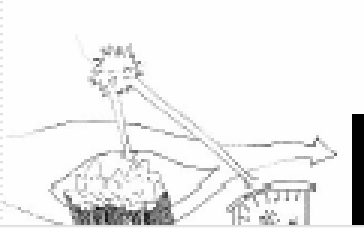


CLIMA / microclimas



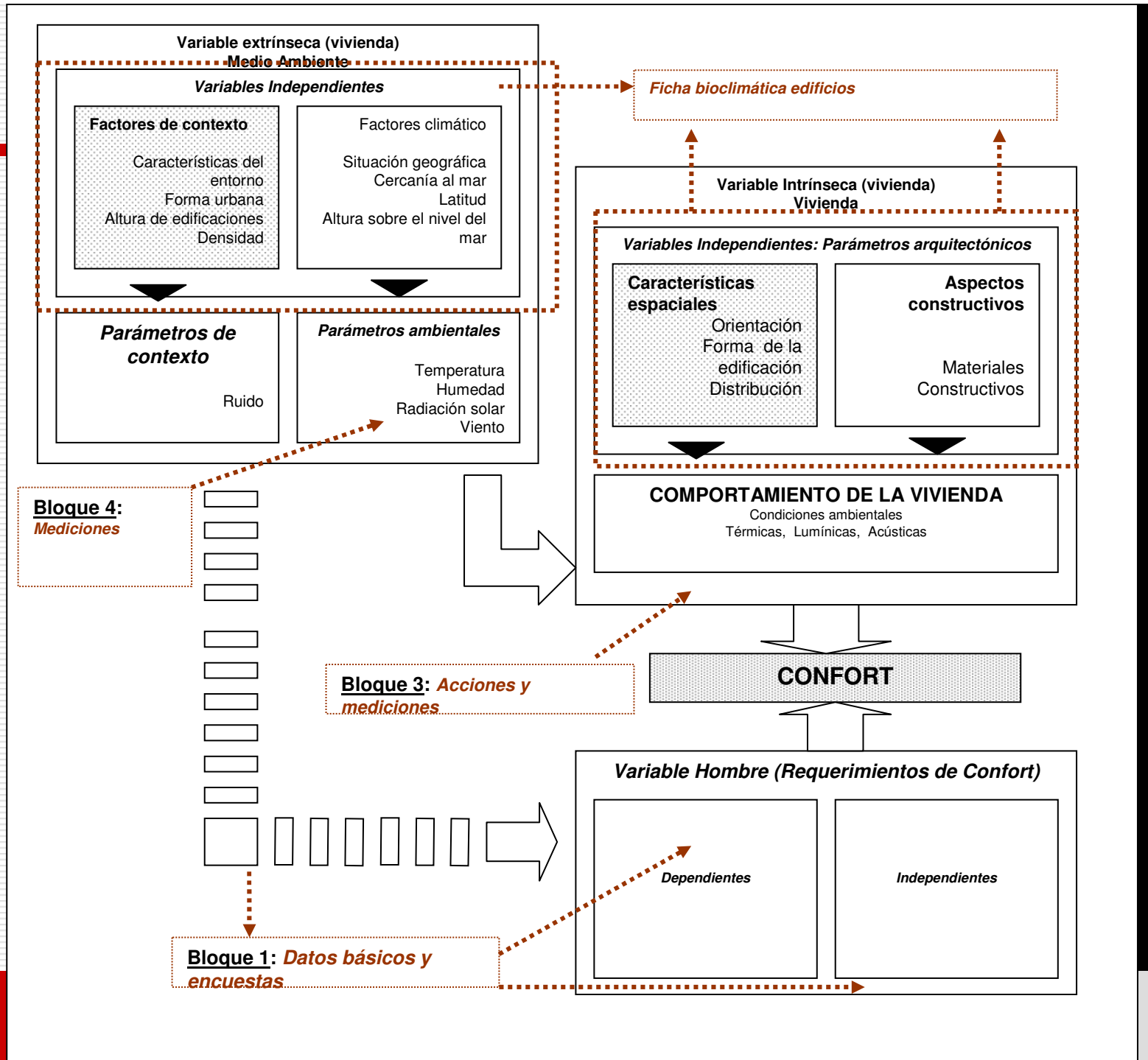
Relación clima-habitat-hombre integral y globalizadora del proceso de diseño.

1. reducir consumo de recursos
- 2. reducir consumo de energía**
- 3. aprovechar recursos naturales**

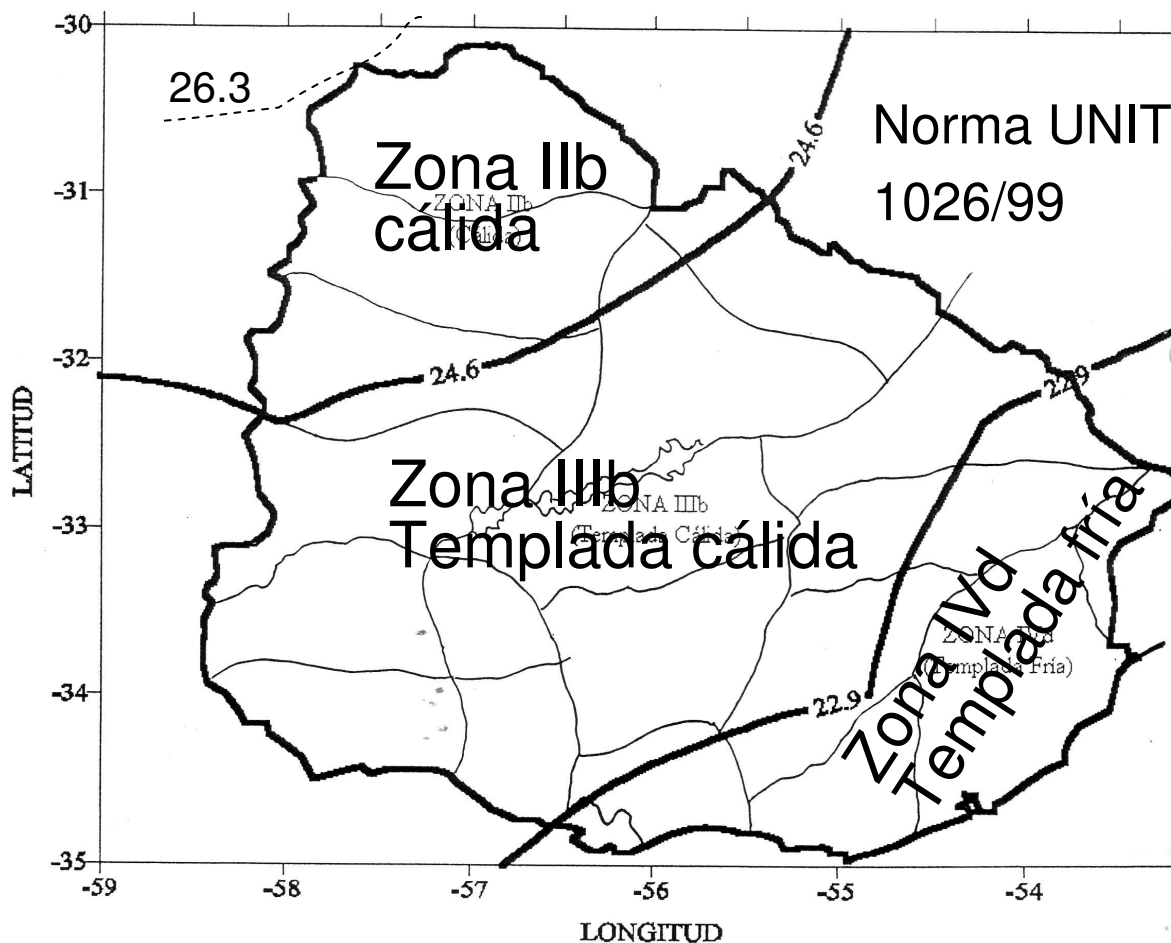
reducir contaminación y peligros para salud
reducir impactos

