INDEX

1.- GENERAL DATA

Geographic information

Location	Latitude (°)	Longitude (°)	Elevation (m)	Time zone	Daylight saving time (DST) First month	Last month
LONDON WEATHER CENT	51.52	-0.10	43.00	GMT 0.00	April	October

Heating design conditions

Dry bulb temperature (°C)	Relative humidity (%)	Ground temperature (°C)
0.40	80.0	7.34

Cooling design conditions

	January	February	March	April	May	June	July	August	September	October	November	December
Temperatures												
DB (°C)	12.60	13.10	15.60	19.00	23.80	26.60	28.20	28.40	24.10	19.00	15.20	13.50
MDBR (°C)	4.00	4.40	5.50	6.60	7.40	7.50	7.60	7.30	6.40	5.20	4.30	3.80
MCWB (°C)	10.30	10.40	10.20	11.60	15.60	17.50	18.10	18.40	17.00	14.80	12.90	11.40
MCWBR (°C)	4.80	3.90	4.00	4.00	4.90	4.90	3.90	3.70	3.70	3.60	3.70	4.40
Solar radiation												
τ_b	0.333	0.344	0.411	0.408	0.436	0.451	0.470	0.442	0.397	0.372	0.347	0.342
τ_d	2.272	2.240	1.977	2.012	1.955	1.945	1.913	2.003	2.144	2.173	2.226	2.235

Abbreviations

DST	Daylight Saving Time
DB	Dry-Bulb
MDBR	Mean dry-bulb range
MCWB	Mean coincident wet-bulb
MCWBR	Mean coincident wet-bulb range
t_b	Clear sky optical depth for beam irradiance
t_d	Clear sky optical depth for diffuse irradiance

2.- LOAD CALCULATION SUMMARY

2.1.- Cooling

Zone cooling loads summary:

					External	Internal		Ventilation			Total			
	A (m²)	Conduction (W)	Solar (W)	Lat. inf. (W)	Sens. inf. (W)	Lat. (W)	Sens. (W)	Airflow (l/s)	Lat. (W)	Sens. (W)	Lat. (W)	Sens. (W)	Total (W/m²)	Total (W)
Peak cooling loads per room														
Lounge	38.0	157.5	923.9	0.0	0.0	26.6	140.5	28.5	-12.0	147.1	14.6	1369.1	36.4	1383.7
Kitchen	11.8	81.7	460.8	0.0	0.0	8.3	42.8	8.9	-3.7	45.7	4.5	631.0	53.9	635.6
Bedroom1	17.0	83.6	49.8	0.0	0.0	11.9	130.8	12.8	-28.3	40.8	-16.4	305.0	17.0	288.7
Bedroom2	14.4	5.7	286.4	0.0	0.0	5.0	51.4	10.8	-56.4	-38.0	-51.4	305.5	17.6	254.1
Bedroom3	22.3	145.7	49.7	0.0	0.0	15.6	171.7	16.7	-37.1	53.6	-21.5	420.6	17.9	399.2
Hall	17.7	28.4	41.1	0.0	0.0	24.8	195.2	13.3	-7.7	64.8	17.1	329.5	19.6	346.6
Bathroom	12.3	30.3	0.0	0.0	0.0	8.6	100.1	9.2	-12.4	31.8	-3.8	162.2	12.9	158.3
Zone simultaneous peak cooling load: 21 of August at 16 (15 apparent solar time)														
	133.5							100.1			63.8	3325.8	25.4	3389.6

Abbreviations

A	Area
Conduction	Conduction heating load
Solar	Solar heating load
Lat. inf.	Latent infiltration
Sens. inf.	Sensible infiltration
Lat.	Latent
Sens.	Sensible

2.2.- Heating

Zone heating loads summary:

					External		Ventilation					Total
	A (m²)	Conduction (W)	Lat. inf. (W)	Sens. inf. (W)	Airflow (l/s)	Lat. (W)	Sens. (W)	Lat. (W)	Sens. (W)	Total (W/m²)	Total (W)
Peak heating loads per room											
Lounge	38.0	1114.4	0.0	0.0	28.5	138.9	759.7	138.9	1874.1	53.0	2013.0
Kitchen	11.8	420.8	0.0	0.0	8.9	43.1	235.9	43.1	656.7	59.3	699.8
Bedroom1	17.0	488.3	0.0	0.0	12.8	62.1	339.9	62.1	828.2	52.4	890.3
Bedroom2	14.4	365.5	0.0	0.0	10.8	52.6	287.9	52.6	653.4	49.0	706.1
Bedroom3	22.3	674.1	0.0	0.0	16.7	81.5	445.8	81.5	1120.0	53.9	1201.5
Hall	17.7	238.0	0.0	0.0	13.3	64.7	353.9	64.7	591.9	37.1	656.6
Bathroom	12.3	489.6	0.0	0.0	9.2	72.4	280.8	72.4	770.4	68.7	842.8
Zone simultaneous peak heating load											
	133.5				100.1			515.3	6494.8	52.5	7010.1

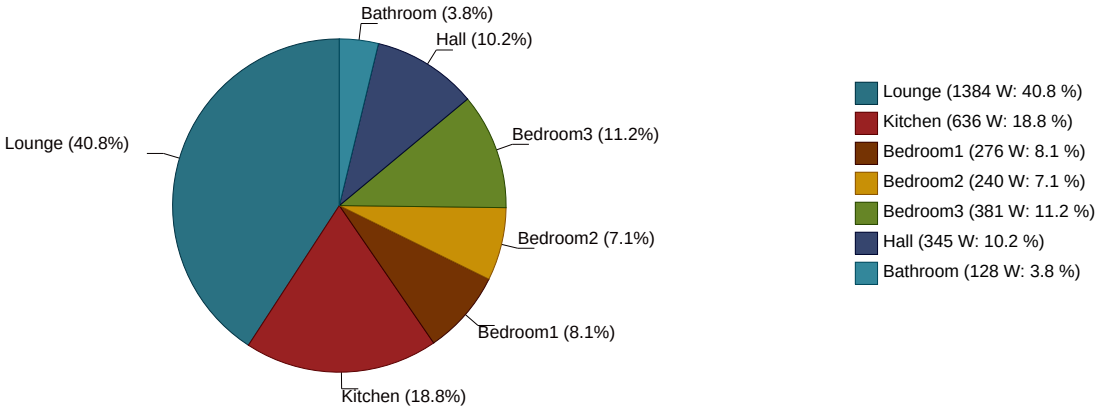
Abbreviations

A	Area
Conduction	Conduction heating load
Solar	Solar heating load
Lat. inf.	Latent infiltration
Sens. inf.	Sensible infiltration
Lat.	Latent
Sens.	Sensible

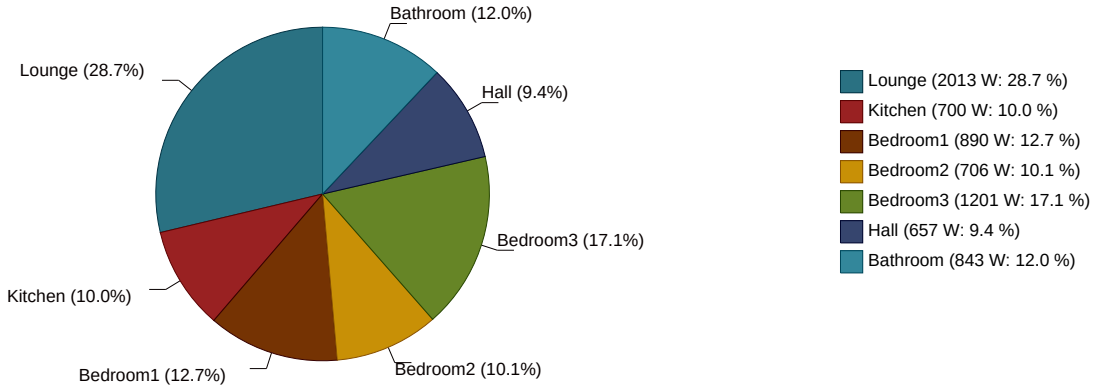
2.3.- Graphs

Simultanous peak cooling load (3390 W)

21 of August at 16h (15 apparent solar time)

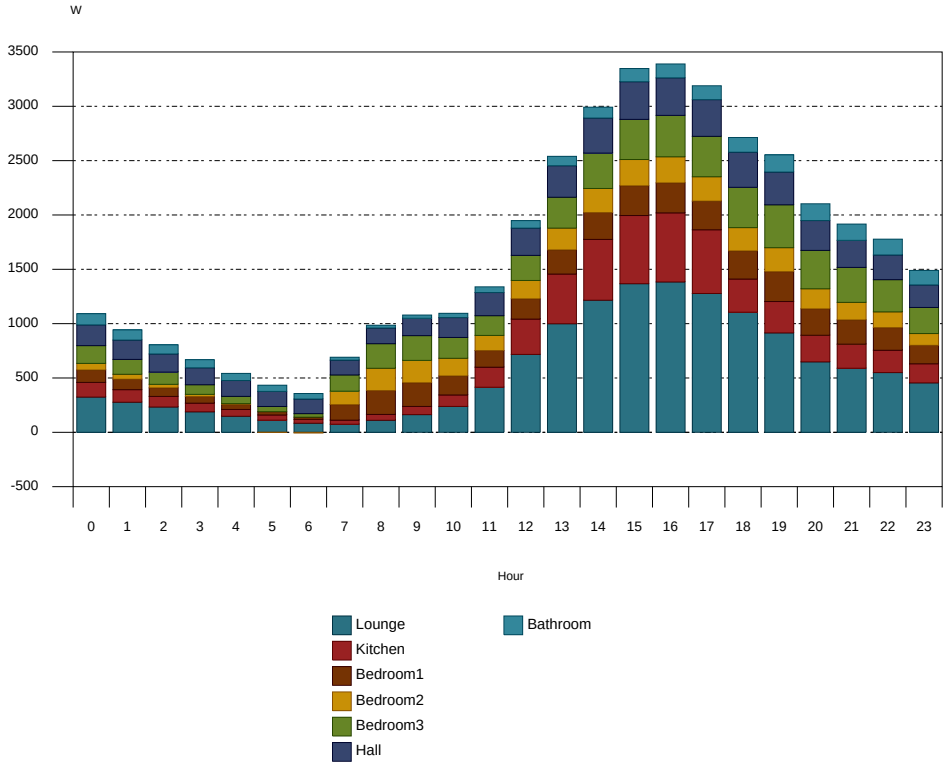


Peak heating load (7010 W)

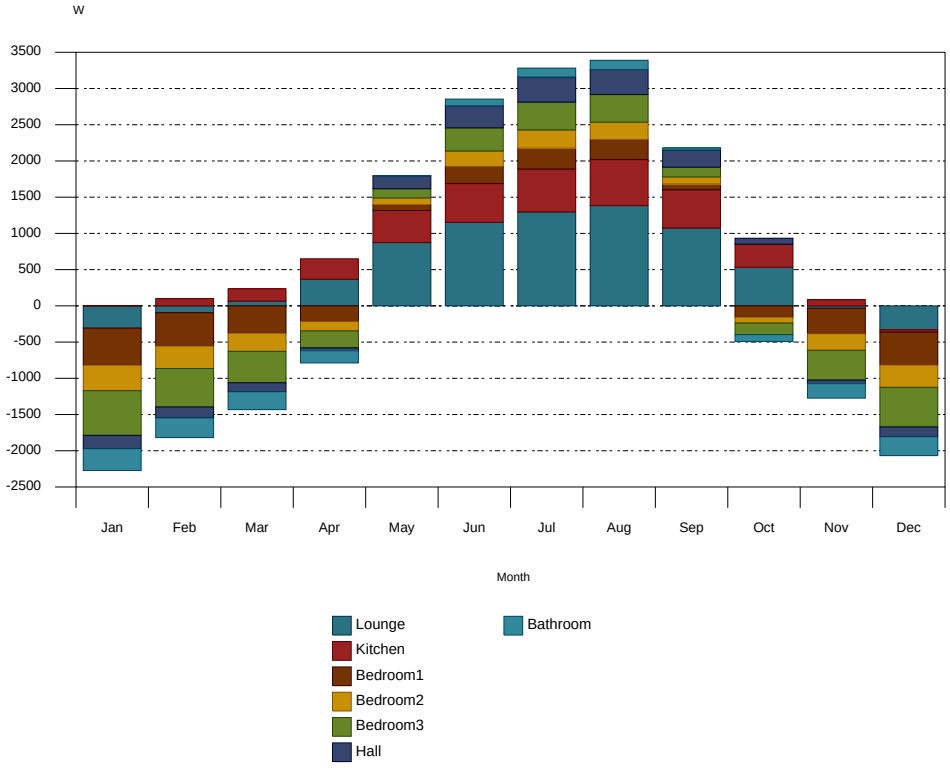


Hourly peak cooling load progression (21 of August)

Loads summary



Annual peak cooling load progression



3.- LOAD CALCULATION PER ROOM

3.1.- Cooling

Peak cooling load

Room: Lounge Zone:

Net floor area: 38.00 m² Net volume: 96.83 m³

Design conditions

Indoor:	Outdoor:
Room air temperature = 24.00 °C	Dry-bulb temperature = 28.4 °C
Relative humidity = 50.00%	Wet-bulb temperature = 18.4 °C

Time of peak cooling load: 21 of August at 16h (15 apparent solar time)

Conduction heat gains (opaque surfaces)

	T_{sa} (°C)	Ori. (°)	A (m²)	U (W/(m²K))	a	Tilt (°)	Convective component (W)	Radiative component (W)	Sensible cooling load (W)
Exterior surface									
Roof	39.17	N(0)	38.00	0.29	0.60	H(0)	17.38	12.66	30.04
NW Façade	37.24	NW(309)	15.70	0.59	0.60	V(90)	6.35	6.49	12.83
SW Façade	47.86	SW(219)	13.80	0.59	0.60	V(90)	15.09	12.18	27.27
SE Façade	31.53	SE(129)	10.80	0.59	0.60	V(90)	25.65	14.28	39.93
								TOTAL:	110.1

Abbreviations

T_{sa}	Sol-air temperature
Ori.	Orientation
A	Area
U	Heat transmission coefficient
a	Absorptance
Tilt	Tilt angle

