

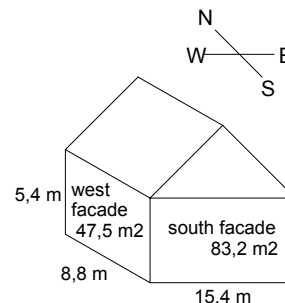
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Data sheet (1):

Geomerty:

Length (North-South):	15,4 m
Width (West-East):	8,8 m
Height (without roof):	5,4 m
Number of floors:	2
Deviation from South direction (west positive):	45 °
Useful area:	216,8 m ²
Air volume	585,4 m ³
A/V - value	0,73 1/m
Facade North/South:	83,2 m ²
Facade West/East	47,5 m ²

Sketch:



Insulation:

U value walls:	
North:	0,24 W/(m ² K)
South:	0,24 W/(m ² K)
East:	0,24 W/(m ² K)
West:	0,24 W/(m ² K)
Absorption coefficient of the walls:	0,75
Upper floor towards:	totally insulated roof
U value upper floor:	0,16 W/(m ² K)
Lower floor towards:	soil (with border insulation)
U value lower floor:	0,22 W/(m ² K)
Door area:	2,1 m ²
U value door	1,10 W/(m ² K)
Heat bridges:	increase U-values of surrounding planes by 0.10 W/(m ² K) (construction with nearly no heat bridges)

Building:

Interior temperature:	20,0 °C
Limit of overheating:	26,0 °C
Natural ventilation (infiltration):	0,50 1/h
Mechanical ventilation:	0,00 1/h
Heat recovery (only mech. ventilation):	0 %
efficiency factor of air conditioning:	0,5 kWh(cool)/kWh(electr.)
Internal Gains:	44,0 kWh/(m ² a)
Kind of indoor walls:	heavy construction
Kind of outdoor walls:	medium construction

Climate:

Climatic data:	Budapest (Magyarország)
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Data sheet (2):

Windows

North:

Windows area:	10,8 m2
Fraction of windows area at the facade:	13,0 %
Kind of windows:	others
U value glazing:	0,73 W/(m2 K)
U value frame:	1,30 W/(m2 K)
g value glazing:	0,50
Fraction of frame:	20,0 %
Shading:	0,0 %

South:

Windows area:	18,3 m2
Fraction of windows area at the facade:	22,0 %
Kind of windows:	others
U value glazing:	0,73 W/(m2 K)
U value frame:	1,30 W/(m2 K)
g value glazing:	0,50
Fraction of frame:	20,0 %
Shading:	0,0 %

East:

Windows area:	10,9 m2
Fraction of windows area at the facade:	23,0 %
Kind of windows:	others
U value glazing:	0,73 W/(m2 K)
U value frame:	1,30 W/(m2 K)
g value glazing:	0,50
Fraction of frame:	20,0 %
Shading:	0,0 %

West:

Windows area:	19,0 m2
Fraction of windows area at the facade:	40,0 %
Kind of windows:	others
U value glazing:	0,73 W/(m2 K)
U value frame:	1,30 W/(m2 K)
g value glazing:	0,50
Fraction of frame:	20,0 %
Shading:	0,0 %

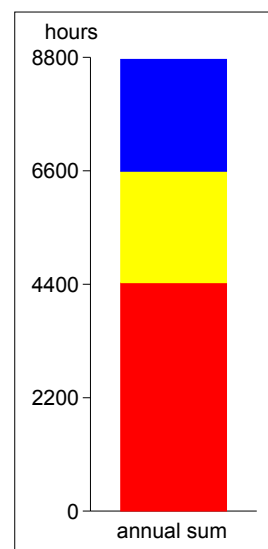
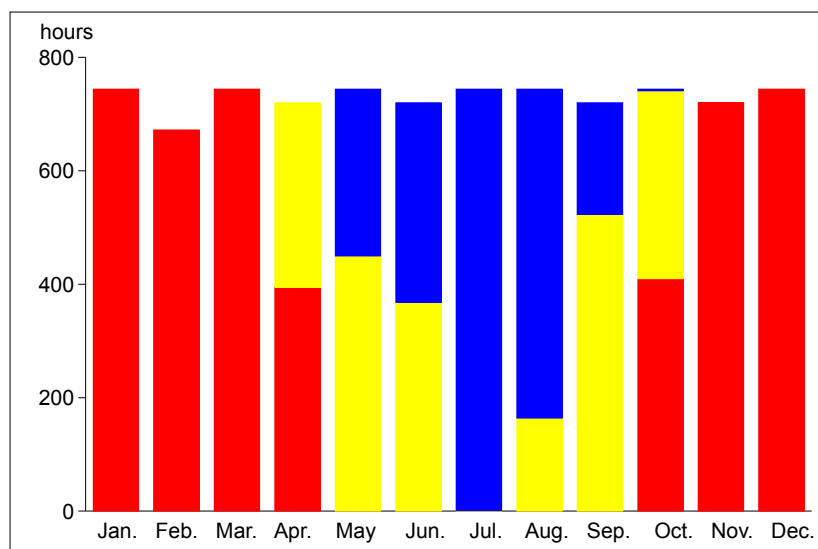
Energy:

