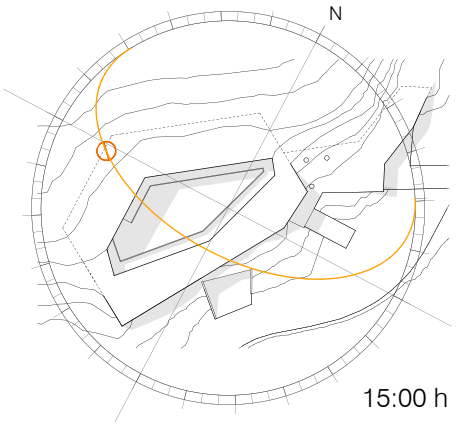
Systems

SHADING

21 June







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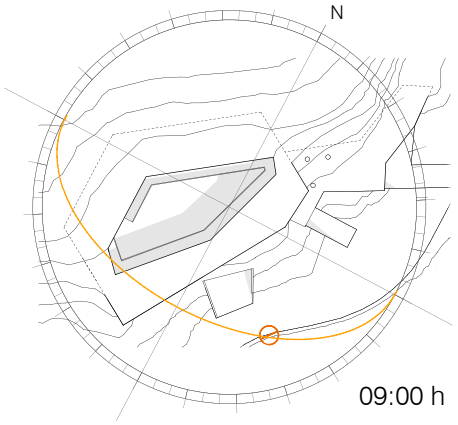
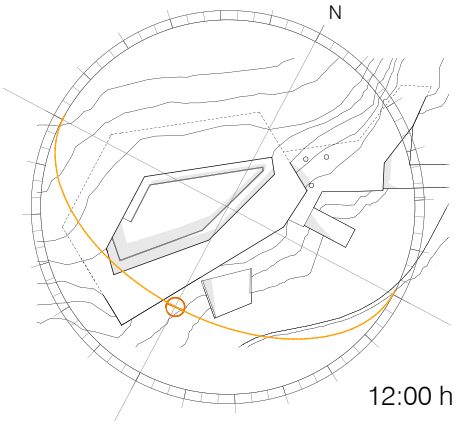
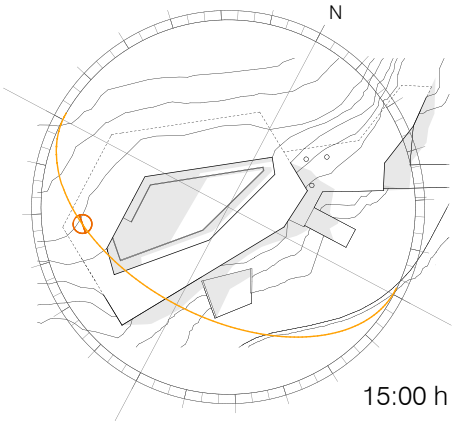
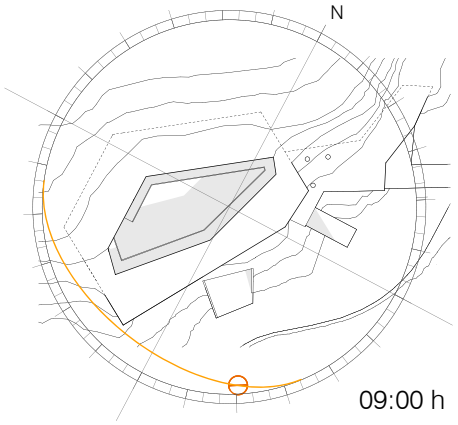
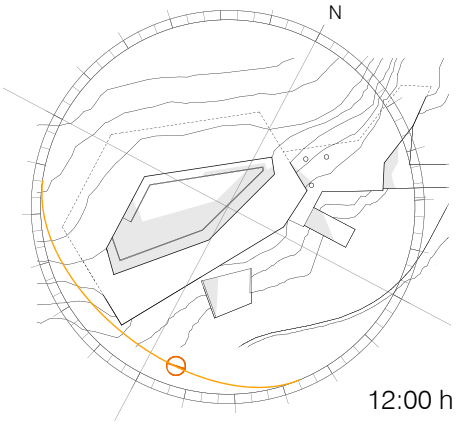