Conduction heat gains (fenestration)

	Ori. (°)	A (m²)	U_{global} (W/(m²K))	Convective component (W)	Radiative component (W)	Sensible cooling load (W)
Exterior surface						
Window1	SW(219)	1.80	3.66	19.41	4.33	23.73
Window2	SW(219)	1.80	3.66	19.41	4.33	23.73

TOTAL:	47.5

Abbreviations

Ori.	Orientation
A	Area
U_{global}	Fenestration global thermic coeficient

Solar radiation heat gain

	Ori.	A	A_s	q	SHGC	Beam solar heat gain	Diffuse solar heat gain	Sensible cooling load
	(°)	(m²)	(m²)	(°)		(W)	(W)	(W)
Exterior surface								
Window1	SW(219)	1.80	1.80	40.72	0.68	357.40	134.72	461.97
Window2	SW(219)	1.80	1.80	40.72	0.68	357.40	134.72	461.97
							TOTAL:	923.9

Abbreviations

Ori.	Orientation
A	Area
A_s	Sunlit area
q	Incident angle
SHGC	Center-of-glazing solar heat gain coefficient, SHGC

Internal heat gains

	Sensible heat gain	Convective component	Radiative component	Latent cooling gain / load	Sensible cooling load
	(W)	(W)	(W)	(W)	(W)
Internal gains					
Occupancy	41.80	16.72	23.47	26.60	40.19
Lighting	50.16	20.06	30.10	-	50.17
Internal equipment	50.16	25.08	25.09	0.00	50.17
			TOTAL:	27	141

Ventilation and infiltration heat gains

	Airflow rate	Sensible heat recovery	Latent heat recovery	Latent cooling load	Sensible cooling load
	(m³/h)	(W)	(W)	(W)	(W)
Ventilation					
Ventilation	102.60	-0.00	0.00	-11.96	147.11
			TOTAL:	-12	147

Loads summary

Total cooling load

Total load per unit area (W/m²)	Sensible heat factor	Convective component (W)	Radiative component (W)	Latent cooling load (W)	Sensible cooling load (W)	TOTAL COOLING LOAD (W)
36.4	0.99	165.1	132.9	14.6	1369.1	1383.7 W

Peak cooling load

Room: Kitchen Zone:

Net floor area: 11.80 m² Net volume: 30.66 m³

Design conditions

Indoor:	Outdoor:
Room air temperature = 24.00 °C	Dry-bulb temperature = 28.4 °C
Relative humidity = 50.00%	Wet-bulb temperature = 18.4 °C

Time of peak cooling load: 21 of August at 16h (15 apparent solar time)

Conduction heat gains (opaque surfaces)

	T_{sa} (°C)	Ori. (°)	A (m²)	U (W/(m²K))	a	Tilt (°)	Convective component (W)	Radiative component (W)	Sensible cooling load (W)
Exterior surface									
Azotea	39.17	N(0)	11.80	0.29	0.60	H(0)	5.40	3.99	9.38
Fachada SW	47.86	SW(219)	6.10	0.59	0.60	V(90)	6.44	4.14	10.59
Fachada SE	31.53	SE(129)	11.30	0.59	0.60	V(90)	26.84	12.28	39.12
								TOTAL:	59.1

Abbreviations

T_{sa}	Sol-air temperature
Ori.	Orientation
A	Area
U	Heat transmission coefficient
a	Absorptance
Tilt	Tilt angle

Conduction heat gains (fenestration)

	Ori. (°)	A (m²)	U_{global} (W/(m²K))	Convective component (W)	Radiative component (W)	Sensible cooling load (W)
Exterior surface						
Ventana1	SW(219)	1.80	3.66	19.41	3.21	22.62
					TOTAL:	22.6

Abbreviations

Ori.	Orientation
A	Area

Loads summary

U_{global}	Fenestration global thermic coeficient

Solar radiation heat gain

	Ori.	A	A_s	q	SHGC	Beam solar heat gain	Diffuse solar heat gain	Sensible cooling load
	(°)	(m²)	(m²)	(°)		(W)	(W)	(W)
Exterior surface								
Ventana1	SW(219)	1.80	1.80	40.72	0.68	357.40	134.72	460.80
							TOTAL:	460.8

Abbreviations

Ori.	Orientation
A	Area
A_s	Sunlit area
q	Incident angle
SHGC	Center-of-glazing solar heat gain coefficient, SHGC

Internal heat gains

	Sensible heat gain	Convective component	Radiative component	Latent cooling gain / load	Sensible cooling load
	(W)	(W)	(W)	(W)	(W)
Internal gains					
Occupancy	12.98	5.19	6.77	8.26	11.96
Lighting	15.58	6.23	9.20	-	15.43
Internal equipment	15.58	7.79	7.66	0.00	15.45
			TOTAL:	8	43

Ventilation and infiltration heat gains

	Airflow rate	Sensible heat recovery	Latent heat recovery	Latent cooling load	Sensible cooling load
	(m³/h)	(W)	(W)	(W)	(W)
Ventilation					
Ventilation	31.86	-0.00	0.00	-3.71	45.68
			TOTAL:	-4	46

Total cooling load

Total load per unit area	Sensible heat factor	Convective component	Radiative component	Latent cooling load	Sensible cooling load	TOTAL COOLING LOAD
(W/m²)		(W)	(W)	(W)	(W)	(W)
53.9	0.99	77.3	47.2	4.5	631.0	635.6 W

Peak cooling load

Room: Bedroom1 Zone:

Net floor area: 17.00 m² Net volume: 44.06 m³

Design conditions

Indoor:	Outdoor:
Room air temperature = 24.00 °C	Dry-bulb temperature = 26.7 °C
Relative humidity = 50.00%	Wet-bulb temperature = 17.3 °C

Time of peak cooling load: 21 of July at 19h (18 apparent solar time)

Conduction heat gains (opaque surfaces)

	T_{sa} (°C)	Ori. (°)	A (m²)	U (W/(m²K))	a	Tilt (°)	Convective component (W)	Radiative component (W)	Sensible cooling load (W)
Exterior surface									
Azotea	28.40	N(0)	17.00	0.29	0.60	H(0)	11.67	7.90	19.57
Fachada NW	39.58	NW(309)	10.60	0.59	0.60	V(90)	14.17	8.12	22.30
Fachada NE	28.39	NE(39)	9.40	0.59	0.60	V(90)	15.60	9.86	25.46
								TOTAL:	67.3

Abbreviations

T_{sa}	Sol-air temperature
Ori.	Orientation
A	Area
U	Heat transmission coefficient
a	Absorptance
Tilt	Tilt angle

Conduction heat gains (fenestration)

	Ori. (°)	A (m²)	U_{global} (W/(m²K))	Convective component (W)	Radiative component (W)	Sensible cooling load (W)
Exterior surface						
Ventana1	NE(39)	1.80	3.66	11.98	4.32	16.30
					TOTAL:	16.3

Abbreviations

Ori.	Orientation
A	Area

U_{global}	Fenestration global thermic coeficient

Solar radiation heat gain

	Ori. (°)	A (m²)	A_s (m²)	q (°)	SHGC	Beam solar heat gain (W)	Diffuse solar heat gain (W)	Sensible cooling load (W)
Exterior surface								
Ventana1	NE(39)	1.80	1.80	115.93	0.68	0.00	42.31	49.77
							TOTAL:	49.8

Abbreviations

Ori.	Orientation
A	Area
A_s	Sunlit area
q	Incident angle
SHGC	Center-of-glazing solar heat gain coefficient, SHGC

Internal heat gains

	Sensible heat gain (W)	Convective component (W)	Radiative component (W)	Latent cooling gain / load (W)	Sensible cooling load (W)
Internal gains					
Occupancy	18.70	7.48	10.78	11.90	18.26
Lighting	74.80	29.92	24.67	-	54.59
Internal equipment	74.80	37.40	20.56	0.00	57.96
				TOTAL: 12	131

Ventilation and infiltration heat gains

	Airflow rate (m³/h)	Sensible heat recovery (W)	Latent heat recovery (W)	Latent cooling load (W)	Sensible cooling load (W)
Ventilation					
Ventilation	45.90	-0.00	0.00	-28.28	40.84
			TOTAL:	-28	41

Total cooling load

Total load per unit area (W/m²)	Sensible heat factor	Convective component (W)	Radiative component (W)	Latent cooling load (W)	Sensible cooling load (W)	TOTAL COOLING LOAD (W)
17.0	1.06	128.2	86.2	-16.4	305.0	288.7 W

Peak cooling load

Room: Bedroom2 Zone:

Net floor area: 14.40 m² Net volume: 37.40 m³

Design conditions

Indoor:	Outdoor:
Room air temperature = 24.00 °C	Dry-bulb temperature = 21.1 °C
Relative humidity = 50.00%	Wet-bulb temperature = 14.4 °C

Time of peak cooling load: 21 of July at 8h (7 apparent solar time)

Conduction heat gains (opaque surfaces)

	T_{sa} (°C)	Ori. (°)	A (m²)	U (W/(m²K))	a	Tilt (°)	Convective component (W)	Radiative component (W)	Sensible cooling load (W)
Exterior surface									
Azotea	25.96	N(0)	14.40	0.29	0.60	H(0)	11.04	7.55	18.59
Fachada NE	33.55	NE(39)	6.30	0.59	0.60	V(90)	1.02	3.82	4.84
								TOTAL:	23.4

Abbreviations

T_{sa}	Sol-air temperature
Ori.	Orientation
A	Area
U	Heat transmission coefficient
a	Absorptance
Tilt	Tilt angle

Conduction heat gains (fenestration)

	Ori. (°)	A (m²)	U_{global} (W/(m²K))	Convective component (W)	Radiative component (W)	Sensible cooling load (W)
Exterior surface						
Ventana1	NE(39)	1.80	3.66	-12.91	-4.77	-17.68
					TOTAL:	-17.7

Abbreviations

Ori.	Orientation
A	Area
U_{global}	Fenestration global thermic coeficient

Loads summary

Solar radiation heat gain

	Ori.	A	A_s	q	SHGC	Beam solar heat gain	Diffuse solar heat gain	Sensible cooling load
	(°)	(m²)	(m²)	(°)		(W)	(W)	(W)
Exterior surface								
Ventana1	NE(39)	1.80	1.80	52.30	0.68	220.14	95.21	286.37
							TOTAL:	286.4

Abbreviations

Ori.	Orientation
A	Area
A_s	Sunlit area
q	Incident angle
SHGC	Center-of-glazing solar heat gain coefficient, SHGC

Internal heat gains

	Sensible heat gain	Convective component	Radiative component	Latent cooling gain / load	Sensible cooling load
	(W)	(W)	(W)	(W)	(W)
Internal gains					
Occupancy	7.92	3.17	11.22	5.04	14.39
Lighting	19.01	7.60	10.84	-	18.44
Internal equipment	19.01	9.50	9.03	0.00	18.54
			TOTAL:	5	51

Ventilation and infiltration heat gains

	Airflow rate	Sensible heat recovery	Latent heat recovery	Latent cooling load	Sensible cooling load
	(m³/h)	(W)	(W)	(W)	(W)
Ventilation					
Ventilation	38.88	0.00	0.00	-56.40	-38.01
			TOTAL:	-56	-38

Total cooling load

Total load per unit area	Sensible heat factor	Convective component	Radiative component	Latent cooling load	Sensible cooling load	TOTAL COOLING LOAD
(W/m²)		(W)	(W)	(W)	(W)	(W)
17.6	1.20	19.4	37.7	-51.4	305.5	254.1 W

Peak cooling load

Room: Bedroom3 Zone:

Net floor area: 22.30 m² Net volume: 57.91 m³

Design conditions

Indoor:	Outdoor:
Room air temperature = 24.00 °C	Dry-bulb temperature = 26.7 °C
Relative humidity = 50.00%	Wet-bulb temperature = 17.3 °C

Time of peak cooling load: 21 of July at 19h (18 apparent solar time)

Conduction heat gains (opaque surfaces)

	T_{sa} (°C)	Ori. (°)	A (m²)	U (W/(m²K))	a	Tilt (°)	Convective component (W)	Radiative component (W)	Sensible cooling load (W)
Exterior surface									
Azotea	28.40	N(0)	22.30	0.29	0.60	H(0)	15.31	10.35	25.66
Fachada NE	28.39	NE(39)	8.80	0.59	0.60	V(90)	14.60	9.24	23.84
Fachada SE	28.39	SE(129)	15.90	0.59	0.60	V(90)	48.96	30.92	79.88
								TOTAL:	129.4

Abbreviations

T_{sa}	Sol-air temperature
Ori.	Orientation
A	Area
U	Heat transmission coefficient
a	Absorptance
Tilt	Tilt angle

Conduction heat gains (fenestration)

	Ori. (°)	A (m²)	U_{global} (W/(m²K))	Convective component (W)	Radiative component (W)	Sensible cooling load (W)
Exterior surface						
Ventana1	NE(39)	1.80	3.66	11.98	4.35	16.33
					TOTAL:	16.3

Abbreviations

Ori.	Orientation
A	Area
U_{global}	Fenestration global thermic coeficient

Loads summary

Solar radiation heat gain

	Ori.	A	A_s	q	SHGC	Beam solar heat gain	Diffuse solar heat gain	Sensible cooling load
	(°)	(m²)	(m²)	(°)		(W)	(W)	(W)
Exterior surface								
Ventana1	NE(39)	1.80	1.80	115.93	0.68	0.00	42.31	49.69
							TOTAL:	49.7

Abbreviations

Ori.	Orientation
A	Area
A_s	Sunlit area
q	Incident angle
SHGC	Center-of-glazing solar heat gain coefficient, SHGC

Internal heat gains

	Sensible heat gain	Convective component	Radiative component	Latent cooling gain / load	Sensible cooling load
	(W)	(W)	(W)	(W)	(W)
Internal gains					
Occupancy	24.53	9.81	14.11	15.61	23.92
Lighting	98.12	39.25	32.42	-	71.67
Internal equipment	98.12	49.06	27.02	0.00	76.08
			TOTAL:	16	172