arquitectura flexible / integración de técnicas

Aspectos metodológicos



Clasificación climática / zonas climáticas



Criterios para zonas cálidas:
Índices de confort de TEC
PMV
Índice IBH

**Templado subtropical con
influencia marítima**

Clima de Uruguay

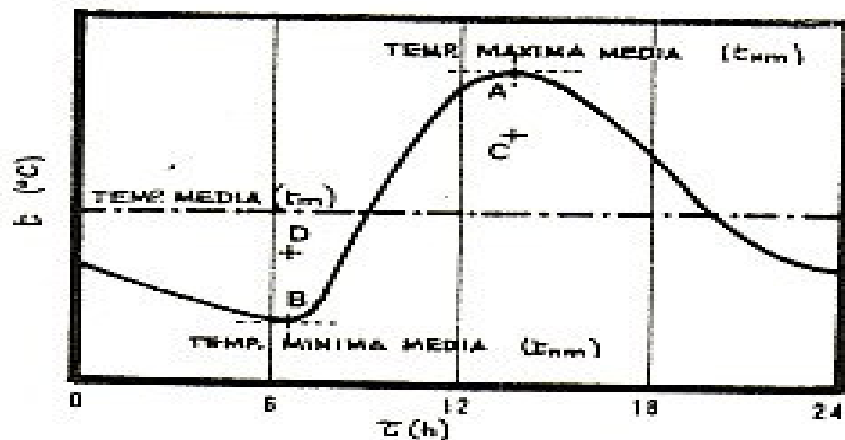
PERÍODO FRÍO Y CALUROSO

ESTACIÓN	CALUROSO período	días	FRÍO días	ESTACIÓN	CALUROSO período	días	FRÍO días
P. ESTE (1940 - 60)	7 dic - 2 abr	116	249	COLONIA (1940 - 60)	4 nov - 7abr	154	211
ROCHA (1944 - 60)	2 dic - 29 mar	117	248	P.TOROS (1937 - 60)	1 nov - 5 abr	155	210
MONTEV. (1901 - 60)	23 nov - 30 mar	127	238	PAYSAN. (1937 - 60)	25 oct - 7 abr	164	201
S. JOSE (1948 - 60)	12 nov - 31 mar	139	226	RIVERA (1944 - 60)	26 oct - 9 abr	165	200
MINAS (1940 - 60)	11 nov - 4 abr	144	221	MERCED.(1941 - 60)	26 oct - 9 abr	165	200
T. TRES (1939 - 60)	8 nov - 4 abr	147	218	SALTO (1942 - 60)	20 oct - 11 abr	173	192
MELO (1937 - 60)	8 nov - 5 abr	148	217	ARTIGAS (1944 - 60)	13 oct - 16 abr	185	180

Régimen y naturaleza de los vientos / VIENTOS PREDOMINANTES

ESTACION	PERIODO	INVIERNO		VERANO	
		DIR (rumbos)	VEL (km/h)	DIR (rumbos)	VEL (Km/h)
ARTIGAS	81-90	ESE	16	ESE	14
RIVERA	81-90	E	12	E	10
SALTO	81-90	NNE	15	E	13
PAYSANDU	81-90	NE	17	E	17
MELO	81-90	E/SE	13	SE	16
PASO DE LOS TOROS	81-90	ENE	17	E	19
MERCEDES	81-90	NE	13	NE	13
TREINTA Y TRES	81-90	S	13	E	11
COLONIA	81-90	NE	20	ENE	18
ROCHA	81-90	WSW	17	ENE	17
CARRASCO	81-90	N	20	SE	22
PRADO	81-90	NE	13	NE	15

Clima de Uruguay



Régimen de temperatura

zona	período	tmax	$T_m^{\circ C}$	tmin	$A^{\circ C}$
IIb	Ver.	>30	>24	>17	16
	Inv.	18	8-12	>7	<14
IIIb	Ver.	> 24	20-30	16	<14
	Inv.	17	8-12	7	<14
IVd	Ver.	< 30	22	17	11
	Inv.	15.5	8-12	6.5	8