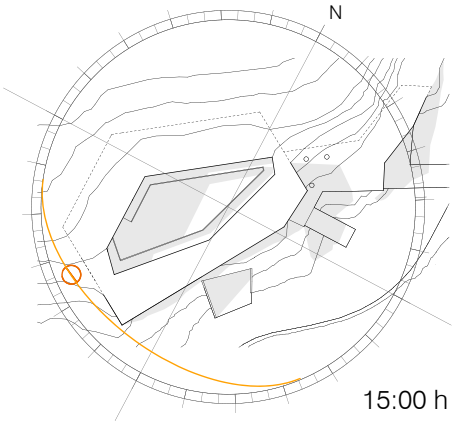




21 December

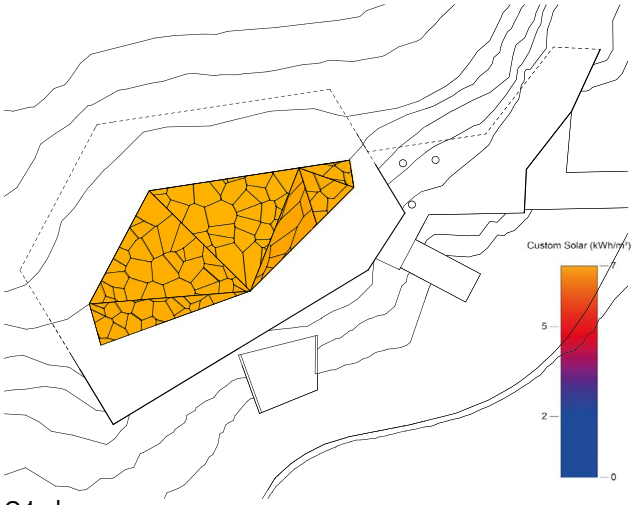






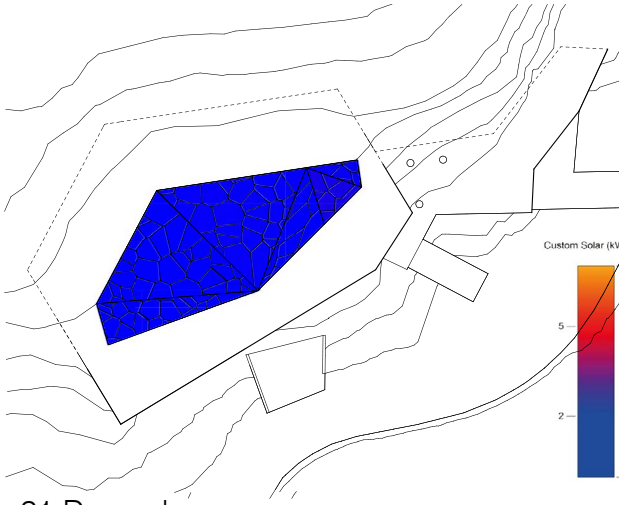
ANALYSIS OF DIRECT SOLAR RADIATION

Roof greenhouse_day comulative radiation



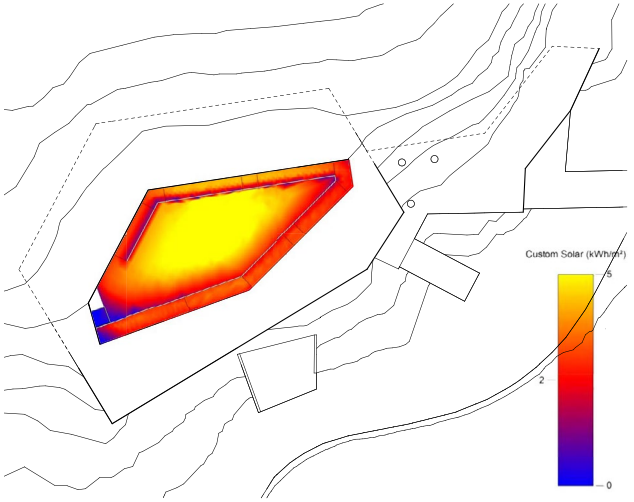
21 June

21 September

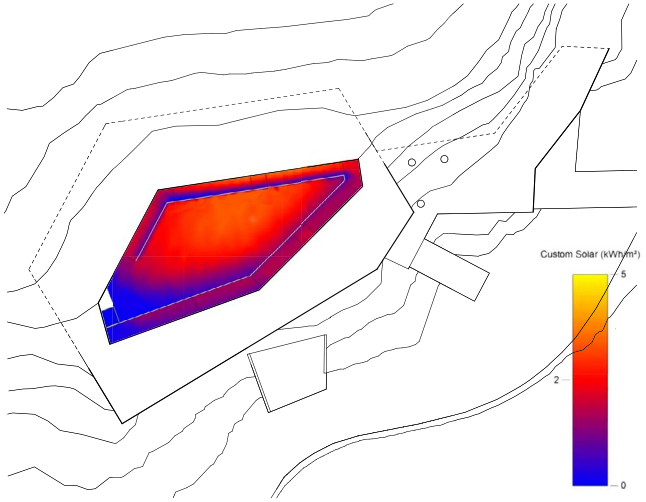


21 December

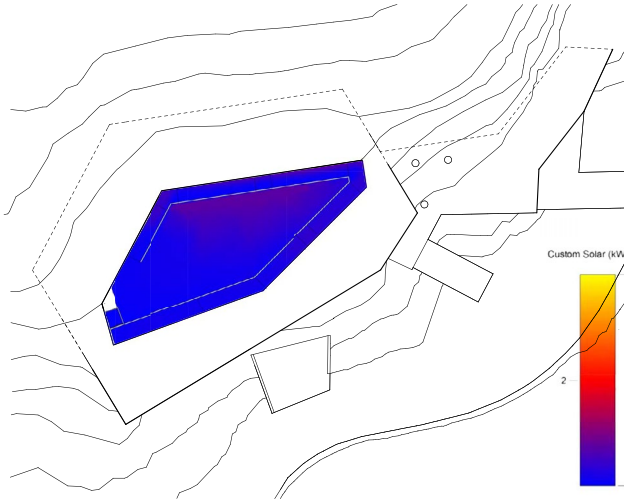
Interior greenhouse_day comulative radiation