Ventilation and infiltration heat gains

	Airflow rate	Sensible heat recovery	Latent heat recovery	Latent cooling load	Sensible cooling load
	(m³/h)	(W)	(W)	(W)	(W)
Ventilation					
Ventilation	60.21	-0.00	0.00	-37.09	53.57
			TOTAL:	-37	54

Total cooling load

Total load per unit area	Sensible heat factor	Convective component	Radiative component	Latent cooling load	Sensible cooling load	TOTAL COOLING LOAD
(W/m²)		(W)	(W)	(W)	(W)	(W)
17.9	1.05	189.0	128.4	-21.5	420.6	399.2 W

Peak cooling load

Room: Hall Zone:

Net floor area: 17.70 m² Net volume: 46.00 m³

Design conditions

Indoor:	Outdoor:
Room air temperature = 24.00 °C	Dry-bulb temperature = 28.2 °C
Relative humidity = 50.00%	Wet-bulb temperature = 18.3 °C

Time of peak cooling load: 21 of August at 15h (14 apparent solar time)

Conduction heat gains (opaque surfaces)

	T_{sa} (°C)	Ori. (°)	A (m²)	U (W/(m²K))	a	Tilt (°)	Convective component (W)	Radiative component (W)	Sensible cooling load (W)
Exterior surface									
Azotea	41.85	N(0)	17.70	0.29	0.60	H(0)	8.13	5.97	14.09
Fachada SW	48.30	SW(219)	2.30	0.59	0.60	V(90)	1.47	1.69	3.16
								TOTAL:	17.3

Abbreviations

T_{sa}	Sol-air temperature
Ori.	Orientation
A	Area
U	Heat transmission coefficient
a	Absorptance
Tilt	Tilt angle

Conduction heat gains (fenestration)

	Ori. (°)	A (m²)	U_{global} (W/(m²K))	Convective component (W)	Radiative component (W)	Sensible cooling load (W)
Exterior surface						
Puerta exterior	SW(219)	1.70	2.20	8.39	2.77	11.16
					TOTAL:	11.2

Abbreviations

Ori.	Orientation
A	Area
U_{global}	Fenestration global thermic coeficient

Loads summary

Solar radiation heat gain

	Ori. (°)	A (m²)	A_s (m²)	q (°)	SHGC	Beam solar heat gain (W)	Diffuse solar heat gain (W)	Sensible cooling load (W)
Exterior surface								
Puerta exterior	SW(219)	1.70	1.70	43.85	0.05	48.68	19.75	41.14
							TOTAL:	41.1

Abbreviations

Ori.	Orientation
A	Area
A_s	Sunlit area
q	Incident angle
SHGC	Center-of-glazing solar heat gain coefficient, SHGC

Internal heat gains

	Sensible heat gain (W)	Convective component (W)	Radiative component (W)	Latent cooling gain / load (W)	Sensible cooling load (W)
Internal gains					
Occupancy	38.94	15.58	23.46	24.78	39.04
Lighting	77.88	31.15	46.93	-	78.08
Internal equipment	77.88	38.94	39.11	0.00	78.05
			TOTAL:	25	195

Ventilation and infiltration heat gains

	Airflow rate (m³/h)	Sensible heat recovery (W)	Latent heat recovery (W)	Latent cooling load (W)	Sensible cooling load (W)
Ventilation					
Ventilation	47.79	-0.00	0.00	-7.67	64.80
			TOTAL:	-8	65

Total cooling load

Total load per unit area (W/m²)	Sensible heat factor	Convective component (W)	Radiative component (W)	Latent cooling load (W)	Sensible cooling load (W)	TOTAL COOLING LOAD (W)
19.6	0.95	103.7	119.9	17.1	329.5	346.6 W

Peak cooling load

Room: Bathroom Zone:

Net floor area: 12.26 m² Net volume: 31.93 m³

Design conditions

Indoor:	Outdoor:
Room air temperature = 24.00 °C	Dry-bulb temperature = 26.9 °C
Relative humidity = 50.00%	Wet-bulb temperature = 17.7 °C

Time of peak cooling load: 21 of August at 19h (18 apparent solar time)

Conduction heat gains (opaque surfaces)

	T_{sa} (°C)	Ori. (°)	A (m²)	U (W/(m²K))	a	Tilt (°)	Convective component (W)	Radiative component (W)	Sensible cooling load (W)
Exterior surface									
Azotea	25.83	N(0)	12.26	0.29	0.60	H(0)	5.99	4.05	10.03
Fachada NW	35.35	NW(309)	11.40	0.59	0.60	V(90)	13.98	6.27	20.25
								TOTAL:	30.3

Abbreviations

T_{sa}	Sol-air temperature
Ori.	Orientation
A	Area
U	Heat transmission coefficient
a	Absorptance
Tilt	Tilt angle

Internal heat gains

	Sensible heat gain (W)	Convective component (W)	Radiative component (W)	Latent cooling gain / load (W)	Sensible cooling load (W)
Internal gains					
Occupancy	26.97	10.79	15.00	8.58	25.79
Lighting	53.94	21.58	14.04	-	35.62
Internal equipment	53.94	26.97	11.70	0.00	38.67
			TOTAL:	9	100

Ventilation and infiltration heat gains

Loads summary

	Airflow rate (m³/h)	Sensible heat recovery (W)	Latent heat recovery (W)	Latent cooling load (W)	Sensible cooling load (W)
Ventilation					
Ventilation	33.10	-0.00	0.00	-12.40	31.79
			TOTAL:	-12	32

Total cooling load

Total load per unit area (W/m²)	Sensible heat factor	Convective component (W)	Radiative component (W)	Latent cooling load (W)	Sensible cooling load (W)	TOTAL COOLING LOAD (W)
12.9	1.02	79.3	51.1	-3.8	162.2	158.3 W

3.2.- Heating

Peak heating load

Room: Lounge	Zone:

Net floor area: 38.00 m² Net volume: 96.83 m³

Design conditions

Indoor:	Outdoor:
Room air temperature = 21.00 °C	Dry-bulb temperature = 0.40 °C
Relative humidity = 30.00%	Relative humidity = 80.00%
	Terrain temperature = 7.34 °C

Conduction heat losses (opaque surfaces)

	Ori. (°)	A (m²)	U (W/(m²K))	Tilt (°)	Sensible heating load (W)
Exterior surface					
Roof	N(0)	38.00	0.29	H(0)	226.94
NW Façade	NW(309)	15.70	0.59	V(90)	191.75
SW Façade	SW(219)	13.80	0.59	V(90)	168.55
SE Façade	SE(129)	10.80	0.59	V(90)	131.91
				TOTAL:	719.2

	A (m²)	U (W/(m²K))	Tilt (°)	Sensible heating load (W)
Below-grade surface				
Floor	38.00	0.34	H(180)	176.51
			TOTAL:	176.5

Abbreviations

Ori.	Orientation
A	Area
U	Heat transmission coefficient
Tilt	Tilt angle

Conduction heat losses (fenestration)

	Ori. (°)	A (m²)	U_{global} (W/(m²K))	Sensible heating load (W)
Exterior surface				
Window1	SW(219)	1.80	3.66	135.71
Window2	SW(219)	1.80	3.66	135.71
			TOTAL:	271.4

Loads summary

Abbreviations	
Ori.	Orientation
A	Area
U_{global}	Fenestration global thermic coeficient

Ventilation and infiltration heat losses

	Airflow rate (m³/h)	Sensible heat recovery (W)	Latent heat recovery (W)	Latent heating load (W)	Sensible heating load (W)
Ventilation					
Ventilation	102.60	-0.00	-0.00	138.87	759.74
			TOTAL:	138.9	759.7

Total heating load

Total load per unit area (W/m²)	Sensible heat factor	Latent heating load (W)	Sensible heating load (W)	TOTAL HEATING LOAD (W)
53.0	0.93	138.9	1874.1	2013.0 W

Peak heating load

Room: Kitchen Zone:

Net floor area: 11.80 m² Net volume: 30.66 m³

Design conditions

Indoor:	Outdoor:
Room air temperature = 21.00 °C	Dry-bulb temperature = 0.40 °C
Relative humidity = 30.00%	Relative humidity = 80.00%
	Terrain temperature = 7.34 °C

Conduction heat losses (opaque surfaces)

	Ori. (°)	A (m²)	U (W/(m²K))	Tilt (°)	Sensible heating load (W)
Exterior surface					
Azotea	N(0)	11.80	0.29	H(0)	70.47
Fachada SW	SW(219)	6.10	0.59	V(90)	74.50
Fachada SE	SE(129)	11.30	0.59	V(90)	138.01
				TOTAL:	283.0

	A (m²)	U (W/(m²K))	Tilt (°)	Sensible heating load (W)
Below-grade surface				
Suelo	11.80	0.34	H(180)	54.81
			TOTAL:	54.8

Abbreviations

Ori.	Orientation
A	Area
U	Heat transmission coefficient
Tilt	Tilt angle

Conduction heat losses (fenestration)

	Ori. (°)	A (m²)	U_{global} (W/(m²K))	Sensible heating load (W)
Exterior surface				
Ventana1	SW(219)	1.80	3.66	135.71
			TOTAL:	135.7

Abbreviations

Ori.	Orientation
A	Area

U_{global}	Fenestration global thermic coeficient

Ventilation and infiltration heat losses

	Airflow rate (m³/h)	Sensible heat recovery (W)	Latent heat recovery (W)	Latent heating load (W)	Sensible heating load (W)
Ventilation					
Ventilation	31.86	-0.00	-0.00	43.12	235.92
			TOTAL:	43.1	235.9

Total heating load

Total load per unit area (W/m²)	Sensible heat factor	Latent heating load (W)	Sensible heating load (W)	TOTAL HEATING LOAD (W)
59.3	0.94	43.1	656.7	699.8 W

Peak heating load

Room: Bedroom1 Zone:

Net floor area: 17.00 m² Net volume: 44.06 m³

Design conditions

Indoor:	Outdoor:
Room air temperature = 21.00 °C	Dry-bulb temperature = 0.40 °C
Relative humidity = 30.00%	Relative humidity = 80.00%
	Terrain temperature = 7.34 °C

Conduction heat losses (opaque surfaces)

	Ori. (°)	A (m²)	U (W/(m²K))	Tilt (°)	Sensible heating load (W)
Exterior surface					
Azotea	N(0)	17.00	0.29	H(0)	101.53
Fachada NW	NW(309)	10.60	0.59	V(90)	129.46
Fachada NE	NE(39)	9.40	0.59	V(90)	114.81
				TOTAL:	345.8

	A (m²)	U (W/(m²K))	Tilt (°)	Sensible heating load (W)
Below-grade surface				
Entarimado sobre rastreles	17.00	0.34	H(180)	78.96
			TOTAL:	79.0

Abbreviations

Ori.	Orientation
A	Area
U	Heat transmission coefficient
Tilt	Tilt angle

Conduction heat losses (fenestration)

	Ori. (°)	A (m²)	U_{global} (W/(m²K))	Sensible heating load (W)
Exterior surface				
Ventana1	NE(39)	1.80	3.66	135.71
			TOTAL:	135.7

	A (m²)	U_{global} (W/(m²K))	Adjacent room temperature (°C)	Sensible heating load (W)
Interior partition				
Puerta al baño	1.70	2.20	24.00	-11.22

TOTAL:	-11.2

Abbreviations

Ori.	Orientation
A	Area
U_{global}	Fenestration global thermic coeficient
T_{ad}	Adjacent room temperature

Ventilation and infiltration heat losses

	Airflow rate (m³/h)	Sensible heat recovery (W)	Latent heat recovery (W)	Latent heating load (W)	Sensible heating load (W)
Ventilation					
Ventilation	45.90	-0.00	-0.00	62.12	339.88
			TOTAL:	62.1	339.9

Total heating load

Total load per unit area (W/m²)	Sensible heat factor	Latent heating load (W)	Sensible heating load (W)	TOTAL HEATING LOAD (W)
52.4	0.93	62.1	828.2	890.3 W

Peak heating load

Room: Bedroom2 Zone:

Net floor area: 14.40 m² Net volume: 37.40 m³

Design conditions

Indoor:	Outdoor:
Room air temperature = 21.00 °C	Dry-bulb temperature = 0.40 °C
Relative humidity = 30.00%	Relative humidity = 80.00%
	Terrain temperature = 7.34 °C

Conduction heat losses (opaque surfaces)

	Ori. (°)	A (m²)	U (W/(m²K))	Tilt (°)	Sensible heating load (W)
Exterior surface					
Azotea	N(0)	14.40	0.29	H(0)	86.00
Fachada NE	NE(39)	6.30	0.59	V(90)	76.95
				TOTAL:	162.9

	A (m²)	U (W/(m²K))	Tilt (°)	Sensible heating load (W)
Below-grade surface				
Entarimado sobre rastreles	14.40	0.34	H(180)	66.89
			TOTAL:	66.9

Abbreviations

Ori.	Orientation
A	Area
U	Heat transmission coefficient
Tilt	Tilt angle

Conduction heat losses (fenestration)

	Ori. (°)	A (m²)	U_{global} (W/(m²K))	Sensible heating load (W)
Exterior surface				
Ventana1	NE(39)	1.80	3.66	135.71
			TOTAL:	135.7

Abbreviations

Ori.	Orientation
A	Area
U_{global}	Fenestration global thermic coeficient

Ventilation and infiltration heat losses

	Airflow rate (m³/h)	Sensible heat recovery (W)	Latent heat recovery (W)	Latent heating load (W)	Sensible heating load (W)
Ventilation					
Ventilation	38.88	-0.00	-0.00	52.62	287.90
			TOTAL:	52.6	287.9

Total heating load

Total load per unit area (W/m²)	Sensible heat factor	Latent heating load (W)	Sensible heating load (W)	TOTAL HEATING LOAD (W)
49.0	0.93	52.6	653.4	706.1 W

Peak heating load

Room: Bedroom3 Zone:

Net floor area: 22.30 m² Net volume: 57.91 m³

Design conditions

Indoor:	Outdoor:
Room air temperature = 21.00 °C	Dry-bulb temperature = 0.40 °C
Relative humidity = 30.00%	Relative humidity = 80.00%
	Terrain temperature = 7.34 °C

Conduction heat losses (opaque surfaces)