Heating system:	condensing boiler (high efficiency), boiler and distribution inside the thermal zone
Heat transfer / system temperature:	underfloor heating (switch difference : 1K), system temperature: 35/28°C
Source of energy:	natural gas

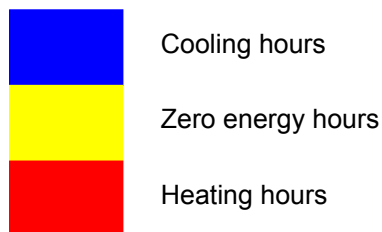
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Output: Heating and cooling hours

	Heating hours in h	Zero energy hours in h	Cooling hours in h
January	744	0	0
February	672	0	0
March	744	0	0
April	395	325	0
May	0	450	294
June	0	368	352
July	0	1	743
August	0	164	580
September	0	523	197
October	410	331	3
November	720	0	0
December	744	0	0
Total in h	4429	2162	2169
Total in %	50,6	24,7	24,8



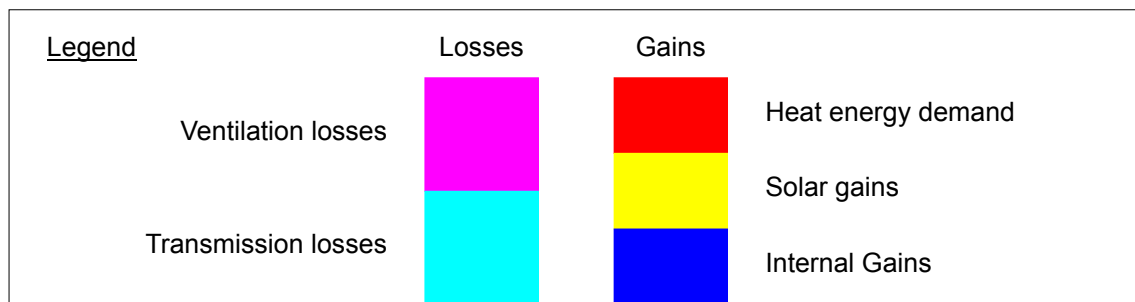
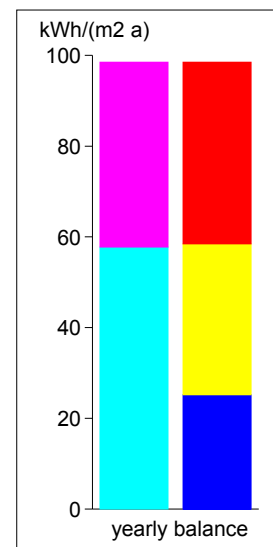
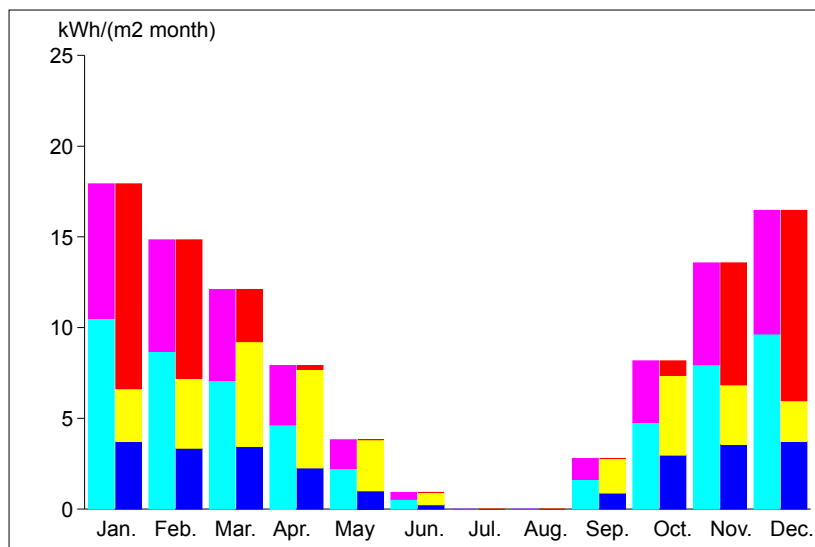
Legend:



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Output: Heat balance

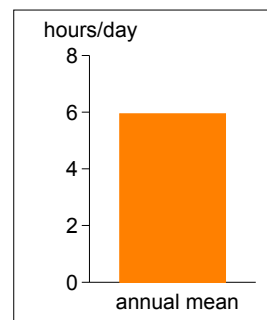
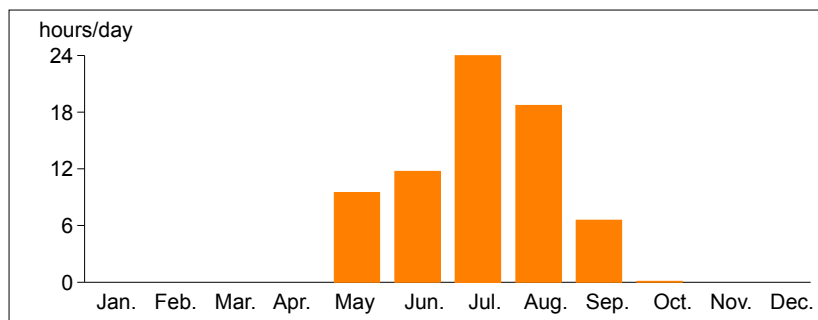
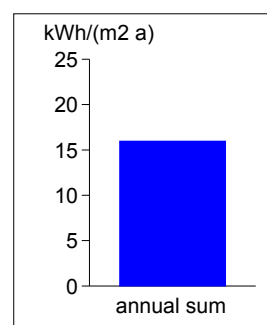
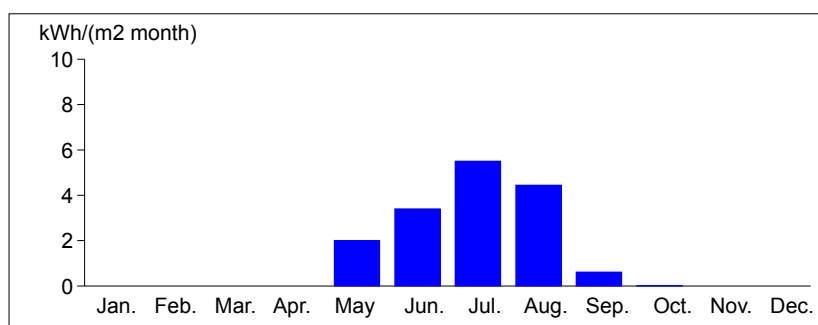
	Transmis- sion losses in kWh/m2	Ventilation losses in kWh/m2	Total heat losses in kWh/m2	Internal gains in kWh/m2	Solar gains in kWh/m2	Usability factor	Heat energy demand in kWh/m2
January	10,5	7,4	17,9	3,7	2,9	1,00	11,3
February	8,7	6,1	14,8	3,3	3,9	0,99	7,6
March	7,1	5,0	12,1	3,4	5,8	0,92	2,9
April	4,6	3,3	7,9	2,3	5,4	0,63	0,2
May	2,2	1,6	3,8	1,0	2,8	0,27	0,0
June	0,5	0,4	0,9	0,2	0,7	0,06	0,0
July	0,0	0,0	0,0	0,0	0,0	0,00	0,0
August	0,0	0,0	0,0	0,0	0,0	0,00	0,0
September	1,6	1,2	2,8	0,9	1,9	0,24	0,0
October	4,8	3,4	8,2	3,0	4,4	0,79	0,8
November	8,0	5,6	13,6	3,6	3,3	0,99	6,7
December	9,6	6,8	16,5	3,7	2,2	1,00	10,5
Total (absolute) in kWh/a	12522	8835	21357	5462	7219		8677
Total (specific) in kWh/(m2 a)	57,8	40,7	98,5	25,2	33,3		40,0