21 June



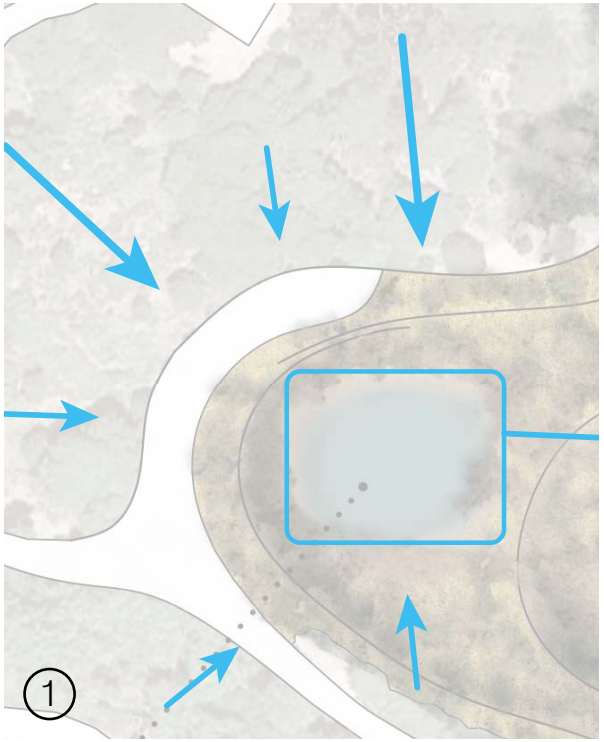
21 September

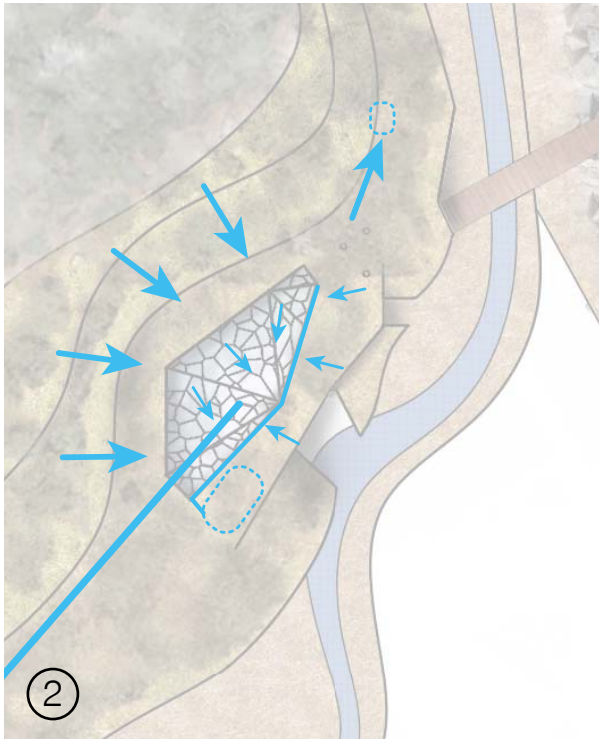


21 December

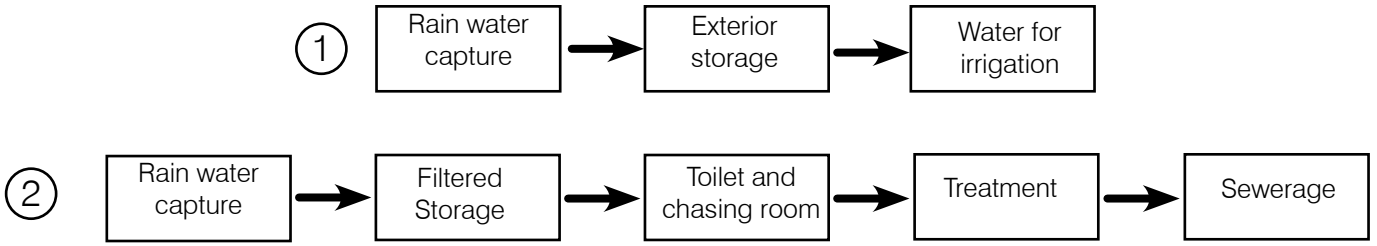
WATER QUANTITIES AND CALCULATIONS

Water is filtered by the coverage of the building inside two cisterns is stored for then being used in the summer period.
The datum of calculation of the captured water is on the base of the wheater Data.
For the roof garden has been considered a 30% absorption factor.
The calculation of the consumption of water has been made on an average of use of the building.





	WC Bay Center	Chasing Room
Users per day	60	30
gallos per use	2,5	12
tot (gallos per day)	150	360



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOT
Water consumed (toilet and chasing room)	9679,17	9679,17	9679,17	9679,17	9679,17	9679,17	9679,17	9679,17	9679,17	9679,17	9679,17	9679,17	116150,00
Rain Water capture	30306,82	22250,57	20332,42	8823,50	1918,15	959,08	191,82	575,45	1534,52	8439,87	21675,13	24168,73	141176,05