	Ori. (°)	A (m²)	U (W/(m²K))	Tilt (°)	Sensible heating load (W)
Exterior surface					
Azotea	N(0)	22.30	0.29	H(0)	133.18
Fachada NE	NE(39)	8.80	0.59	V(90)	107.48
Fachada SE	SE(129)	15.90	0.59	V(90)	194.20
				TOTAL:	434.9

	A (m²)	U (W/(m²K))	Tilt (°)	Sensible heating load (W)
Below-grade surface				
Entarimado sobre rastreles	22.30	0.34	H(180)	103.58
			TOTAL:	103.6

Abbreviations

Ori.	Orientation
A	Area
U	Heat transmission coefficient
Tilt	Tilt angle

Conduction heat losses (fenestration)

	Ori. (°)	A (m²)	U_{global} (W/(m²K))	Sensible heating load (W)
Exterior surface				
Ventana1	NE(39)	1.80	3.66	135.71
			TOTAL:	135.7

Abbreviations

Ori.	Orientation
A	Area

U_{global}	Fenestration global thermic coeficient

Ventilation and infiltration heat losses

	Airflow rate (m³/h)	Sensible heat recovery (W)	Latent heat recovery (W)	Latent heating load (W)	Sensible heating load (W)
Ventilation					
Ventilation	60.21	-0.00	-0.00	81.49	445.85
			TOTAL:	81.5	445.8

Total heating load

Total load per unit area (W/m²)	Sensible heat factor	Latent heating load (W)	Sensible heating load (W)	TOTAL HEATING LOAD (W)
53.9	0.93	81.5	1120.0	1201.5 W

Loads summary

Peak heating load

Room: Hall | Zone:

Net floor area: 17.70 m² Net volume: 46.00 m³

Design conditions

Indoor:	Outdoor:
Room air temperature = 21.00 °C	Dry-bulb temperature = 0.40 °C
Relative humidity = 30.00%	Relative humidity = 80.00%
	Terrain temperature = 7.34 °C

Conduction heat losses (opaque surfaces)

	Ori. (°)	A (m²)	U (W/(m²K))	Tilt (°)	Sensible heating load (W)
Exterior surface					
Azotea	N(0)	17.70	0.29	H(0)	105.71
Fachada SW	SW(219)	2.30	0.59	V(90)	28.09
				TOTAL:	133.8

	A (m²)	U (W/(m²K))	Tilt (°)	Sensible heating load (W)
Below-grade surface				
Entarimado sobre rastreles	17.70	0.34	H(180)	82.21
			TOTAL:	82.2

Abbreviations

Ori.	Orientation
A	Area
U	Heat transmission coefficient
Tilt	Tilt angle

Conduction heat losses (fenestration)

	Ori. (°)	A (m²)	U_{global} (W/(m²K))	Sensible heating load (W)
Exterior surface				
Puerta exterior	SW(219)	1.70	2.20	77.04
			TOTAL:	77.0

	A (m²)	U_{global} (W/(m²K))	Adjacent room temperature (°C)	Sensible heating load (W)
Interior partition				
Puerta al baño	1.70	2.20	24.00	-11.22
			TOTAL:	-11.2

Loads summary

Abbreviations	
Ori.	Orientation
A	Area
U_{global}	Fenestration global thermic coeficient
T_{ad}	Adjacent room temperature

Ventilation and infiltration heat losses

	Airflow rate (m³/h)	Sensible heat recovery (W)	Latent heat recovery (W)	Latent heating load (W)	Sensible heating load (W)
Ventilation					
Ventilation	47.79	-0.00	-0.00	64.68	353.88
			TOTAL:	64.7	353.9

Total heating load

Total load per unit area (W/m²)	Sensible heat factor	Latent heating load (W)	Sensible heating load (W)	TOTAL HEATING LOAD (W)
37.1	0.90	64.7	591.9	656.6 W

Peak heating load

Room: Bathroom Zone:

Net floor area: 12.26 m² Net volume: 31.93 m³

Design conditions

Indoor:	Outdoor:
Room air temperature = 24.00 °C	Dry-bulb temperature = 0.40 °C
Relative humidity = 30.00%	Relative humidity = 80.00%
	Terrain temperature = 7.34 °C

Conduction heat losses (opaque surfaces)

	Ori. (°)	A (m²)	U (W/(m²K))	Tilt (°)	Sensible heating load (W)
Exterior surface					
Azotea	N(0)	12.26	0.29	H(0)	83.88
Fachada NW	NW(309)	11.40	0.59	V(90)	159.51
				TOTAL:	243.4

	A (m²)	U (W/(m²K))	Tilt (°)	Sensible heating load (W)
Below-grade surface				
Suelo	12.26	0.34	H(180)	69.45
			TOTAL:	69.5

Abbreviations

Ori.	Orientation
A	Area
U	Heat transmission coefficient
Tilt	Tilt angle

Conduction heat losses (fenestration)

	A (m²)	U_{global} (W/(m²K))	Adjacent room temperature (°C)	Sensible heating load (W)
Interior partition				
Puerta interior1	1.70	2.20	21.00	11.22
Puerta interior2	1.70	2.20	21.00	11.22
			TOTAL:	22.4

Abbreviations

A	Area
U_{global}	Fenestration global thermic coeficient

T_{ad}	Adjacent room temperature

Ventilation and infiltration heat losses

	Airflow rate (m³/h)	Sensible heat recovery (W)	Latent heat recovery (W)	Latent heating load (W)	Sensible heating load (W)
Ventilation					
Ventilation	33.10	-0.00	-0.00	72.39	280.81
			TOTAL:	72.4	280.8

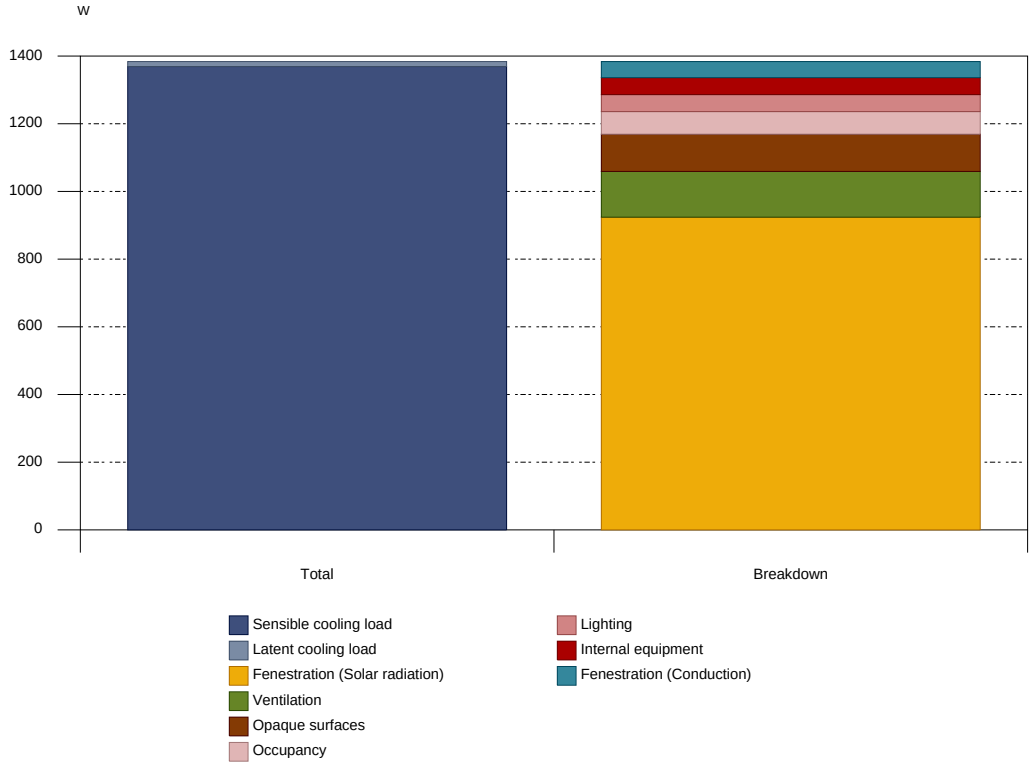
Total heating load

Total load per unit area (W/m²)	Sensible heat factor	Latent heating load (W)	Sensible heating load (W)	TOTAL HEATING LOAD (W)
68.7	0.91	72.4	770.4	842.8 W

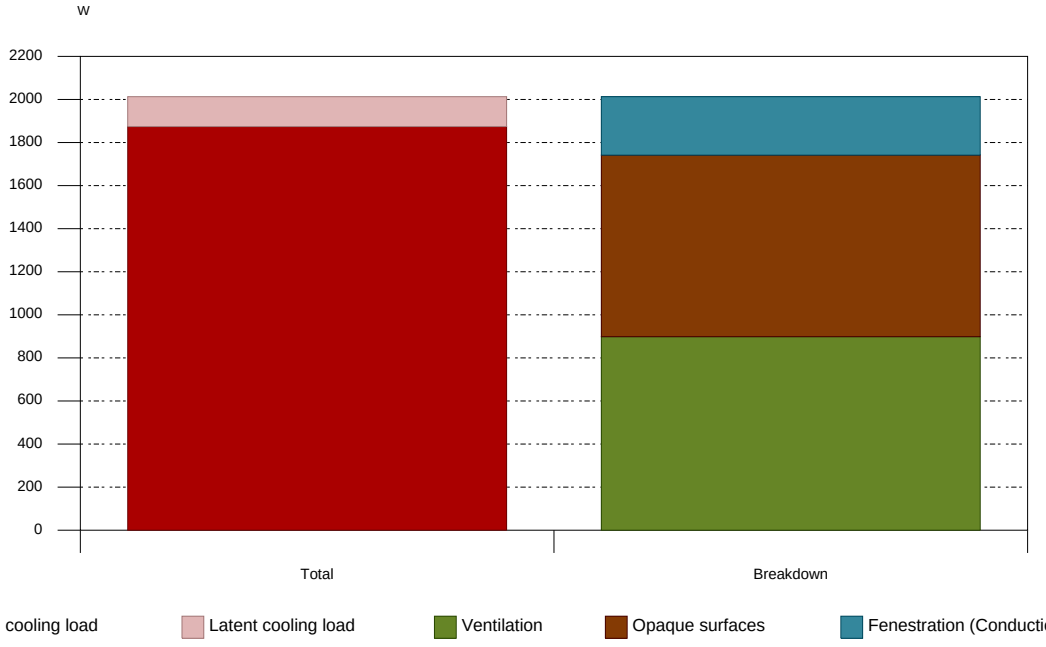
3.3.- Graphs

Lounge

Peak cooling load (21 of August at 16h)

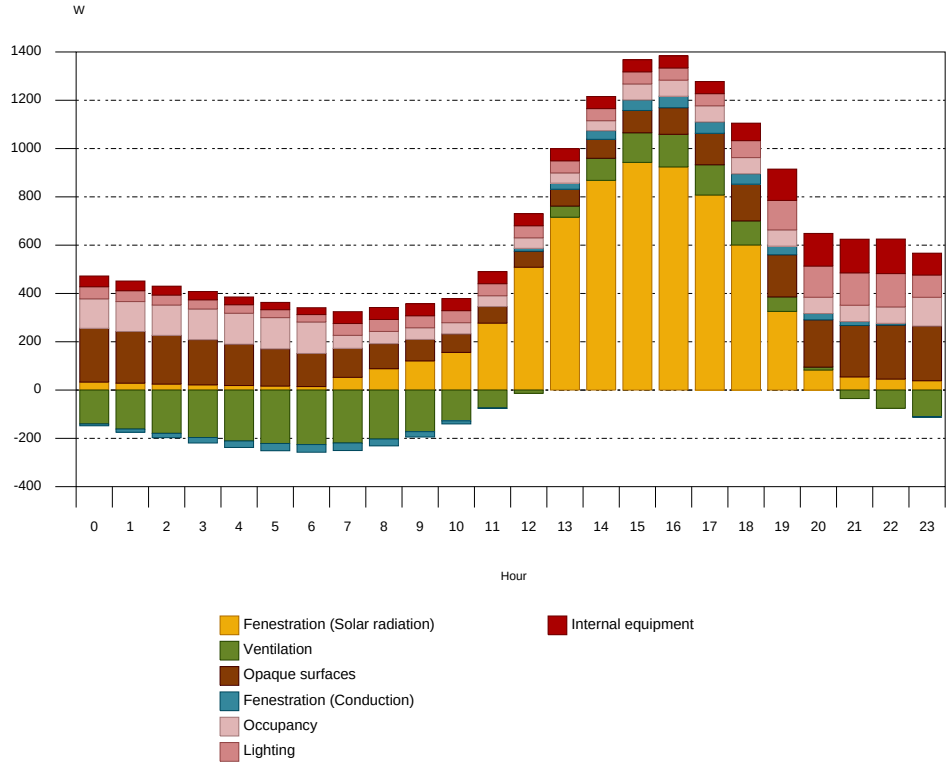


Peak heating load

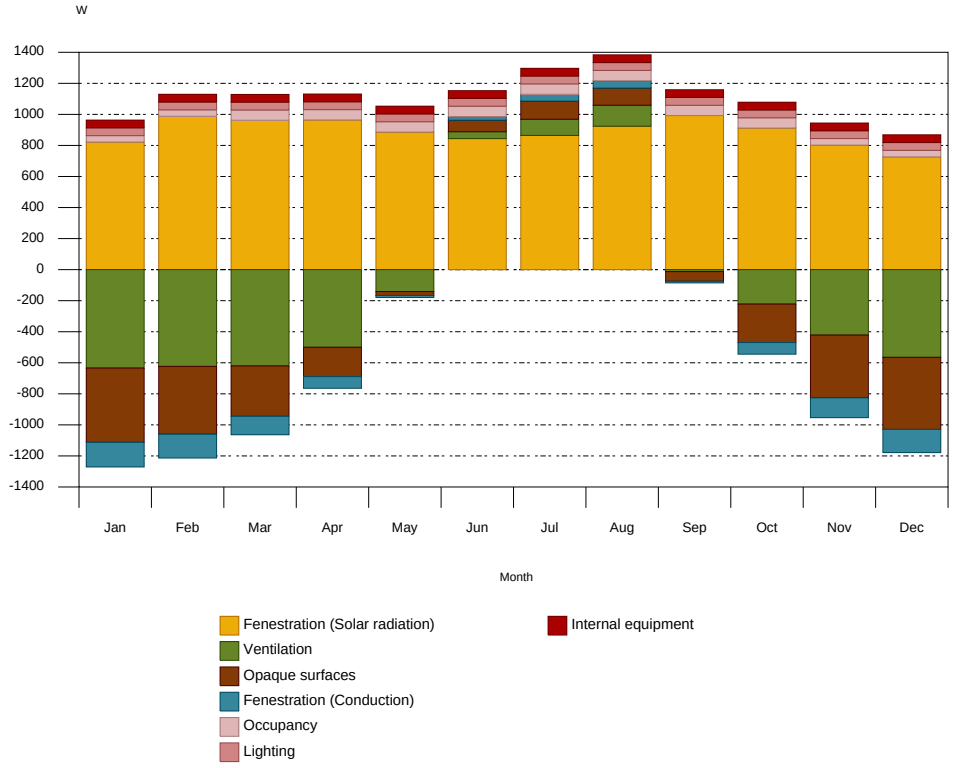


Hourly cooling load progression (21 of August)