Clima de Uruguay

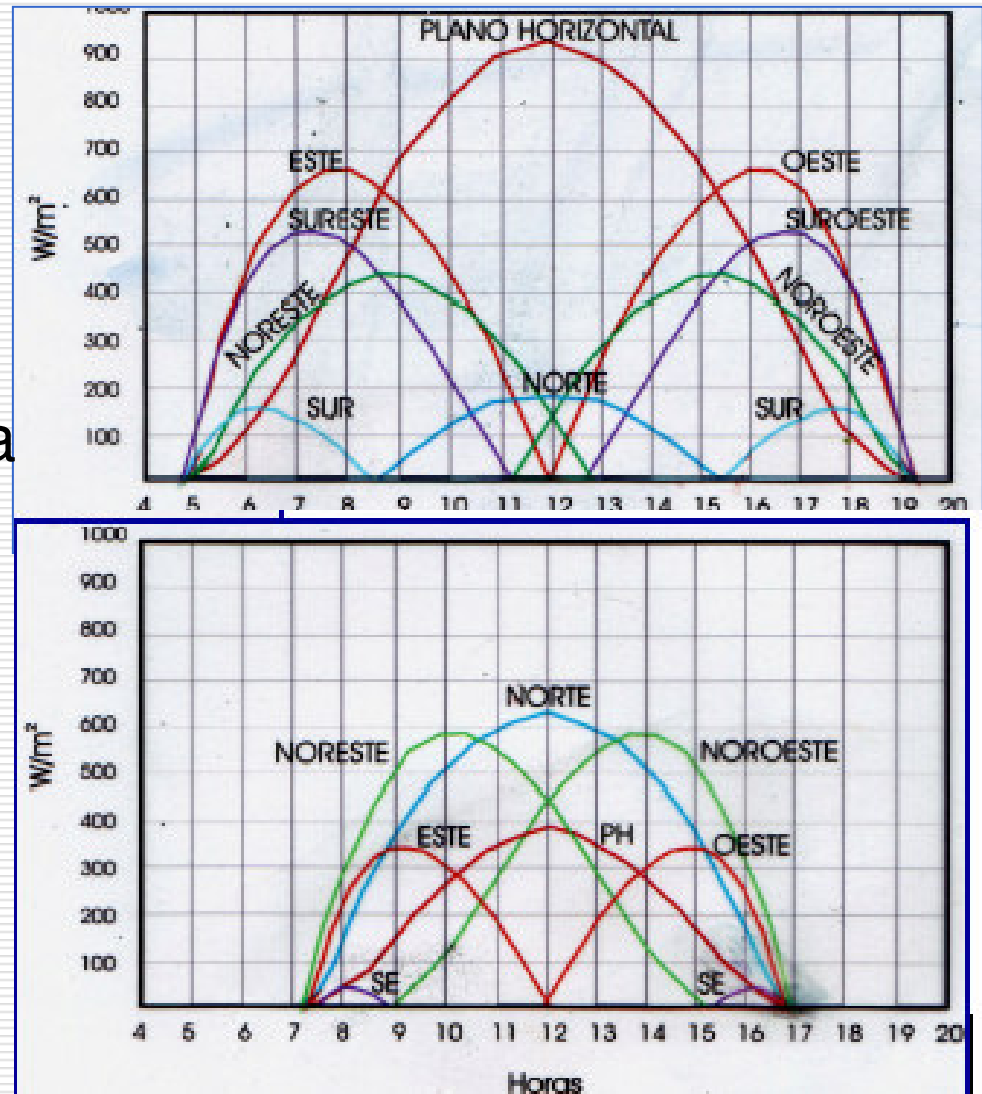
Régimen de **asoleamiento**

Radiación solar

Es el parámetro más conocido y una característica macroclimática

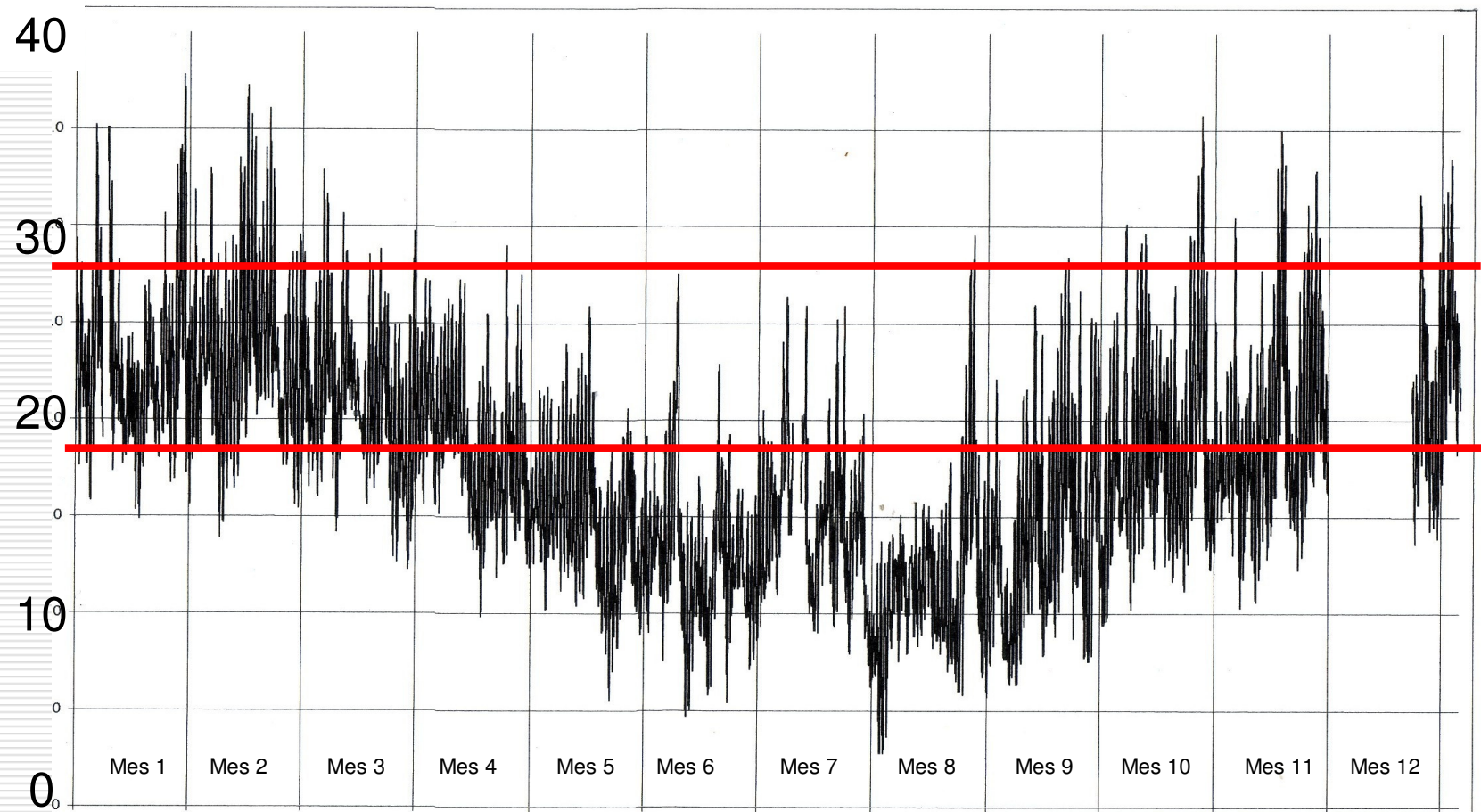
Nos interesa saber :

- ❑ La cantidad de radiación recibida
- ❑ En que momentos se la recibe (mes, día y hora)



Andamio de temperaturas

Potencialidades



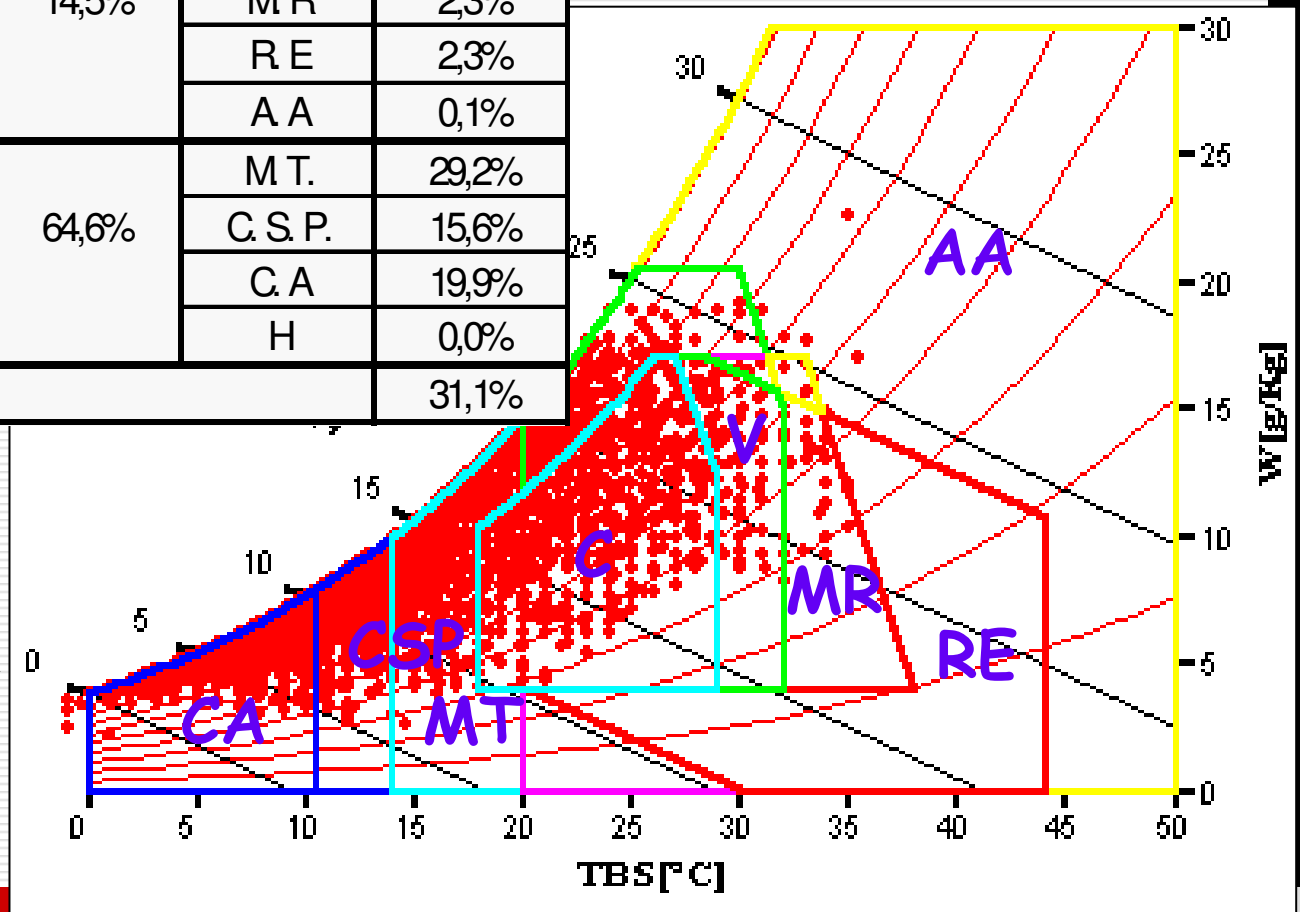
Carta Bioclimática Montevideo

acondtotuy@gmail.com

Clave: acondtotermico

CONFORT				20,9%
DISCONFORT				79,1%
DISCONFORT	CALOR	14,5%	V	14,0%
			M R	2,3%
			R E	2,3%
			A A	0,1%
	FRIO	64,6%	M T.	29,2%
			C. S. P.	15,6%
			C. A	19,9%
			H	0,0%
SOMBREAMIENTO				31,1%