Storagare water	47000,00	47000,00	47000,00	46144,34	38383,32	29663,23	20175,88	11072,16	2927,52	1688,22	13684,18	28173,74	25026,05

PV RENEWABLE ENERGY

Onyx Stylight with 90% transparency

ELECTRICITY GENERATED PER YEAR

17,617 kWh *

TOTAL LIGHTING POINTS OPERATING 4 HOURS PER DAY

1,004 Lights **

AVOIDED CO_2 EMMISIONS PER YEAR

11,803 Kg CO2

BARRELS OF OIL SAVED

10 Barrels

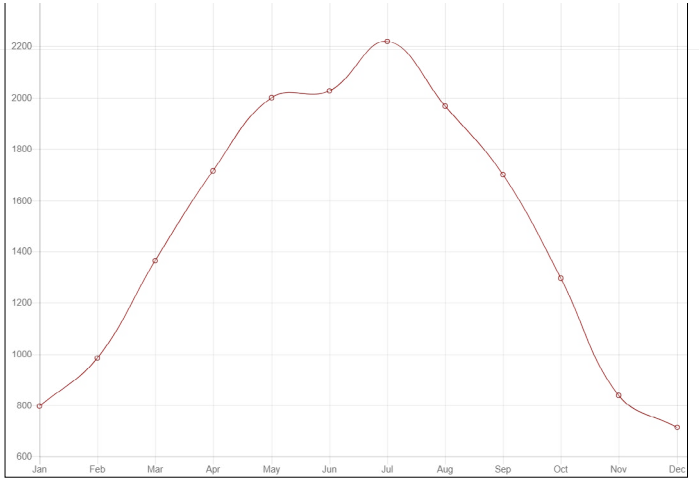
ELECTRIC CAR MILEAGE THANKS TO THE ENERGY GENERATED

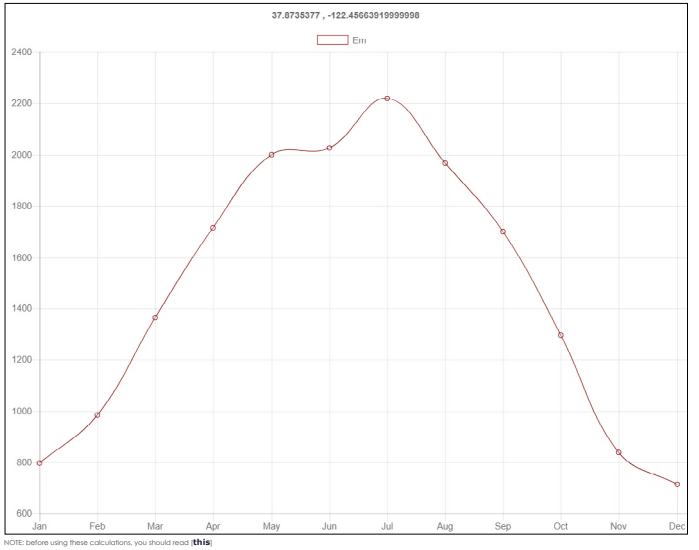
130,494 km

* The energy production is just an estimation where factors like surrounding shadows, self-shades or other external impacts have not been taking into account. These factors might lead to reduction in energy production. In addition, other potential losses due to BOS are also excluded from these calculations. The calculation has been done using PVGIS and PVWATTS.