Loads summary



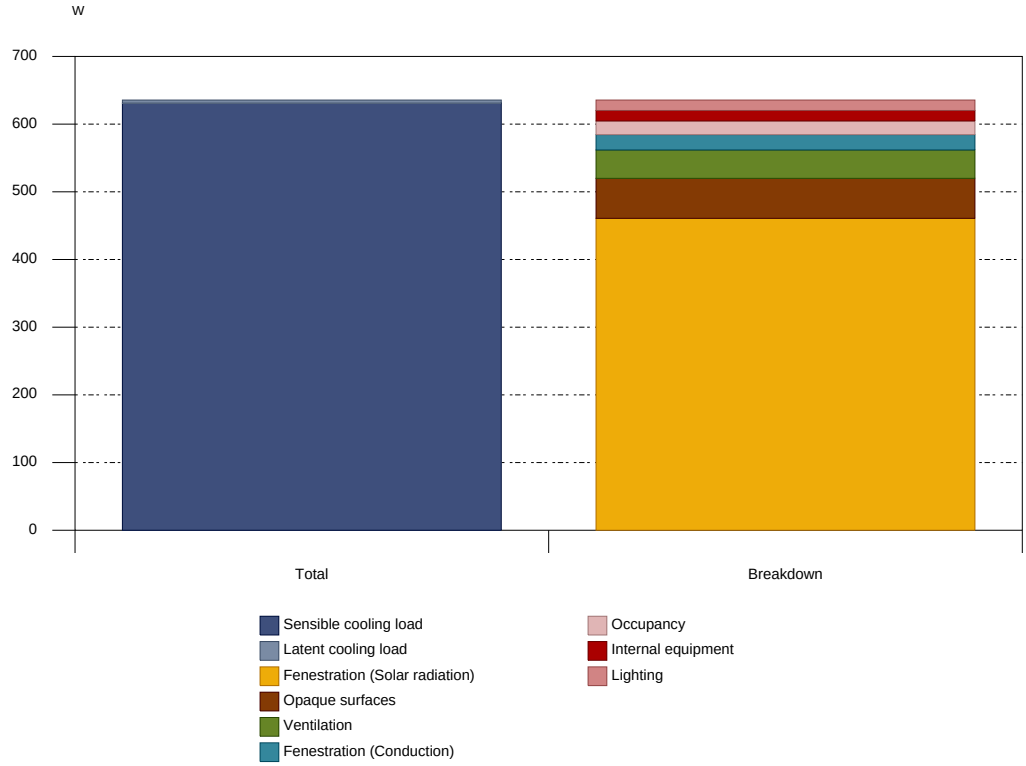
Annual peak cooling load progression



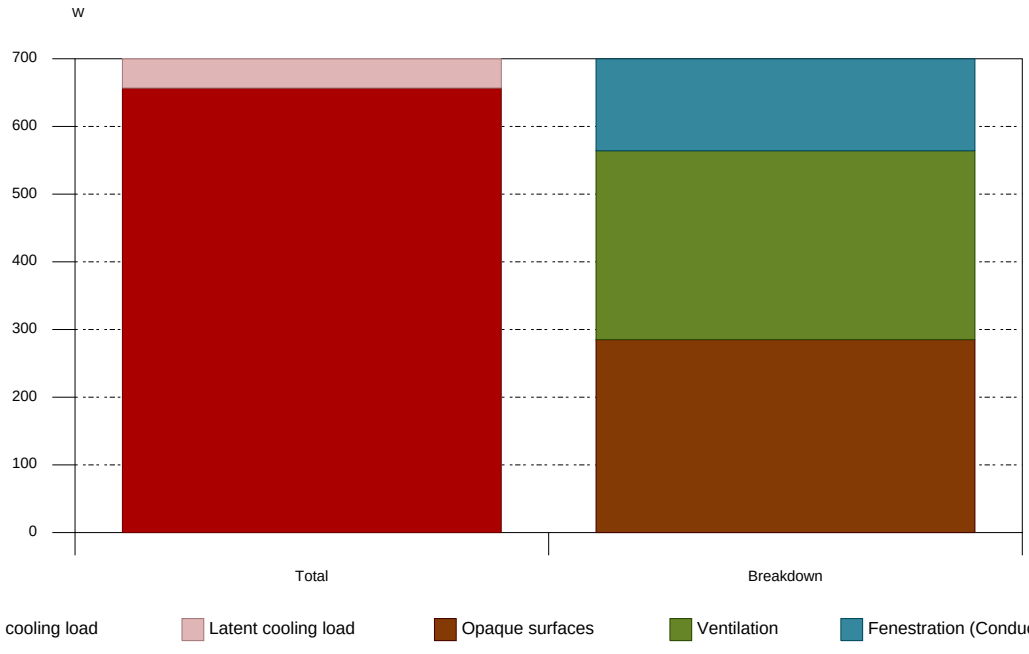
Loads summary

Kitchen

Peak cooling load (21 of August at 16h)

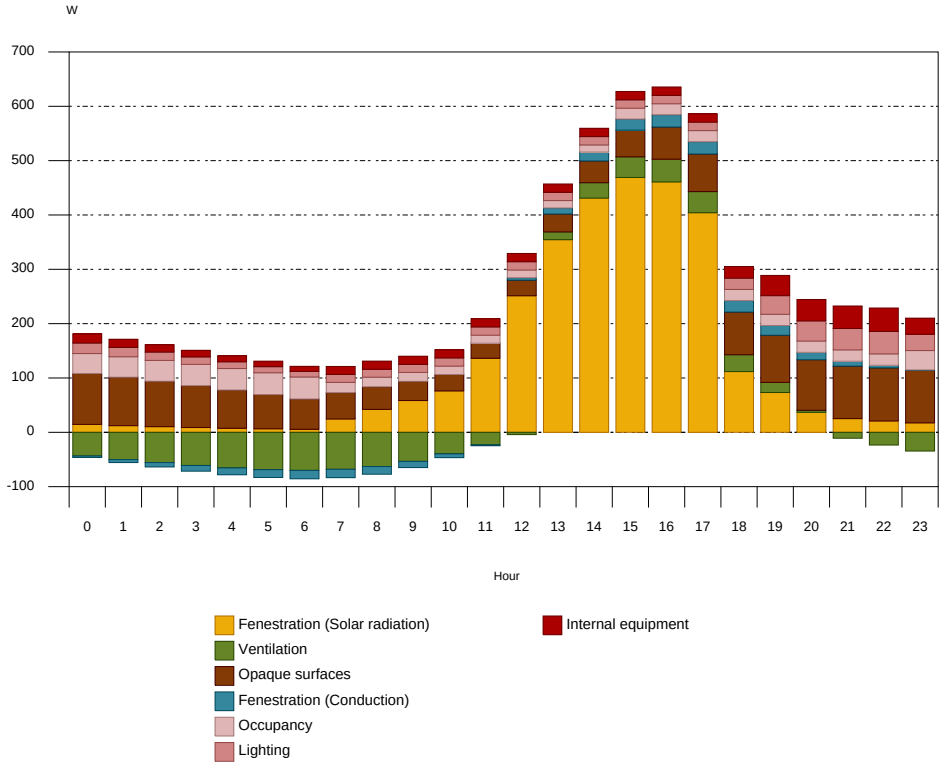


Peak heating load

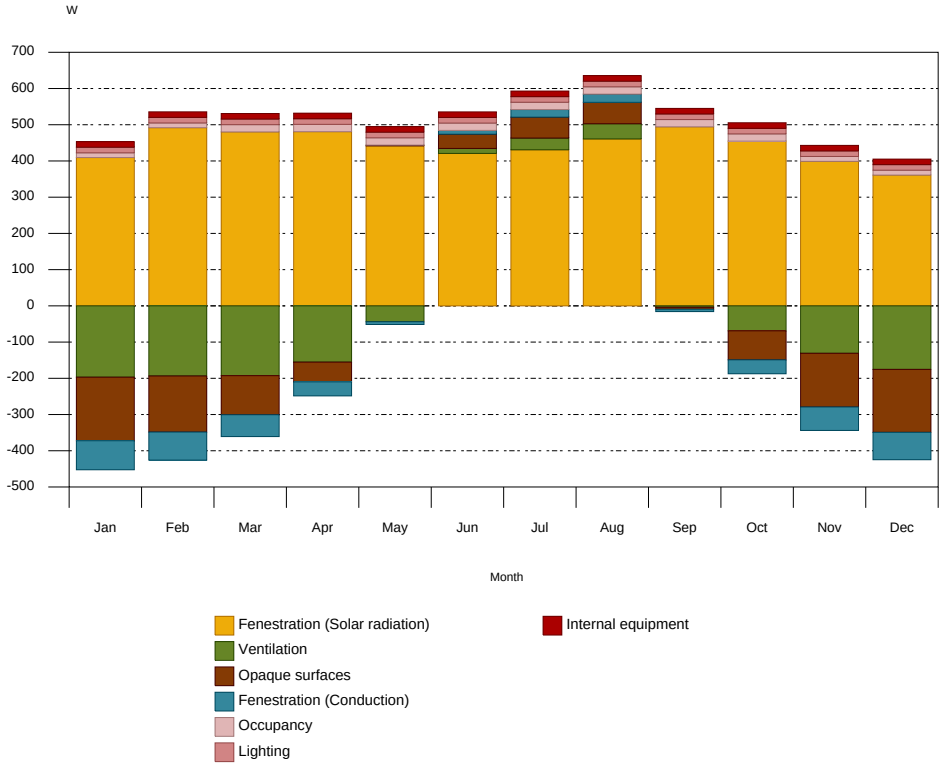


Hourly cooling load progression (21 of August)

Loads summary



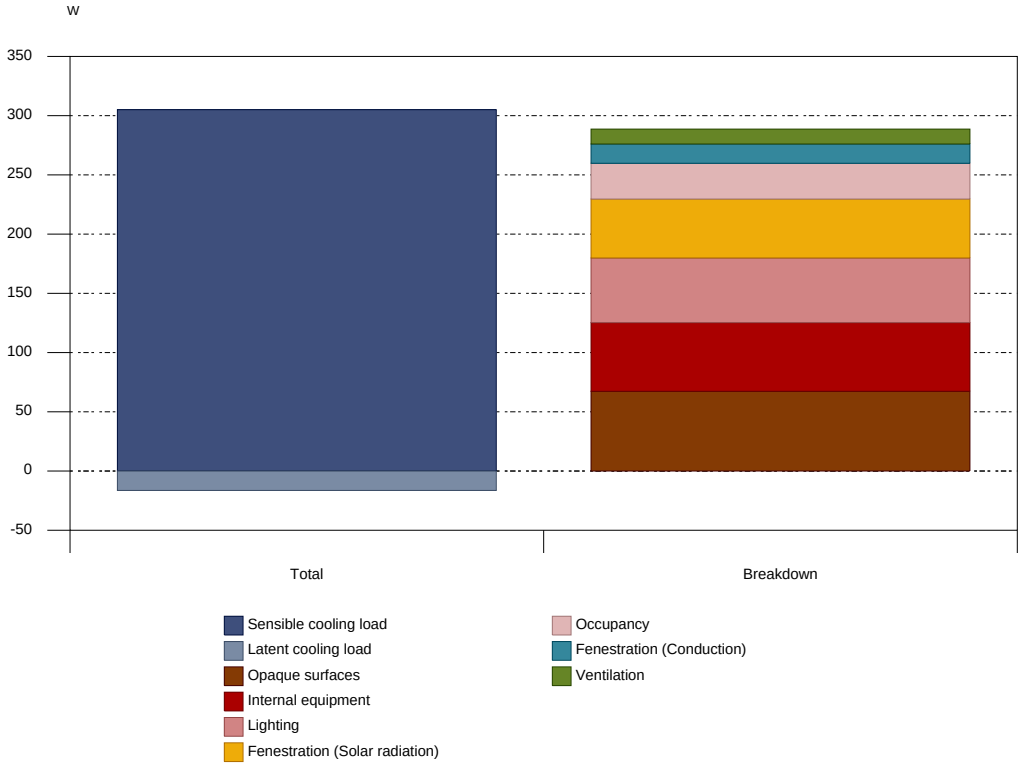
Annual peak cooling load progression



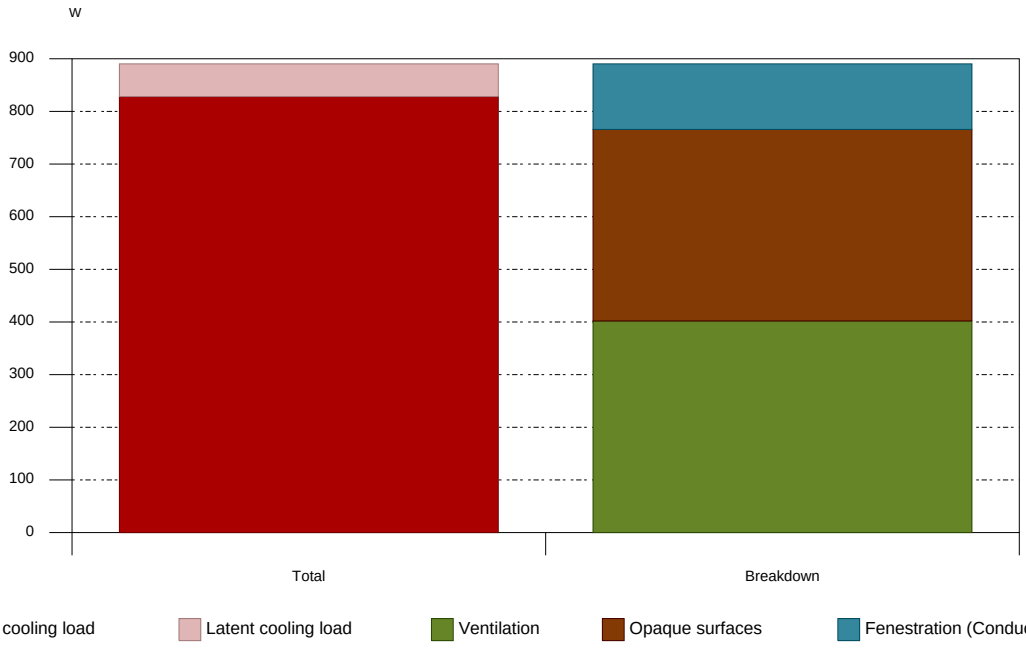
Loads summary

Bedroom1

Peak cooling load (21 of July at 19h)