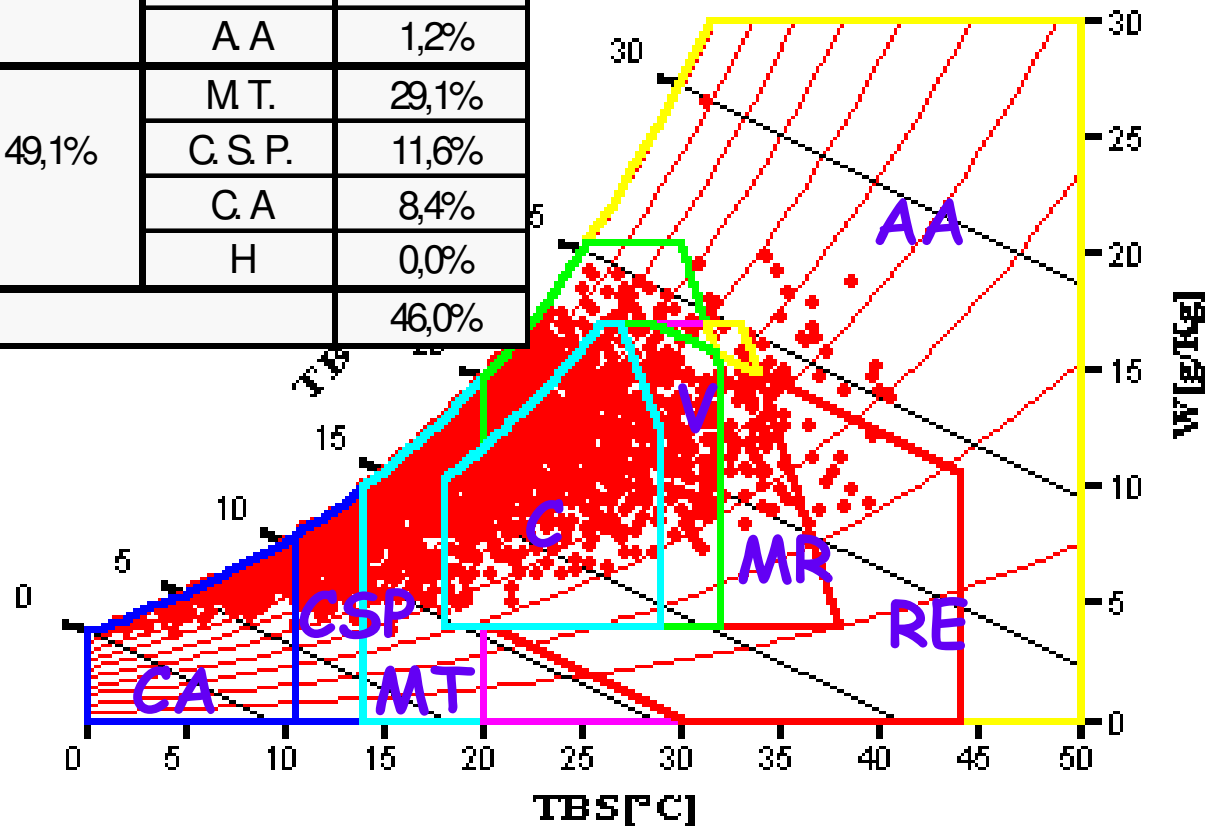
Porcentaje de horas en que cada estrategia es adecuada



Carta Bioclimática Salto

CONFORT				29,8%
DISCONFORT				70,2%
DISCONFORT	CALOR	21,1%	V	17,3%
			M R	7,3%
			R E	7,5%
			A A	1,2%
	FRIO	49,1%	M T.	29,1%
			C. S. P.	11,6%
			C. A	8,4%
			H	0,0%
SOMBREAMIENTO				46,0%

Porcentaje de horas en que cada estrategia es adecuada



Horas confort salto

Deseab sol salto t <19°C

horas	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2	21.2	21.5	24	20.6	20.2	22.6	24	24.8	22.6	21	25	29.3	20.6	20.2	24.2
5	21.8	18.8	18.5	19.2	18.4	18.6	21	21.6	21.2	19.4	24.5	28.8	20	17.6	22.6
8	28.3	26.2	21	25.8	25.4	29	30.6	29.6	24.8	26.8	28.8	31.8	23	24	30.8
11	33.5	33.2	28.2	31.4	31.5	34	33	32	30	33.6	34.2	21	28.9	30.2	36.6
14	35.2	35.8	31.2	33.2	34.5	36.2	39.4	38	33.2	36.4	39.6	22	31	35.4	39.8
17	34	35.4	31.6	32	35	37	38.1	31.8	31.8	35.2	38.5	23.6	31.6	25.4	40.5
20	26.9	28.8	28.8	25.8	26.2	28.7	30	31.3	30.6	27	30.2	34	22.4	26.6	30.2
23	22.6	25.3	26.3	22.8	22	24.2	26.2	27.4	27	22.8	26.4	31.2	21.6	23	26

horas	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2	21.2	21.5	24	20.6	20.2	22.6	24	24.8	22.6	21	25	29.3	20.6	20.2	24.2
5	21.8	18.8	18.5	19.2	18.4	18.6	21	21.6	21.2	19.4	24.5	28.8	20	17.6	22.6
8	28.3	26.2	21	25.8	25.4	29	30.6	29.6	24.8	26.8	28.8	31.8	23	24	30.8
11	33.5	33.2	28.2	31.4	31.5	34	33	32	30	33.6	34.2	21	28.9	30.2	36.6
14	35.2	35.8	31.2	33.2	34.5	36.2	39.4	38	33.2	36.4	39.6	22	31	35.4	39.8
17	34	35.4	31.6	32	35	37	38.1	31.8	31.8	35.2	38.5	23.6	31.6	25.4	40.5
20	26.9	28.8	28.8	25.8	26.2	28.7	30	31.3	30.6	27	30.2	34	22.4	26.6	30.2
23	22.6	25.3	26.3	22.8	22	24.2	26.2	27.4	27	22.8	26.4	31.2	21.6	23	26

Horas	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2	18.2	21	19	21.5	19.2	15	14.6	19.5	18.6	21	19.7	20	20.2	13.3	10.2
5	19	20.4	19	20	17.4	13.7	14.6	19.2	18.2	20.9	19.8	20.7	20.2	12.5	12
8	19.4	20.7	21.8	21	17	16.8	18.6	20	20.4	22.2	19.8	20.8	20.2	12.6	11.8
11	24.4	22.8	22.6	26	22.4	25.4	25	21.4	24.4	22	22	19.8	19	16.5	16.4
14	23.5	23.6	23.4	29	25	27.7	24.2	20.8	26	21.2	23	21.8	17.6	19	18
17	20.5	24.6	27	24	24.4	25.6	19.6	21.4	25.9	22.2	23.2	23	17.9	17.4	15.6
20	21	21	20.4	22.6	21	20.2	18.9	19.6	20.8	21.6	20.6	21.6	20.6	16.8	14
23	19.6	21.2	19.2	22.3	20.6	16.1	18	19.9	19.4	19.5	19.6	21.6	19.9	17	11.8