** Calculated with energy efficient light bulbs of 12W (light-emitting diode equivalent to a traditional incandescent light bulb of 100W)

Month	E_d	E_m	H_d	H_m
January	25.67	795.92	2.73	84.73
February	35.19	985.19	3.73	104.36
March	43.98	1,363.51	4.64	143.69
April	57.16	1,714.88	6.04	181.25
May	64.50	1,999.50	6.81	211.17
June	67.50	2,025.04	7.15	214.40
July	71.58	2,218.93	7.61	236.05
August	63.48	1,967.88	6.76	209.61
September	56.62	1,698.69	6.05	181.56
October	41.77	1,294.90	4.47	138.50
November	27.96	838.84	2.98	89.39
December	23.01	713.43	2.45	76.06
Yearly average	48.20	1,468.06	5.12	155.90
Total for year		**17,616.71**		**1,870.77**





NOTE: before using these calculations, you should read (**this**)

PV RENEWABLE ENERGY

Onyx photovoltaic floor (exterior cycle lane)

ELECTRICITY GENERATED PER YEAR

38,741 kWh *

TOTAL LIGHTING POINTS OPERATING 4 HOURS PER DAY

2,208 Lights **

AVOIDED CO_2 EMMISIONS PER YEAR

25,957 Kg CO2

BARRELS OF OIL SAVED

23 Barrels

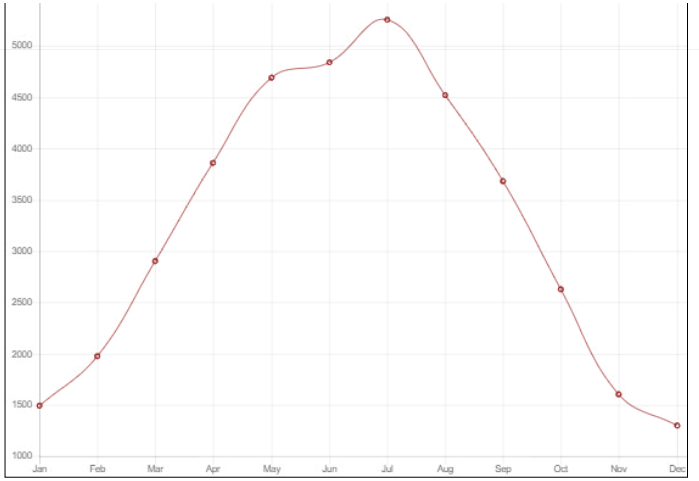
ELECTRIC CAR MILEAGE THANKS TO THE ENERGY GENERATED

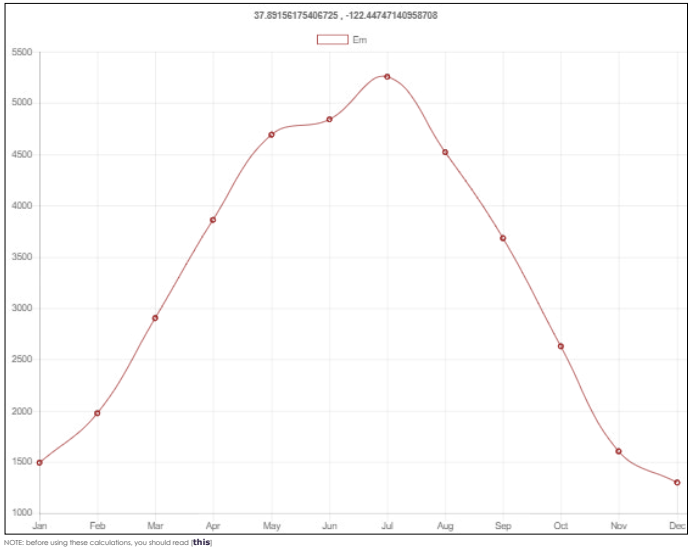
286,973 km

* The energy production is just an estimation where factors like surrounding shadows, self-shades or other external impacts have not been taking into account. These factors might lead to reduction in energy production. In addition, other potential losses due to BOS are also excluded from these calculations. The calculation has been done using PVGIS and PVWATTS.