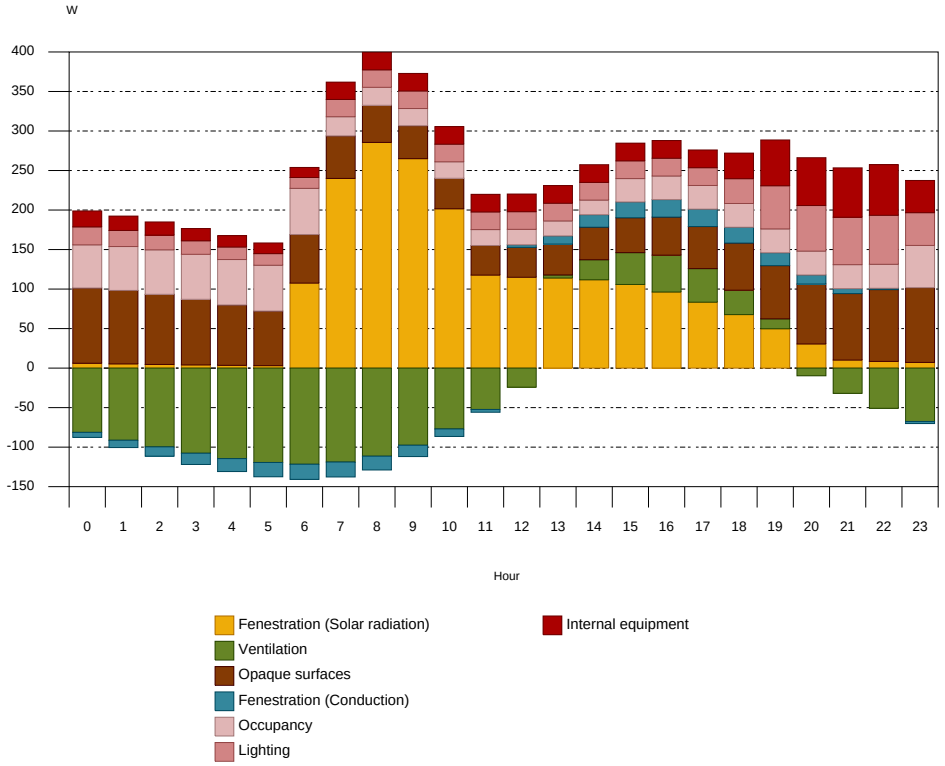


Peak heating load

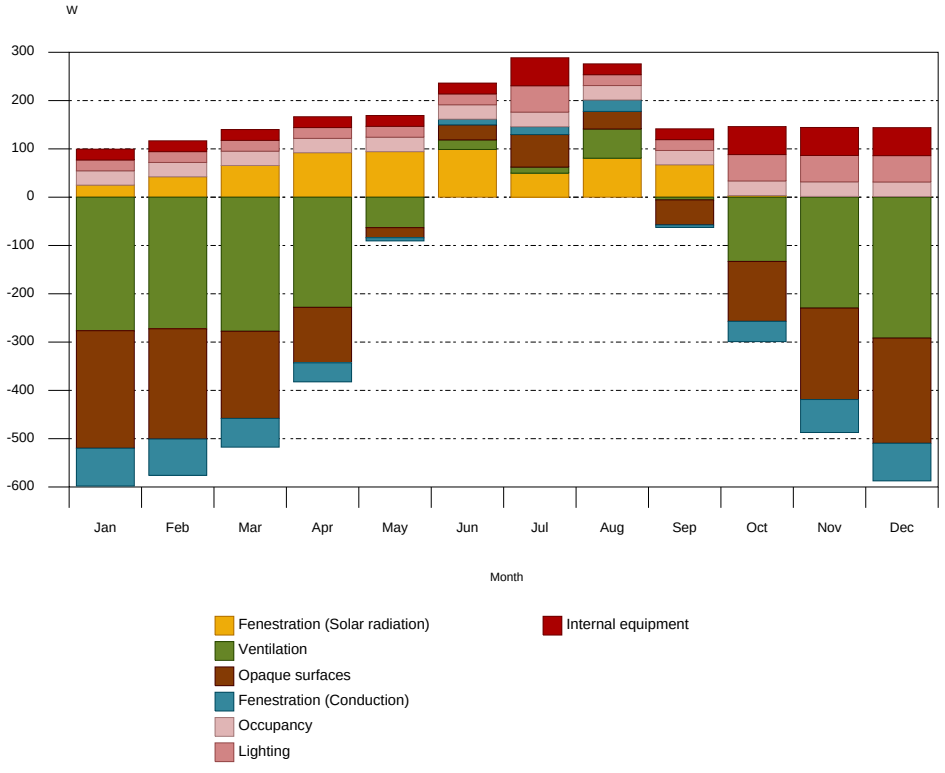


Hourly cooling load progression (21 of July)

Loads summary



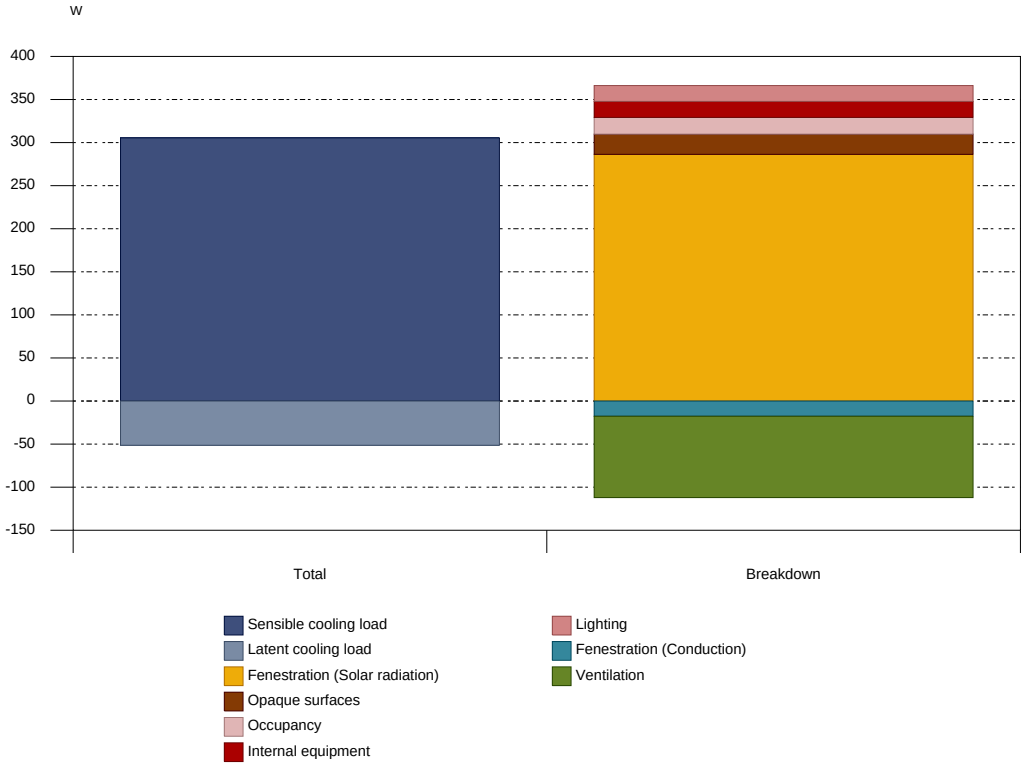
Annual peak cooling load progression



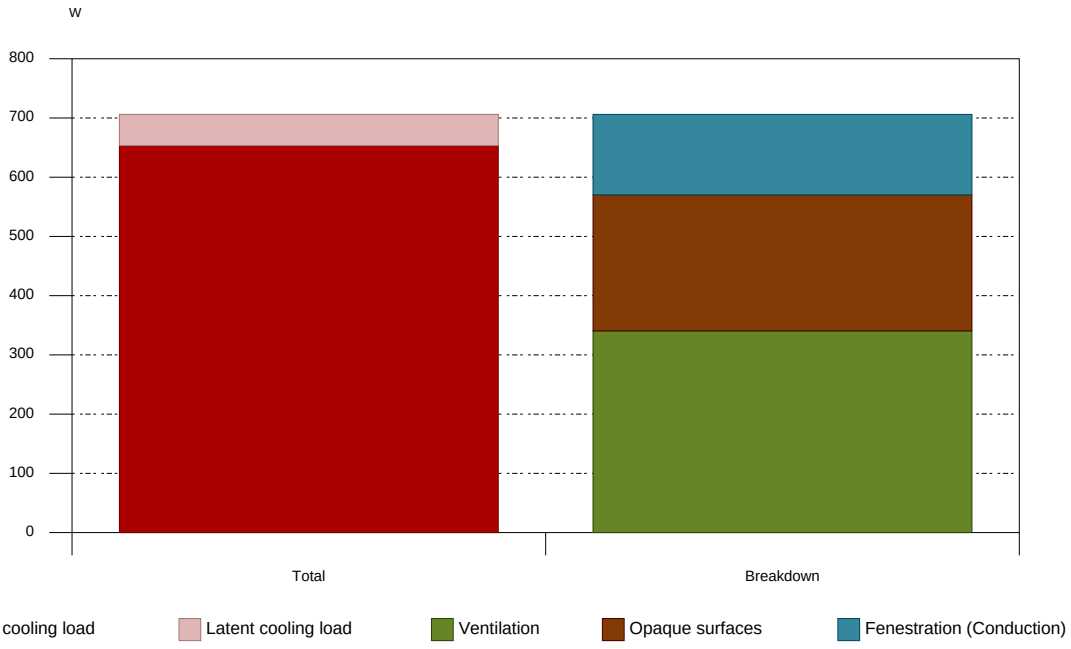
Loads summary

Bedroom2

Peak cooling load (21 of July at 8h)

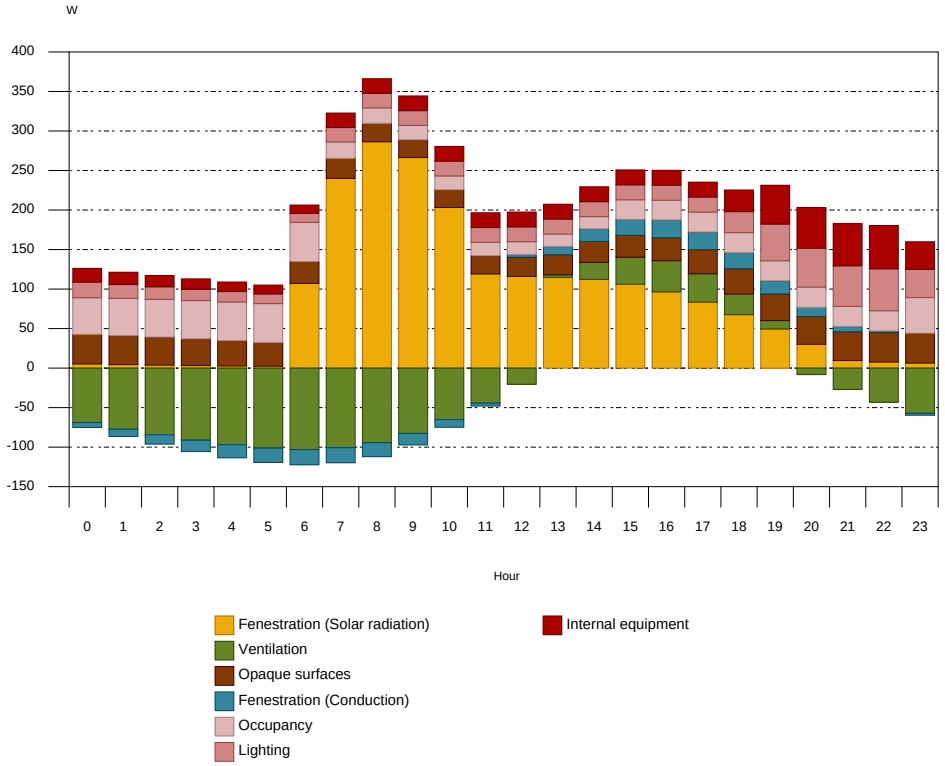


Peak heating load

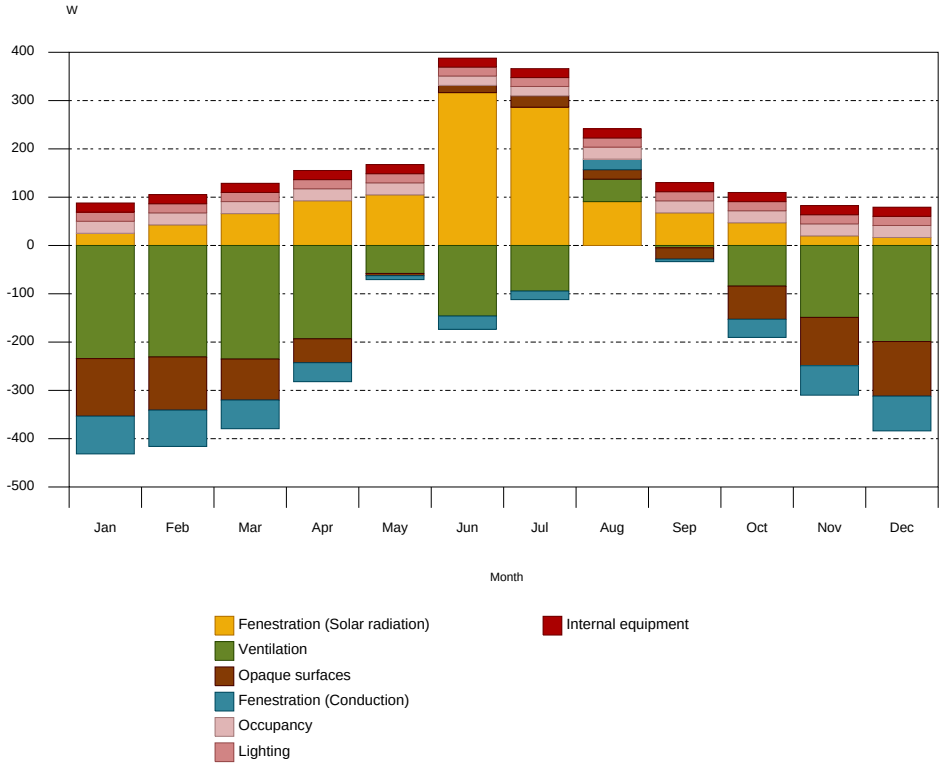


Hourly cooling load progression (21 of July)