Horas	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2	18.2	21	19	21.5	19.2	15	14.6	19.5	18.6	21	19.7	20	20.2	13.3	10.2
5	19	20.4	19	20	17.4	13.7	14.6	19.2	18.2	20.9	19.8	20.7	20.2	12.5	12
8	19.4	20.7	21.8	21	17	16.8	18.6	20	20.4	22.2	19.8	20.8	20.2	12.6	11.8
11	24.4	22.8	22.6	26	22.4	25.4	25	21.4	24.4	22	22	19.8	19	16.5	16.4
14	23.5	23.6	23.4	29	25	27.7	24.2	20.8	26	21.2	23	21.8	17.6	19	18
17	20.5	24.6	27	24	24.4	25.6	19.6	21.4	25.9	22.2	23.2	23	17.9	17.4	15.6
20	21	21	20.4	22.6	21	20.2	18.9	19.6	20.8	21.6	20.6	21.6	20.6	16.8	14
23	19.6	21.2	19.2	22.3	20.6	16.1	18	19.9	19.4	19.5	19.6	21.6	19.9	17	11.8

Horas	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2	7.1	5	7.4	11.8	12.3	7.5	9.2	11.6	12.6	13.2	13.2	16.8	12.8	16.2	17
5	5	4.6	6	10	12.7	5.6	7.3	11.1	11	11.4	12.4	16.2	12	16.2	16.8
8	5.4	6.6	7.5	11	12.2	7.6	10	11.8	11.8	12	13.2	15.8	14.2	15.2	18
11	11.6	14.6	15.7	13.8	12.8	14.2	16	19.3	19.4	19.6	19.2	19.2	19	21.4	19.4
14	14	16.6	18.6	20.8	13	16.8	19.2	22.2	22.2	22	21.6	21.6	25.3	23.6	20.3
17	12.6	15	17	19.6	12.4	13.8	17	19.2	20.2	19.7	21	18.9	21.6	23.1	20
20	11	7.8	11	14.2	15	11.4	10.2	13.2	15.8	16	15.6	17.8	13.4	18.6	20.3
23	9	5.8	9.4	12.8	13.4	9.2	9.8	13.2	13.4	14.7	14.4	17.4	13.4	18.2	18.8

Horas	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2	7.1	5	7.4	11.8	12.3	7.5	9.2	11.6	12.6	13.2	13.2	16.8	12.8	16.2	17
5	5	4.6	6	10	12.7	5.6	7.3	11.1	11	11.4	12.4	16.2	12	16.2	16.8
8	5.4	6.6	7.5	11	12.2	7.6	10	11.8	11.8	12	13.2	15.8	14.2	15.2	18
11	11.6	14.6	15.7	13.8	12.8	14.2	16	19.3	19.4	19.6	19.2	19.2	19	21.4	19.4
14	14	16.6	18.6	20.8	13	16.8	19.2	22.2	22.2	22	22	21.6	21.6	25.3	23.6
17	12.6	15	17	19.6	12.4	13.8	17	19.2	20.2	19.7	21	18.9	21.6	23.1	20
20	11	7.8	11	14.2	15	11.4	10.2	13.2	15.8	16	15.6	17.8	13.4	18.6	20.3
23	9	5.8	9.4	12.8	13.4	9.2	9.8	13.2	13.4	14.7	14.4	17.4	13.4	18.2	18.8

Horas	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2	18.6	19.9	19.9	15.8	16.9	13.4	17.6	18	20.7	15	10	10.5	15.2	17.2	18.8
5	18.4	16.2	13.8	15.1	16.5	11.8	16.2	23.6	20.2	12.7	8.2	10	13	14.9	17.6
8	20	17.2	14.4	15.4	18.6	21	24.4	24.4	20.4	16.2	14.6	16.8	19.8	22.4	24.8
11	22.8	16.8	17.8	16.2	23	26.4	29	27.4	23.2	23.2	17.5	22	27	27.5	27.5
14	23	17.4	17.6	17.4	24.8	29	31.2	27	26	21.7	21.6	25.7	28.4	29.6	33.5
17	24.4	16.2	16.8	18.4	24.8	28.9	28.9	23.4	25.8	25.8	20.4	25.2	28	28.6	31.6
20	21.2	23	15.6	16.2	17.2	18.5	21.2	22.4	22.4	19.2	15.9	14.2	19.6	22.4	23.6
23	19.8	21.4	14.8	15.9	17.2	15.8	18.6	18.6	21	17.3	12.8	13.3	18.2	20.2	20.8

Horas	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2	18.6	19.9	19.9	15.8	16.9	13.4	17.6	18	20.7	15	10	10.5	15.2	17.2	18.8
5	18.4	16.2	13.8	15.1	16.5	11.8	16.2	23.6	20.2	12.7	8.2	10	13	14.9	17.6
8	20	17.2	14.4	15.4	18.6	21	24.4	24.4	20.4	16.2	14.6	16.8	19.8	22.4	24.8
11	22.8	16.8	17.8	16.2	23	26.4	29	27.4	23.2	23.2	17.5	22	27	27.5	27.5
14	23	17.4	17.6	17.4	24.8	29	31.2	27	26	21.7	21.6	25.7	28.4	29.6	33.5
17	24.4	16.2	16.8	18.4	24.8	28.9	28.9	23.4	25.8	25.8	20.4	25.2	28	28.6	31.6
20	21.2	23	15.6	16.2	17.2	18.5	21.2	22.4	22.4	19.2	15.9	14.2	19.6	22.4	23.6
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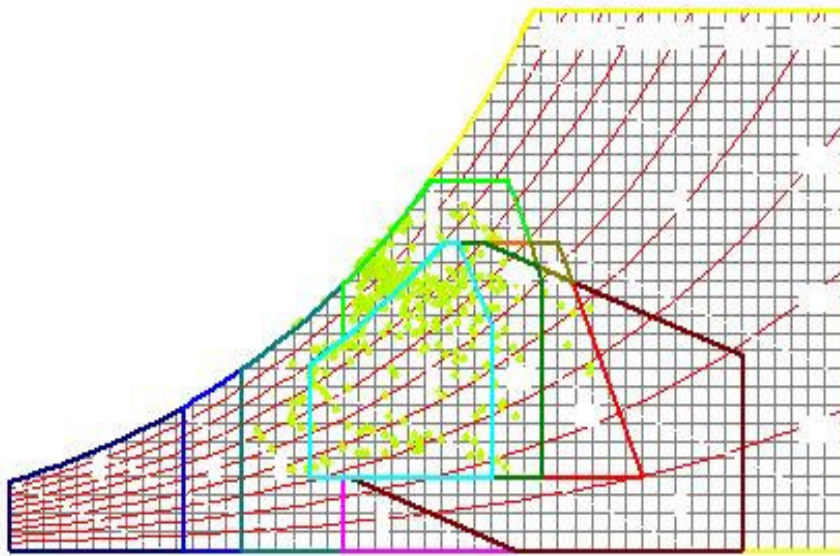
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28	20	18	20	19	21	23	24	22	24	21	21	23	25	25	25	25	27	27	20	18	18	22	17	27	27	24	20	23	24	24	24	24
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30	20	18	20	19	21	23	24	22	24	21	21	23	25	25	25	25	27	27	20	18	18	22	17	27	27	24	20	23	24	24	24	24
31	20	18	20	19	21	23	24	22	24	21	21	23	25	25	25	25	27	27	20	18	18	22	17	27	27	24	20	23	24	24	24	24