** Calculated with energy efficient light bulbs of 12W (light-emitting diode equivalent to a traditional incandescent light bulb of 100W)

Month	E_d	E_m	H_d	H_m
January	48.25	1,495.63	2.22	68.67
February	70.48	1,973.49	3.18	89.03
March	93.64	2,902.76	4.17	129.33
April	128.71	3,861.20	5.72	171.56
May	151.21	4,687.55	6.70	207.83
June	161.28	4,838.52	7.16	214.85
July	169.41	5,251.76	7.56	234.40
August	145.75	4,518.23	6.52	202.22
September	122.71	3,681.34	5.53	165.80
October	84.72	2,626.37	3.85	119.36
November	53.38	1,601.54	2.45	73.36
December	42.03	1,302.98	1.95	60.41
Yearly average	105.96	3,228.45	4.75	144.74
Total for year		**38,741.37**		**1,736.83**



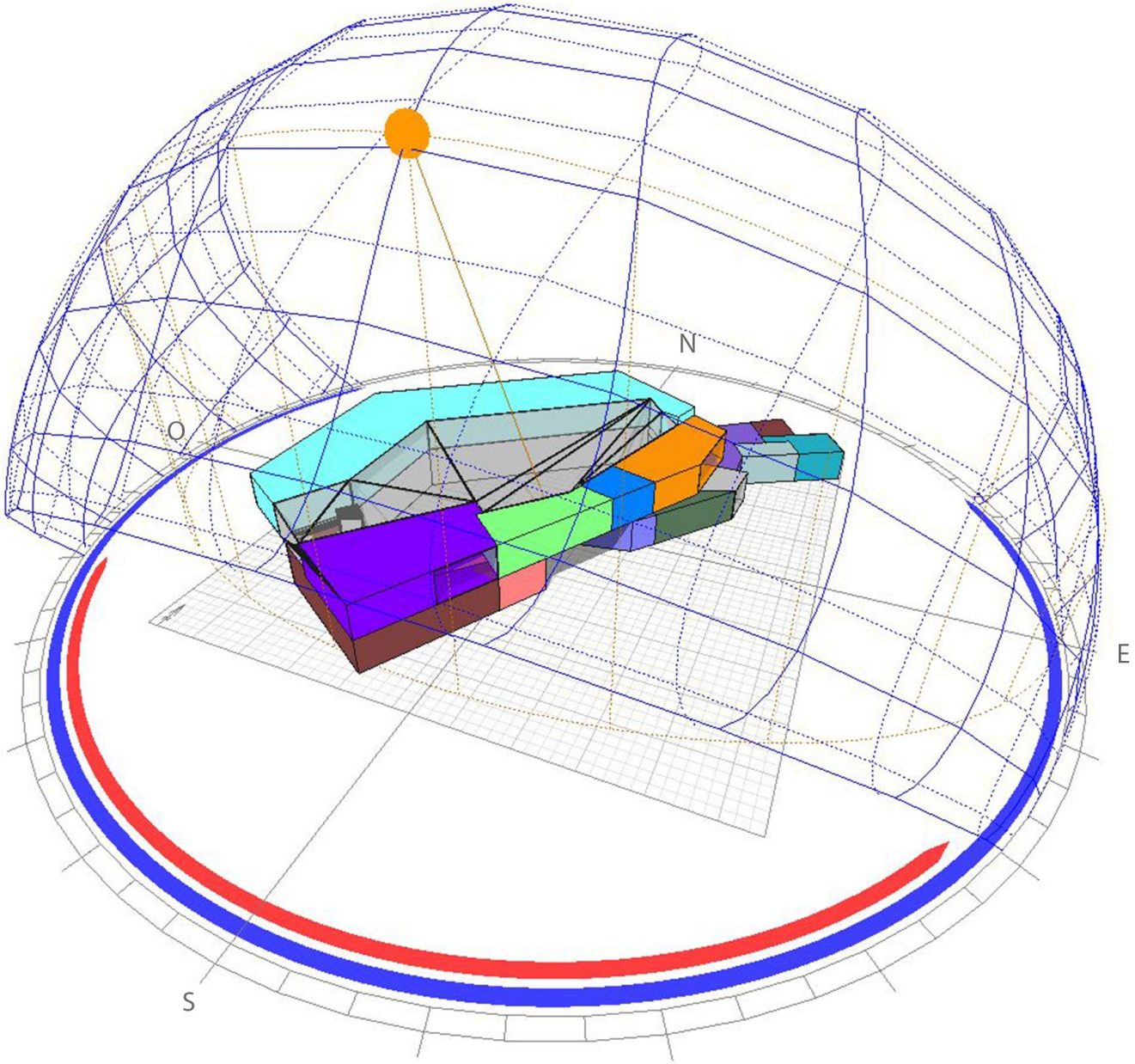


NOTE: before using these calculations, you should read (**this**)