Loads summary



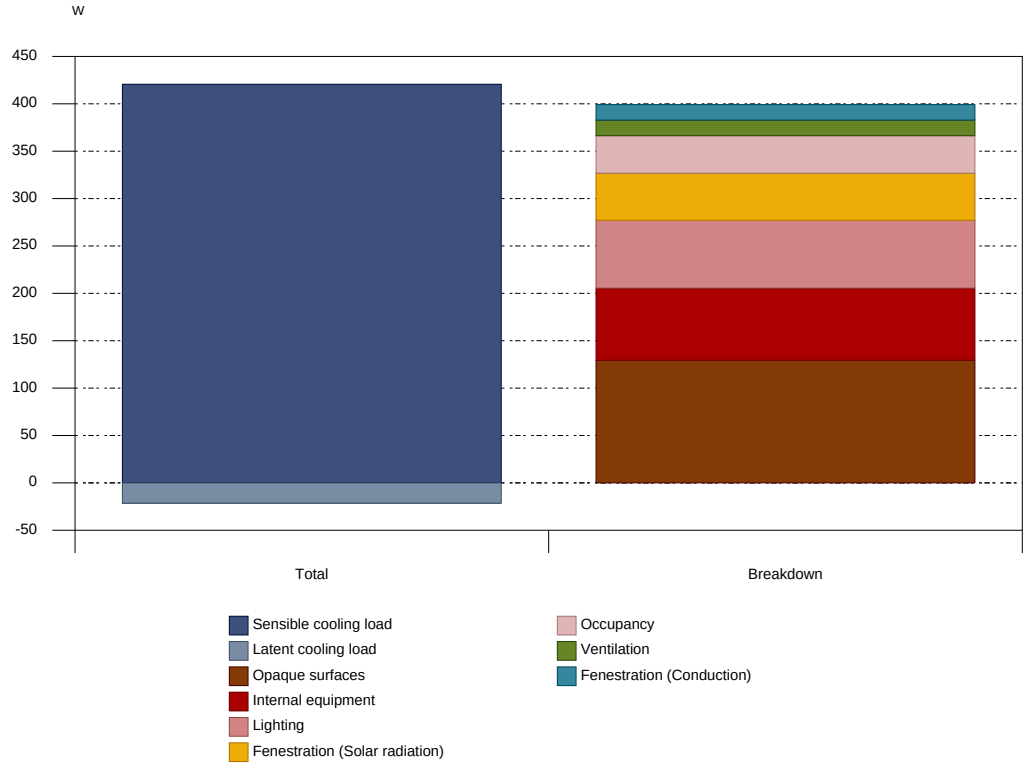
Annual peak cooling load progression



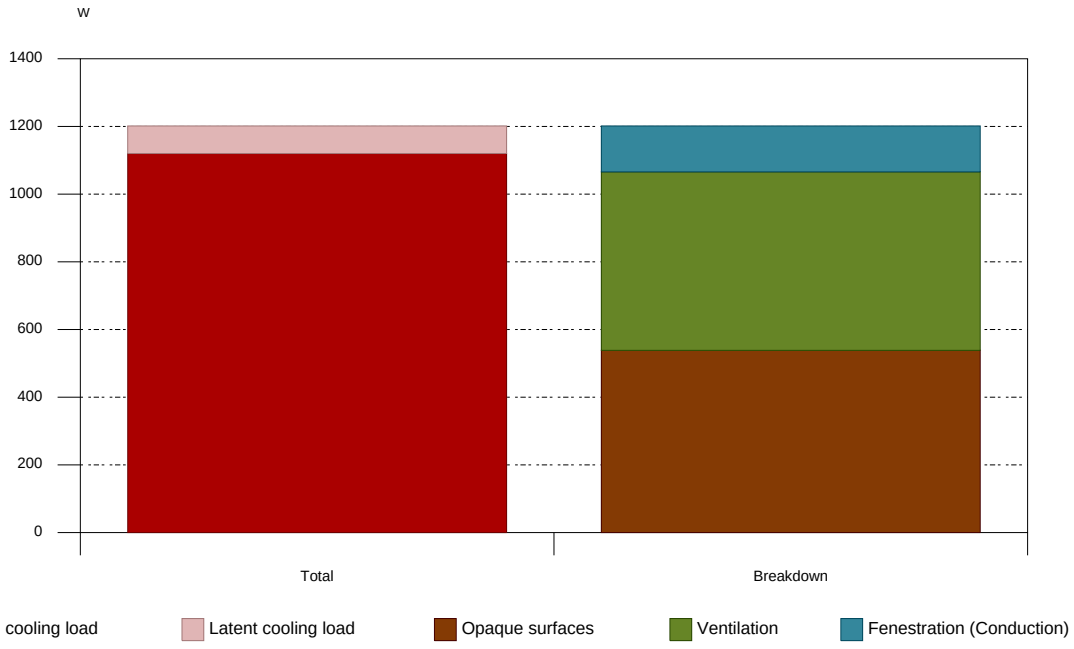
Loads summary

Bedroom3

Peak cooling load (21 of July at 19h)

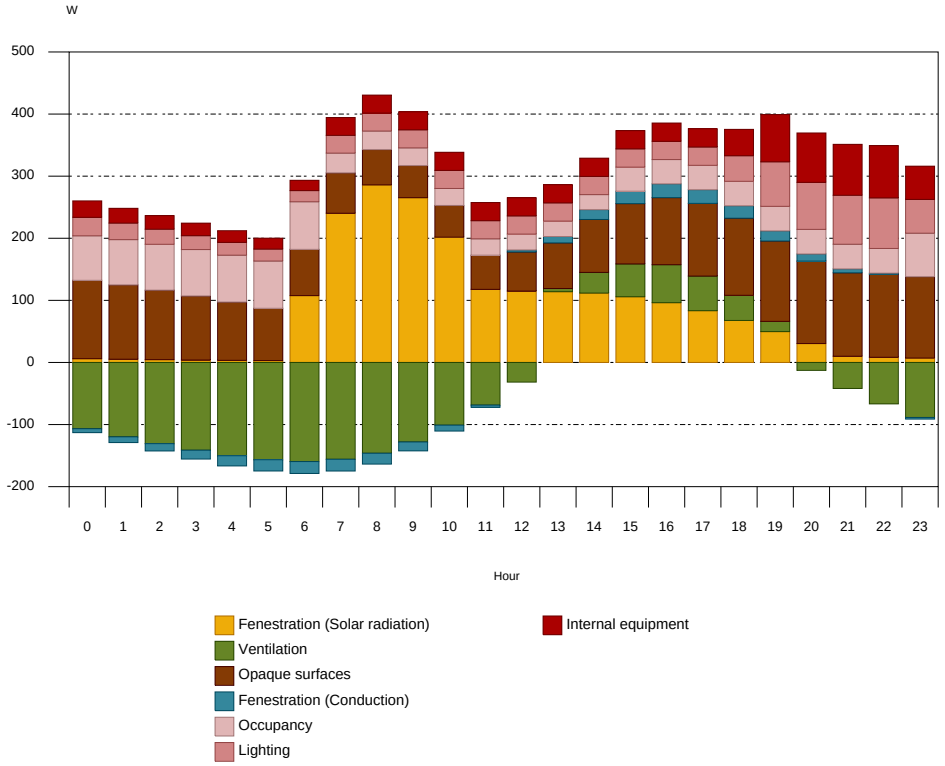


Peak heating load

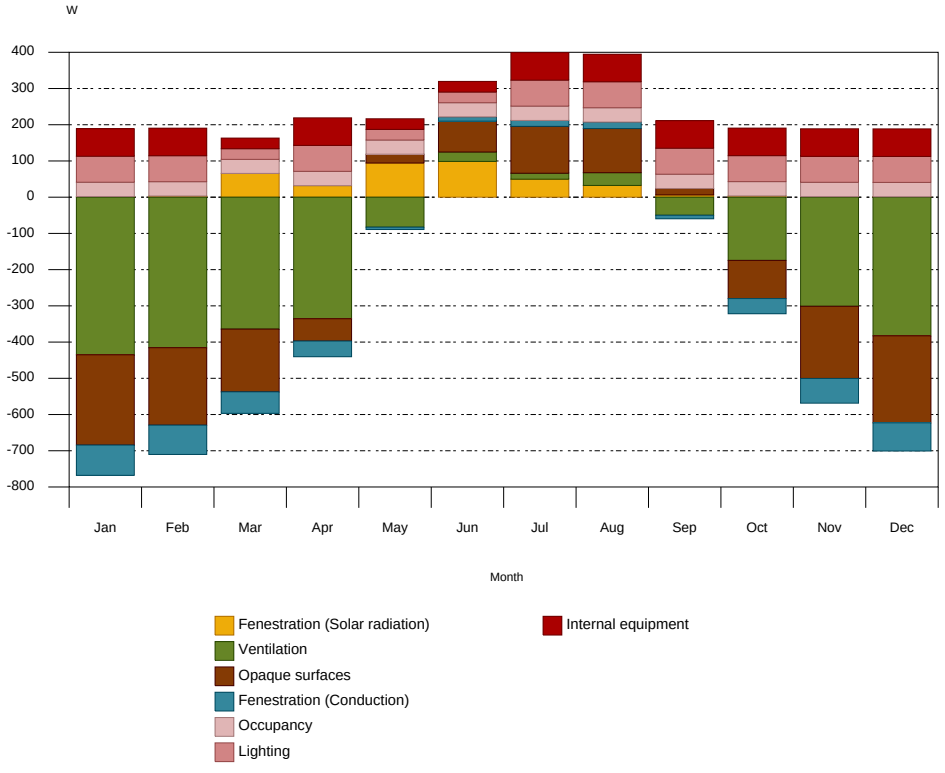


Hourly cooling load progression (21 of July)