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
210	18.0	15.0	17.0	17.0	18.0	21.0	18.0	19.0	20.0	21.0	21.0	23.0	23.0	22.0	18.0	20.0	22.0	19.0	18.0	13.0	15.0	17.0	19.0	20.0	20.0	22.0	22.0	22.0	19.0	18.0		
200	15.0	15.0	16.0	16.0	14.0	19.0	21.0	17.0	18.0	20.0	21.0	22.0	22.0	21.4	20.0	18.0	20.0	20.0	18.0	15.0	16.0	16.0	18.0	20.0	21.0	21.0	21.0	22.0	19.0	18.0		
190	13.0	13.0	14.0	14.0	13.0	20.0	15.0	18.0	18.0	19.0	20.0	22.0	22.0	19.0	13.0	18.0	21.0	20.0	18.0	11.0	15.0	15.0	18.0	18.0	19.0	19.0	20.0	22.0	20.0	16.0		
180	13.0	13.0	13.0	16.0	18.0	20.0	16.0	17.0	17.0	18.0	19.6	21.0	19.0	20.2	18.0	17.0	21.0	20.0	18.0	10.6	15.0	15.0	17.0	18.0	19.0	19.0	22.0	20.0	16.0	16.0		
150	13.6	13.6	13.0	13.0	13.0	18.4	20.2	16.5	17.0	16.8	18.0	23.2	23.2	20.0	20.0	17.0	20.0	20.0	17.4	11.0	15.6	16.4	16.6	18.0	19.5	19.5	16.5	21.6	18.6	18.0		
140	13.0	13.0	13.0	13.0	13.0	18.0	20.0	17.0	17.0	17.0	18.0	23.0	23.0	21.0	21.0	17.0	21.0	21.0	17.0	10.0	15.0	15.0	17.0	18.0	19.0	19.0	22.0	20.0	16.0	16.0		
130	19.0	19.0	16.0	14.0	16.0	20.0	22.0	17.0	20.0	18.0	20.0	23.0	22.0	21.0	20.2	21.6	18.0	21.0	21.4	18.0	14.6	17.0	20.2	19.0	19.0	19.0	22.0	20.0	17.0	20.0	17.0	
120	19.8	19.2	17.0	19.0	21.0	21.8	19.2	22.0	21.6	23.2	26.0	24.0	23.2	21.0	24.0	23.2	22.0	22.6	23.0	18.0	18.0	19.0	24.0	21.0	21.4	21.8	22.0	21.2	21.0	21.2	19.2	
110	19.0	21.0	20.0	20.0	20.0	22.0	24.0	24.0	22.0	25.0	28.0	28.0	27.0	27.0	21.0	23.0	23.0	22.0	25.0	25.0	19.0	24.0	26.0	24.0	25.0	25.0	24.0	24.0	21.0	23.0	23.0	
200	21.0	21.0	21.0	21.0	23.0	23.0	26.0	27.0	27.0	28.2	29.0	27.0	27.0	21.8	23.2	24.0	27.0	28.4	19.0	21.4	24.0	27.0	27.0	27.0	27.0	27.0	27.0	28.0	21.0	23.0	25.0	
190	21.0	21.0	21.0	21.0	23.0	23.0	26.0	27.0	27.0	28.2	29.0	27.0	27.0	21.8	23.2	24.0	27.0	28.4	19.0	21.4	24.0	27.0	27.0	27.0	27.0	27.0	27.0	28.0	21.0	23.0	25.0	
210	22.0	22.0	21.0	23.0	23.0	24.0	29.0	29.0	30.0	27.6	30.0	27.0	27.0	23.8	23.8	27.0	29.0	25.0	23.0	23.0	26.0	27.0	28.0	30.0	30.0	30.0	28.0	21.0	23.0	27.0		
200	22.0	22.0	20.0	21.0	24.0	24.0	28.0	29.0	30.0	27.0	27.0	23.8	26.8	27.0	22.8	30.0	28.4	30.0	24.0	19.0	23.0	26.0	26.2	29.0	28.0	31.0	29.0	21.0	23.0	28.0		
204	22.0	22.0	20.2	21.6	24.2	24.2	28.0	27.6	27.6	27.0	27.0	23.8	26.0	23.0	23.0	27.0	29.0	24.0	22.0	20.0	23.0	26.4	26.0	28.0	27.4	29.0	21.0	23.0	28.4	21.0	23.0	
209	22.0	22.0	20.0	21.0	24.0	24.0	28.0	29.0	30.0	27.6	27.6	23.8	26.0	23.0	23.0	27.0	29.0	24.0	22.0	20.0	23.0	26.4	26.0	28.0	27.4	29.0	21.0	23.0	28.4	21.0	23.0	
190	19.0	19.0	19.0	21.0	22.0	23.2	26.4	27.0	27.0	25.0	25.0	26.4	26.0	25.0	22.0	22.0	26.2	22.0	20.6	22.0	22.0	26.0	25.0	27.0	26.0	31.0	27.0	21.0	23.0	25.0		
180	19.2	20.6	18.0	20.8	22.2	22.0	26.0	26.4	26.4	24.0	26.0	26.0	24.0	21.0	22.0	24.0	22.0	20.0	19.2	20.0	24.0	23.0	25.8	25.0	26.4	28.0	25.8	21.0	23.0	24.0	23.6	
150	19.0	18.0	18.0	20.0	22.0	22.0	24.0	25.0	24.0	24.0	26.0	24.0	24.0	22.0	22.0	23.0	22.0	20.0	18.0	19.0	23.0	24.0	23.0	25.0	25.0	25.0	20.0	22.0	23.0	23.0		
140	19.0	18.0	18.0	20.0	22.0	22.0	24.0	25.0	24.0	24.0	26.0	24.0	24.0	22.0	22.0	23.0	22.0	20.0	18.0	19.0	23.0	24.0	23.0	25.0	25.0	25.0	20.0	22.0	23.0	23.0		
130	19.0	18.0	18.0	20.0	22.0	22.0	24.0	25.0	24.0	24.0	26.0	24.0	24.0	22.0	22.0	23.0	22.0	20.0	18.0	19.0	23.0	24.0	23.0	25.0	25.0	25.0	20.0	22.0	23.0	23.0		
120	19.0	18.0	18.0	20.0	22.0	22.0	24.0	25.0	24.0	24.0	26.0	24.0	24.0	22.0	22.0	23.0	22.0	20.0	18.0	19.0	23.0	24.0	23.0	25.0	25.0	25.0	20.0	22.0	23.0	23.0		
110	19.0	18.0	18.0	20.0	22.0	22.0	24.0	25.0	24.0	24.0	26.0	24.0	24.0	22.0	22.0	23.0	22.0	20.0	18.0	19.0	23.0	24.0	23.0	25.0	25.0	25.0	20.0	22.0	23.0	23.0		
200	19.0	17.0	17.0	19.0	21.0	21.0	24.0	24.0	23.0	23.0	24.0	23.0	23.0	21.0	21.0	22.0	21.0	19.4	17.0	18.6	19.4	23.0	23.0	23.0	23.0	23.0	21.0	22.0	23.0	23.0	23.0	
190	18.0	18.0	17.0	20.0	21.0	20.0	22.0	24.0	22.0	24.0	24.0	24.0	24.0	21.0	21.0	22.0	20.0	19.0	17.0	18.0	20.0	22.0	22.0	23.0	23.0	24.0	24.0	20.0	22.0	23.0		
170	17.0	17.0	17.0	17.0	20.0	21.0	20.0	23.0	23.0	23.0	23.0	23.0	23.0	21.0	20.8	22.0	19.6	18.0	14.0	17.0	19.0	21.0	22.0	22.0	23.0	23.0	24.0	23.0	23.0	20.0	19.0	21.0