ENERGY MODEL

Annual Sun Path

Autodesk_Ecotect

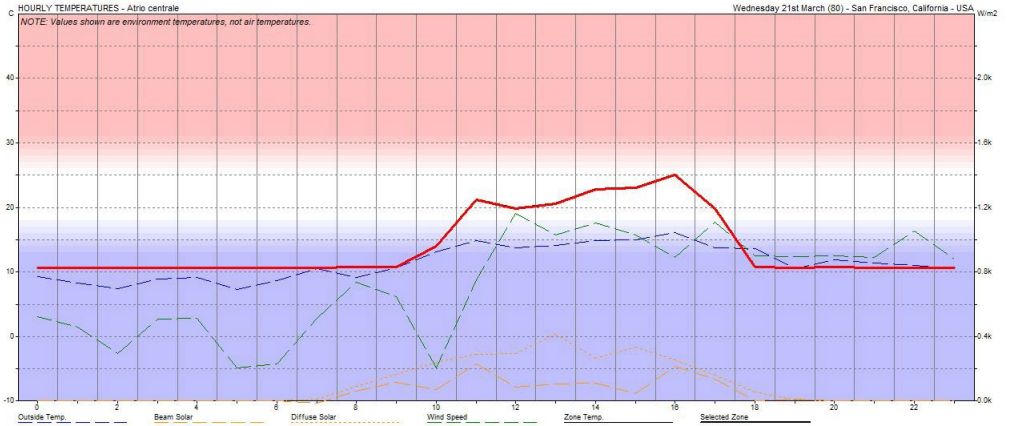


HOURLY TEMPERATURES

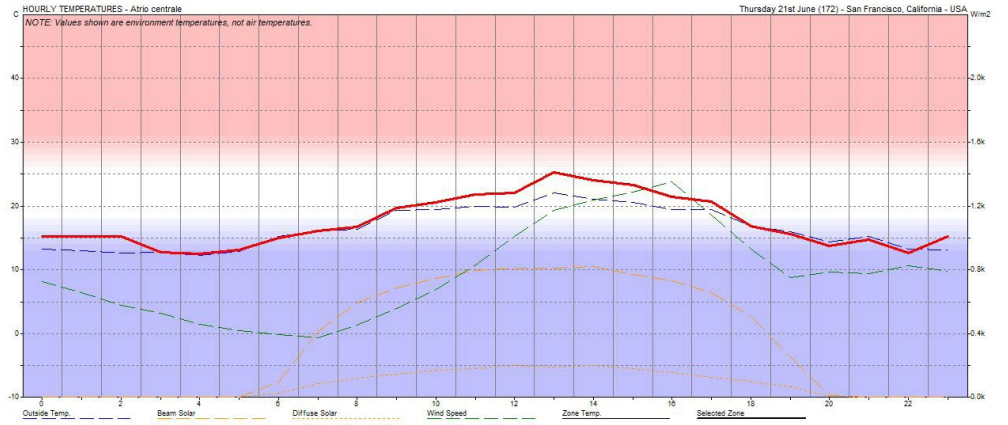
GREENOUSE not air-conditioned

Passive control of the inside temperature of the greenhouse.