Loads summary



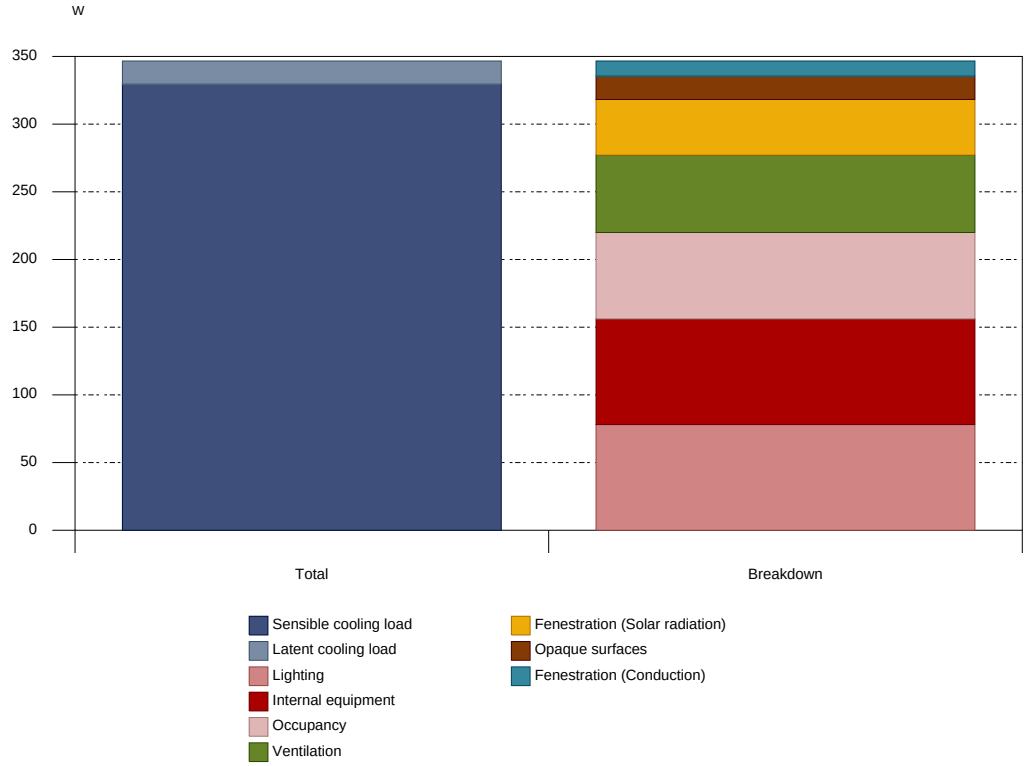
Annual peak cooling load progression



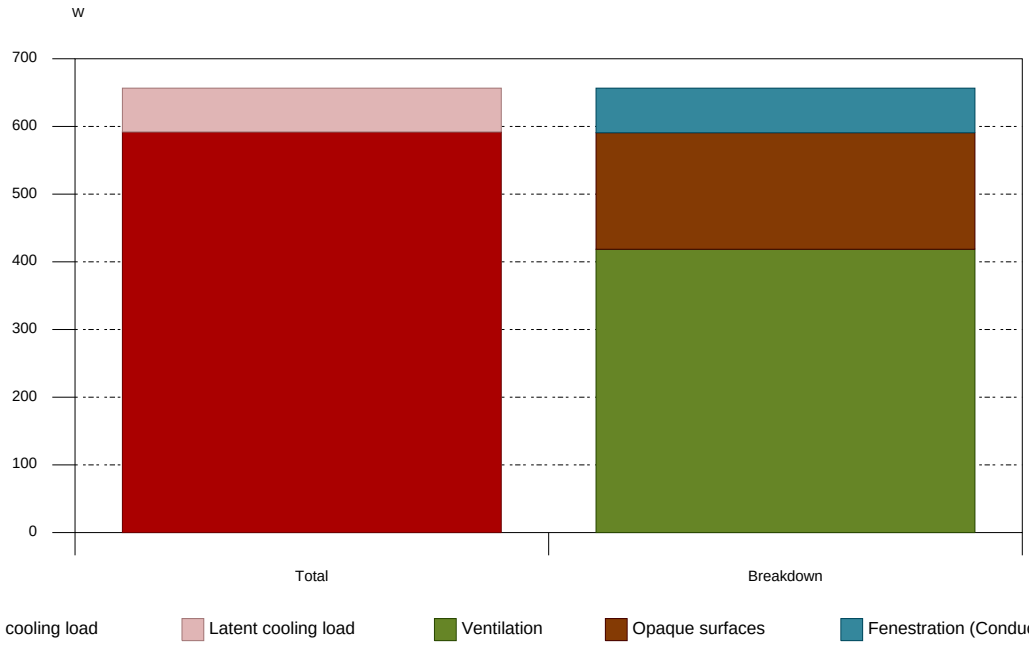
Loads summary

Hall

Peak cooling load (21 of August at 15h)

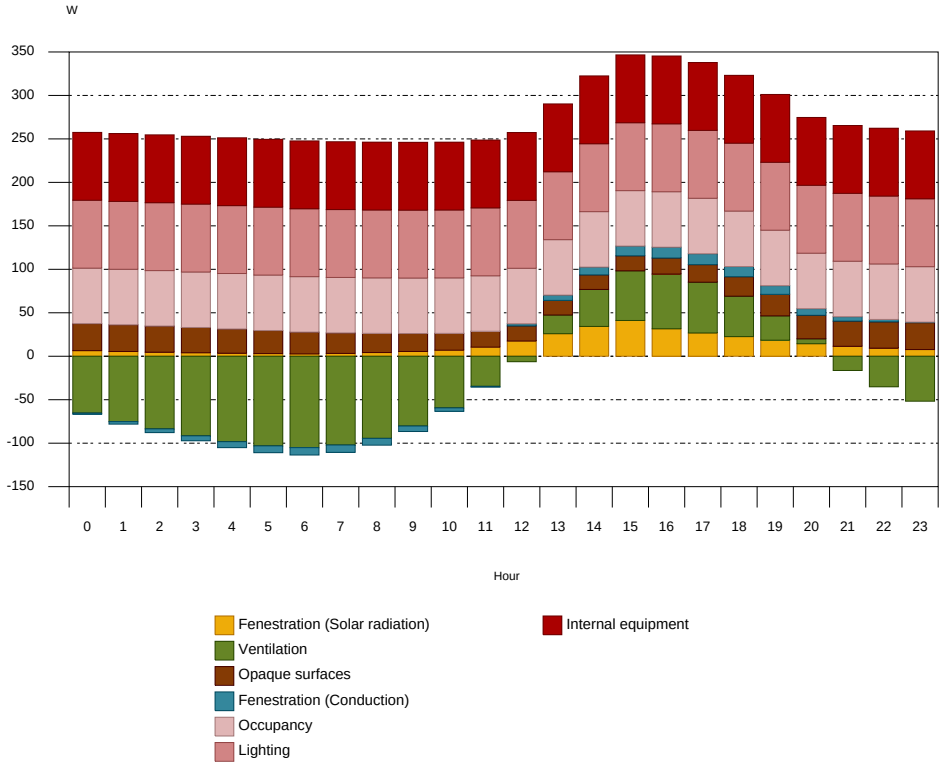


Peak heating load

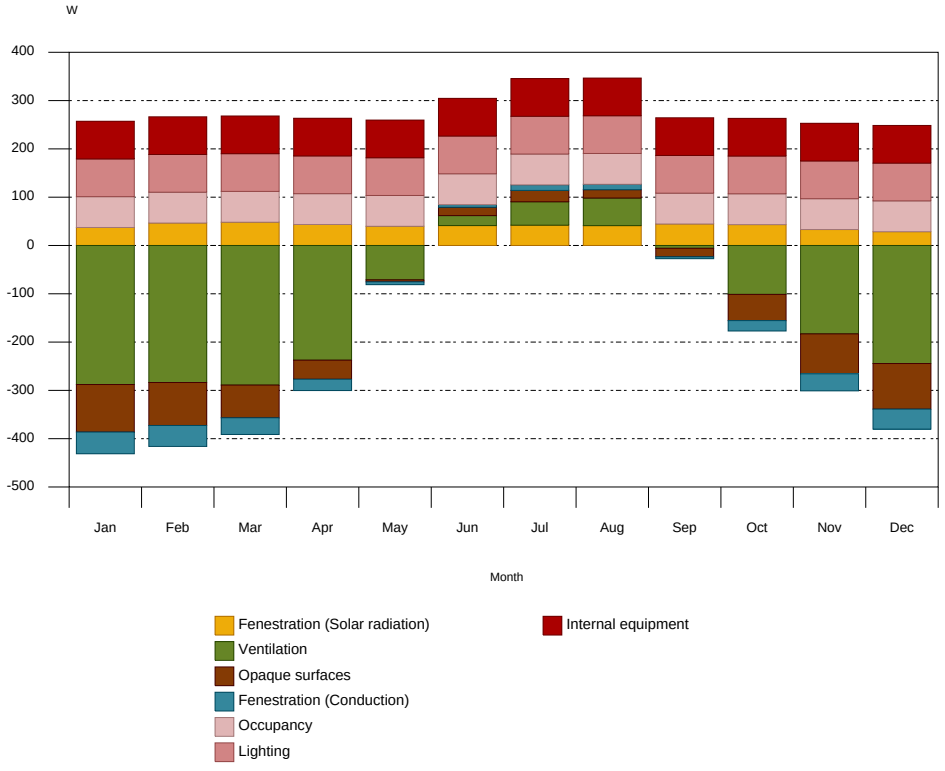


Hourly cooling load progression (21 of August)

Loads summary



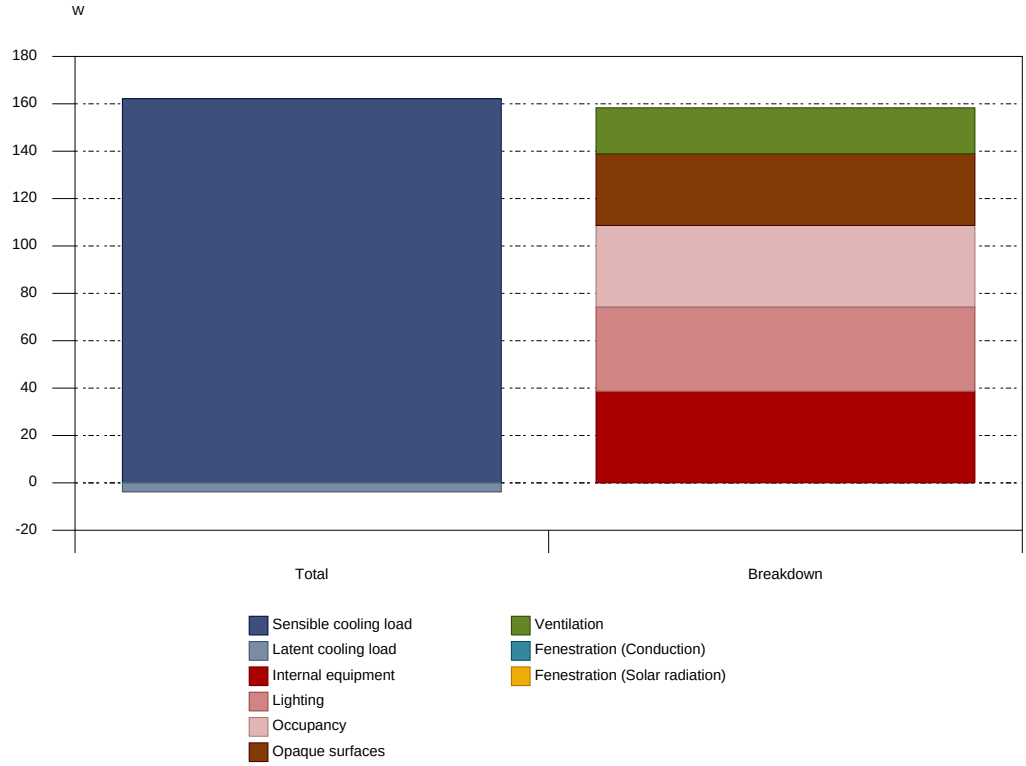
Annual peak cooling load progression



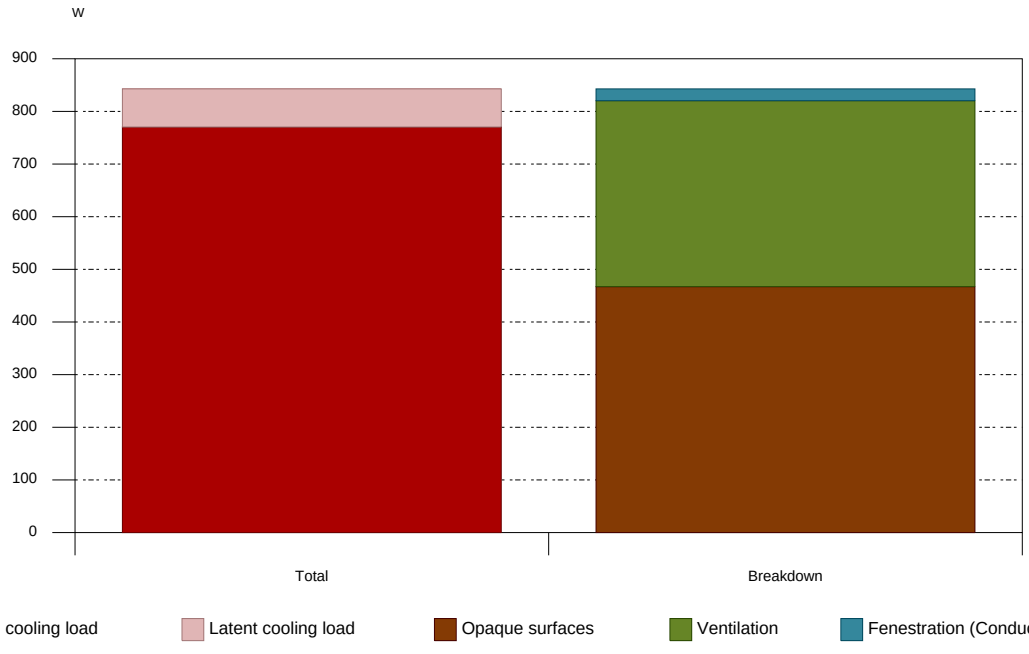
Loads summary

Bathroom

Peak cooling load (21 of August at 19h)

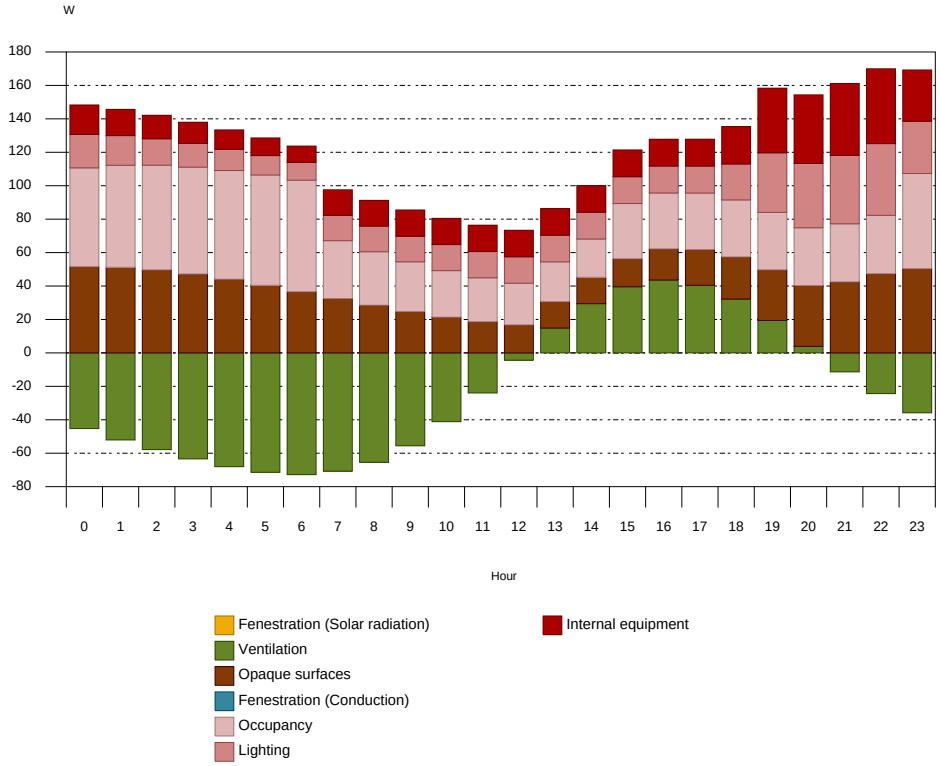


Peak heating load



Hourly cooling load progression (21 of August)

Loads summary



Annual peak cooling load progression