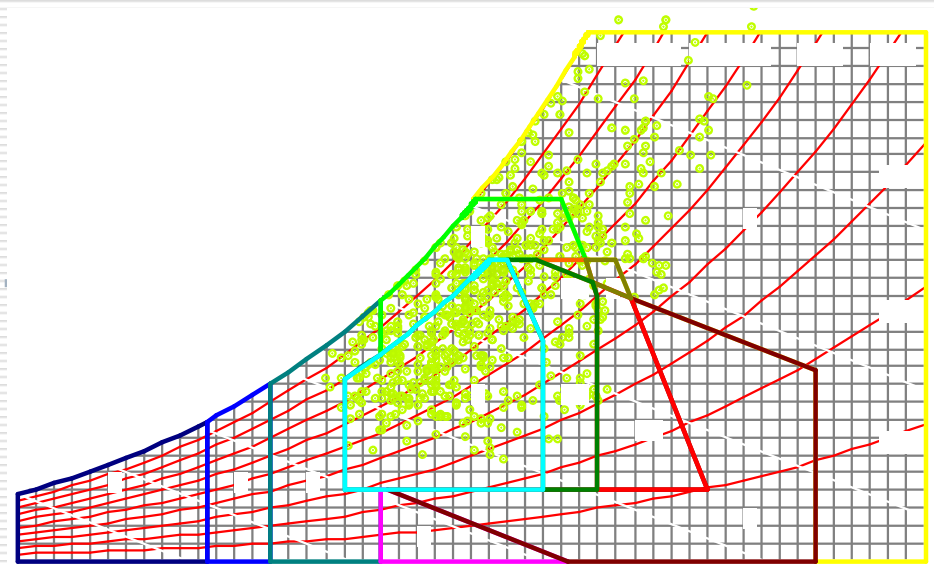
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
7.2	3.0	7.2	0.0	1.0	8.5	3.0	8.0	7.0	4.0	8.0	4.5	3.0	3.0	3.0	3.0	1.0	6.0	12.0	7.0	3.0	0.0	12.0	3.0	4.0	5.0	3.0	1.0	8.0	8.0	3.0	
7.2	9.0	8.0	0.0	1.0	8.0	0.0	8.0	7.0	4.0	8.0	4.5	3.0	3.0	3.0	3.0	0.0	6.0	12.0	7.0	3.0	0.0	12.0	3.0	4.0	5.0	3.0	1.0	8.0	8.0	3.0	
6.8	8.0	9.0	9.8	1.0	8.5	1.4	8.4	8.8	3.4	5.4	3.0	8.0	9.8	0.0	2.8	2.8	8.2	12.0	6.5	9.0	10.2	12.0	8.8	2.0	4.2	10.2	10.8	8.0	9.0	9.2	
6.0	7.0	9.4	9.0	1.0	1.0	1.0	8.0	7.0	3.0	5.0	2.0	7.0	3.0	1.0	2.0	3.0	6.0	12.0	6.0	9.0	1.0	12.0	3.0	2.0	4.0	10.0	10.0	8.0	8.0	9.0	
8.0	8.0	9.0	9.0	1.0	0.0	1.0	8.0	6.0	2.8	5.0	2.0	7.5	8.0	1.0	2.0	3.0	4.0	11.0	6.0	9.0	1.0	12.0	3.0	2.0	4.0	10.0	10.0	8.0	8.0	9.0	
9.0	7.2	9.0	3.4	10.2	8.0	0.0	7.8	6.0	2.0	4.2	1.0	8.0	6.0	8.4	2.4	2.8	4.8	1.0	17.8	9.0	10.2	12.0	8.8	1.8	4.0	12.0	10.0	8.0	9.0	9.0	
8.0	7.2	9.0	6.4	10.0	1.0	0.0	8.0	6.0	2.0	4.2	1.0	8.0	6.0	8.4	2.4	2.8	4.8	1.0	17.8	9.0	10.2	12.0	8.8	1.8	4.0	12.0	10.0	8.0	9.0	9.0	
6.0	7.0	9.0	3.0	10.2	8.0	3.0	6.0	8.0	4.6	3.0	1.4	9.8	9.0	12.2	2.0	4.0	11.0	9.0	9.0	1.0	12.0	8.4	2.0	3.0	4.0	10.0	10.0	8.4	9.4	9.0	
8.0	8.0	9.0	10.2	1.0	8.0	4.0	8.0	7.2	9.0	3.0	4.0	9.0	9.0	4.0	2.8	3.4	5.2	13.0	14.1	10.0	12.0	12.2	9.0	2.0	4.0	12.0	8.8	9.0	10.0	9.8	
11.0	10.0	9.6	11.0	10.0	10.0	10.0	9.0	10.0	9.0	11.0	7.0	7.0	9.0	3.4	8.0	7.0	7.0	8.0	14.0	11.0	12.0	13.0	10.0	6.0	6.0	11.0	9.0	9.0	10.0	10.0	
15.0	10.0	10.0	11.0	10.4	10.4	7.4	12.0	12.0	12.2	10.0	9.0	10.0	9.0	9.0	9.0	10.0	12.0	15.0	14.0	11.2	12.6	12.0	10.0	9.0	10.0	12.0	9.0	9.6	11.0	10.0	
16.8	10.0	10.0	11.8	10.0	10.0	8.0	12.8	13.4	12.0	10.8	12.0	10.0	8.0	11.0	11.0	11.0	11.0	11.0	14.0	17.0	13.0	11.0	12.0	12.2	10.0	9.8	11.0	13.0	9.0	10.0	10.0
17.0	10.0	10.6	12.0	10.0	10.0	12.0	14.0	14.0	12.0	12.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	14.0	17.0	13.0	11.0	12.0	12.0	10.0	9.0	12.0	14.0	10.0	10.0	10.0	10.0
18.0	10.0	11.0	12.0	9.0	9.6	10.0	14.0	14.0	12.0	12.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	14.0	17.0	13.0	11.0	12.0	12.0	10.0	9.0	12.0	14.0	10.0	10.0	10.0	10.0
8.4	10.0	8.0	10.0	10.0	12.0	14.0	12.0	10.4	8.0	9.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	14.0	17.0	13.0	11.0	12.0	12.0	10.0	9.0	12.0	14.0	10.0	10.0	10.0	10.0
9.0	10.2	10.0	11.0	10.2	12.0	15.0	14.0	9.0	9.0	7.0	11.0	14.0	17.0	14.0	20.0	13.0	11.0	12.0	10.0	9.0	9.0	15.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
12.0	9.0	10.0	11.0	9.0	7.0	11.8	14.0	13.0	10.0	9.0	8.0	9.0	8.8	11.0	17.0	13.0	17.6	12.0	10.4	12.2	12.0	10.0	9.0	9.0	14.0	14.0	8.0	8.8	10.0	8.0	8.0
9.0	9.0	9.0	9.0	9.0	6.0	12.2	12.2	10.8	9.0	8.2	8.0	8.0	8.0	7.0	9.0	9.0	12.0	17.0	11.0	10.0	12.0	11.4	7.0	8.0	14.0	14.0	8.0	9.0	9.0	9.0	9.0
9.0	9.0	9.0	11.0	3.4	6.0	11.0	10.0	9.0	8.0	7.0	8.0	8.0	5.2	6.0	9.0	10.0	12.0	16.0	10.0	10.0	11.0	11.0	6.0	8.0	10.0	12.0	8.0	9.0	9.0	9.0	9.0
9.0	8.8	9.0	9.0	9.0	6.0	9.0	11.0	8.0	8.0	7.0	8.0	8.0	4.0	6.0	8.0	9.0	12.0	16.0	10.0	10.0	11.0	11.0	6.0	7.0	10.0	12.0	8.4	9.0	9.0	8.0	8.0
8.0	9.0	10.0	10.0	9.0	6.8	9.0	9.6	7.0	9.0	7.0	8.4	8.8	2.8	5.8	6.8	9.0	12.0	15.8	10.8	10.8	10.8	10.8	6.8	7.0	11.2	12.0	8.8	9.0	8.8	9.0	7.4
8.0	9.0	10.0	10.0	9.0	6.8	9.0	9.6	7.0	9.0	7.0	8.4	8.8	2.8	5.8	6.8	9.0	12.0	15.8	10.8	10.8	10.8	10.8	6.8	7.0	11.2	12.0	8.8	9.0	8.8	9.0	7.4
8.0	9.0	10.0	10.0	9.0	6.8	9.0	9.6	7.0	9.0	7.0	8.4	8.8	2.8	5.8	6.8	9.0	12.0	15.8	10.8	10.8	10.8	10.8	6.8	7.0	11.2	12.0	8.8	9.0	8.8	9.0	7.4
8.0	7.8	8.8	10.0	8.8	5.0	9.0	7.0	8.0	5.0	8.0	5.0	8.0	3.0	14.0	8.0	7.0	13.8	9.0	9.0	9.0	10.0	10.0	7.0	7.0	10.0	10.0	8.0	7.4	8.0	7.0	7.0