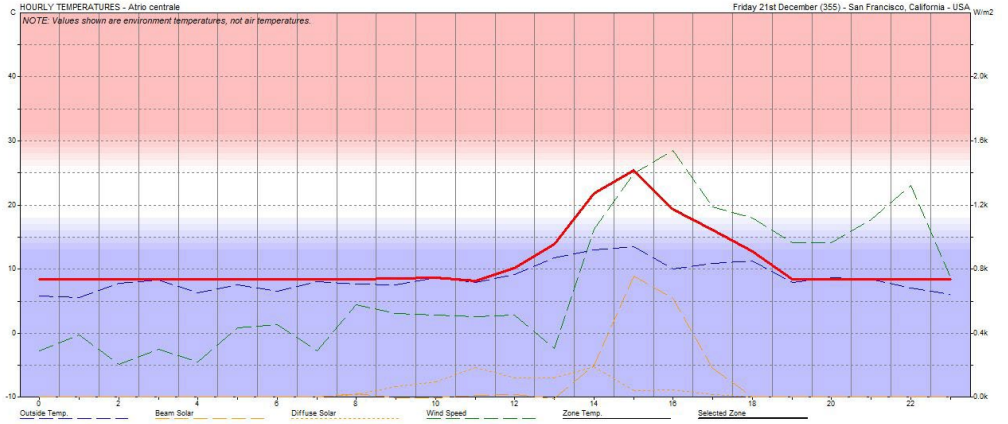
March



June

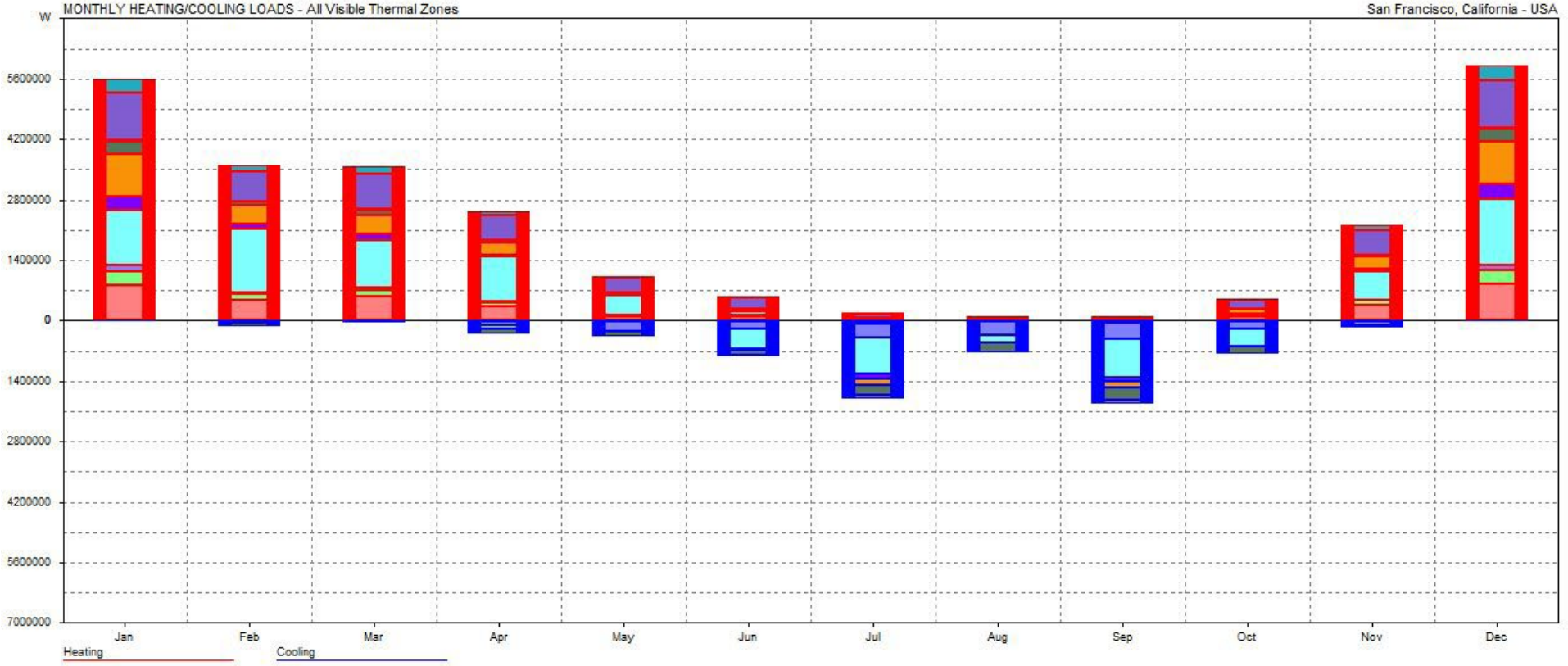


December



ENERGY CONSUMPTION

Heating and Cooliong of the building
Monthly summary



FINAL REPORT OF CONSUMPTION

Month	Heating Pumps - Fun (Kwh)	Cooling- Pumps - Fun (kwh)	Lighting LED (kwh)	Other Plugs (kwh)	TOT (kwh)	PV roof greenhouse (kwh)	PV Exterior pavement (kwh)	TOT (kwh)	Difference (kwh)
Jan	5596	14	231,65	1481	7322,65	795,92	1495,6	2291,52	5031,13
Feb	3606	117	231,65	1481	5435,65	985,19	1973,5	2958,69	2476,96
Mar	3578	48	231,65	1481	5338,65	1363,5	2902,7	4266,2	1072,45
Apr	2536	304	231,65	1481	4552,65	1714,9	3861,2	5576,1	-1023,45
May	1014	347	231,65	1481	3073,65	1999,5	4687,5	6687	-3613,35
Jun	552	830	231,65	1481	3094,65	2025	4838,5	6863,5	-3768,85
Jul	174	1812	231,65	1481	3698,65	2218	5251,7	7469,7	-3771,05
Aug	112	736	231,65	1481	2560,65	1967	4518,2	6485,2	-3924,55
Sep	97	1933	231,65	1481	3742,65	1698	3681,3	5379,3	-1636,65
Oct	509	762	231,65	1481	2983,65	1295	2626,4	3921,4	-937,75
Nov	2216	147	231,65	1481	4075,65	838,8	1601,5	2440,3	1635,35
Dec	5917	6	231,65	1481	7635,65	713,4	1303	2016,4	5619,25
TOT Year	**25907**	**7056**	**2779,8**	**17772**	**53514,8**	**17614,21**	**38741,1**	**56355,31**	**-2840,51**

	Comsumption	Generation
kwh (year)	53514,8	56355,31
EUI Kbtu/ft²	16,45	-17,28

SOFTWARE SKILLS