[illegible]

- características climáticas
- potencialidades



18 27
Montevideo, febrero



18 27
Salto, enero

De hecho, ya es sabido que en los últimos años los picos de consumo energético en España, ya no se dan en Invierno, como antiguamente, si no en los meses de más calor y esto es debido *múltiples causas...*

CLIMA TEMPLADO

Requerimientos – desafíos a resolver

Problemas del frío, del calor y amplitud de temp

Frío: Aumentar la temp. interior media

- Evitar perder calor
- Captar energía solar

Calor: Reducir la Temp. interior media

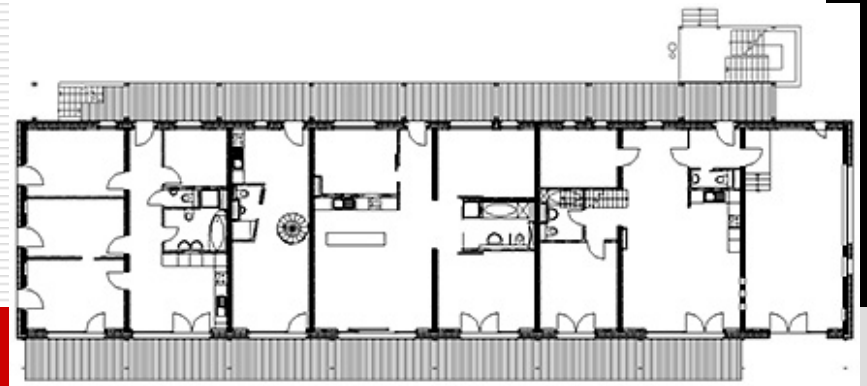
- No captar energía solar
- Aumentar pérdidas

- Control de los flujos de calor en el tiempo

Estrategias de diseño / Orientación, protecciones, ventilación, inercia térmica. (masa térmica aislada)

dispositivos arquitectónicos flexibles

VIVIENDAS en FRIBURGO - Alemania



VIVIENDAS en FRIBURGO - Alemania

Energía

Orientación

El edificio es un paralelepípedo **orientado N-S**

Ventilación natural

La disposición del bloque con las viviendas pasantes permite **ventilación cruzada N-S**

Iluminación natural

Todas las habitaciones tienen iluminación natural. El 50% de la fachada sur y un 20% de la norte son acristaladas.

Inercia térmica

La estructura del edificio, de muros portantes de ladrillos silico calcáreos y prelosas que sirven de encofrado perdido a la chapa de hormigón, favorece una **regulación térmica natural**.

Aislamiento

Cubierta ajardinada de vegetación extensiva. **Triple vidrio**. Subestructura de las fachadas de madera para evitar puentes térmicos.

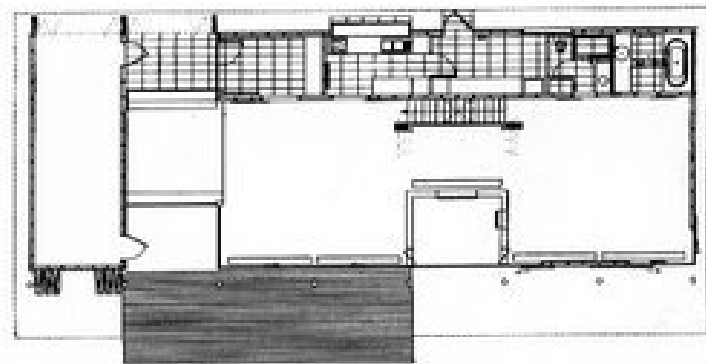
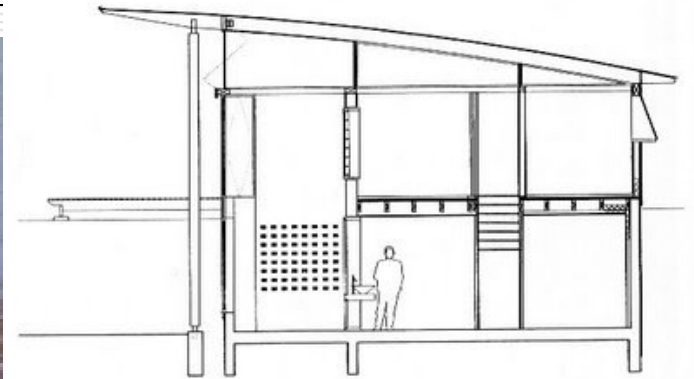
Eficiencia energética

Para optimizar los aportes solares y reducir las pérdidas térmicas los acristalamientos ocupan **50% de la fachada sur** y el **20% en el resto de fachadas**. Ventilación mecánica provista de un recuperador de calor con un rendimiento del 85%

Energías alternativas/renovables

Depósito de agua caliente de 3400l que contribuyen a la calefacción durante el invierno y aportan toda el agua caliente necesaria entre abril y septiembre. Un cogenerador y un sistema de placas fotovoltaicas que aportan el 80% de la electricidad necesaria.

VIVIENDAS en Perche – Francia / 1998 Sonia Cortesse



Plan of the lower, garden level (left)
and the ground floor (right).

0 1 2 3 4 m

VIVIENDAS en Perche – Francia / 1998 Sonia Cortesse

Energía

Orientación

Fachadas principales orientación N-S. Los locales equipados se concentran en la fachada norte creando un colchón térmico

Ventilación natural

Fachadas principales orientación N-S. Los locales equipados se concentran en la fachada norte creando un colchón térmico

Iluminación natural

Grandes ventanales para favorecer la iluminación natural

Inercia térmica

Mamparas pivotantes y regulables que permiten controlar el calor de los materiales macizos

Aislamiento

Aislamiento reforzado, doble cristal

Eficiencia energética

Aprovechamiento pasivo de la energía solar



Pautas para trabajo:

CONFORT:

De acuerdo a los conceptos presentados, analizar qué aspectos tienen, a su juicio, relación con su sensación de bienestar térmico en el ambiente en que trabaja, estudia, vive.

CLIMA:

Para el caso de estudio, analizar:

- cuáles estrategias de diseño se han aplicado;
- si se ajustan a las condiciones climáticas de Montevideo,
- cuáles no han sido consideradas

Repartido AT 01: www.farq.edu.uy, link publicaciones

Rivero R. Arquitectura y clima

Gonzalo G. Manual de Arquitectura bioclimática

Lamberts, Dutra y Pereira- Eficiencia energética na Arquitetura. www.labeee.ufsc.br/arquivos/publicacoes/eficiencia_energetica_na_arquitetura.pdf

www.underground.com (datos desde 1996 hasta hoy)

<http://estandconstrumat.paus.cat/>