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Output: Cooling balance

	Cooling demand in kWh/m2	Overheating (hours per day)	Cooling degree hours in Kh
January	0,0	0,0	0,0
February	0,0	0,0	0,0
March	0,0	0,0	0,0
April	0,0	0,0	0,0
May	2,0	9,5	1066,9
June	3,4	11,7	1649,5
July	5,5	24,0	3874,0
August	4,4	18,7	3195,0
September	0,6	6,6	123,5
October	0,0	0,1	0,2
November	0,0	0,0	0,0
December	0,0	0,0	0,0
Mean value / yearly sum	16,0	0,2	9909,1



Legend:



Cooling demand
in kWh / m2



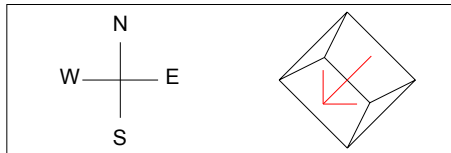
Monthly average of overheated
in hours per day

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Output: Balance of windows

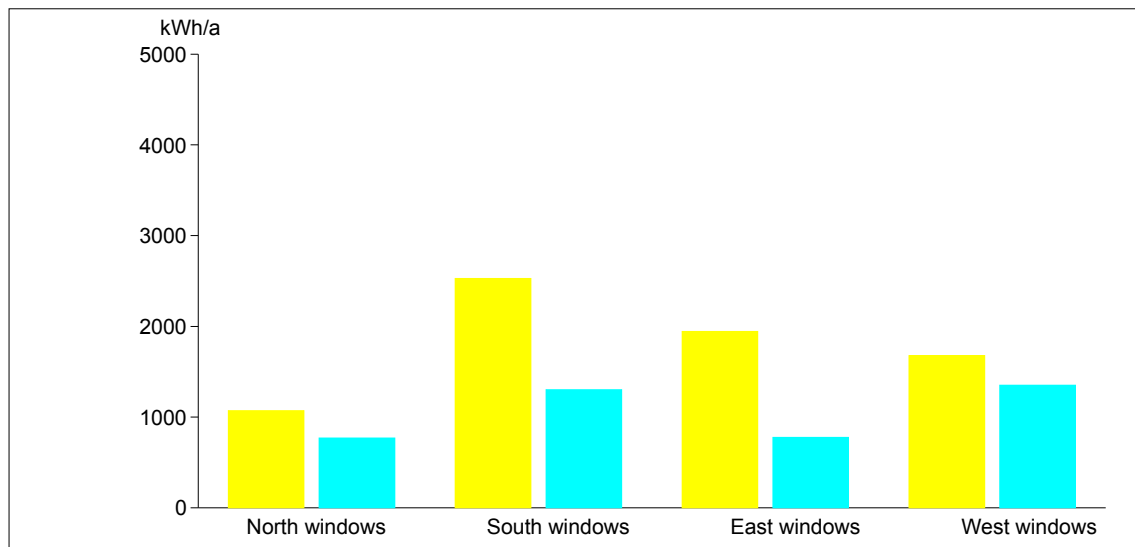
Orientation:

Deviation from South direction: 45 ° to West



Gains / losses:

	North in kWh/a	South in kWh/a	East in kWh/a	West in kWh/a	Total in kWh/a
Usable solar Gains	1070,7	2527,0	1943,4	1677,7	7218,7
Transmission losses of windows	768,5	1300,6	777,0	1351,2	4197,2
Balance	302,2	1226,4	1166,4	326,4	3021,5



Legend:

Solar gains



Transmission losses
of windows



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Output: Primary and end energy demand for heating

Heat:

Heat energy demand: 40,0 kWh/(m2 a)
 Losses of the heat storage: 0,0 kWh/(m2 a)
 Heat losses from the distribution: 0,6 kWh/(m2 a)
 Losses at the transmission to the rooms: 1,1 kWh/(m2 a)
 Expense number of heat generation: 0,94

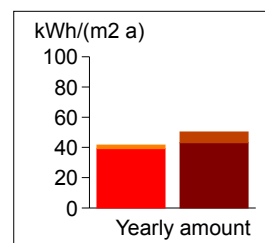
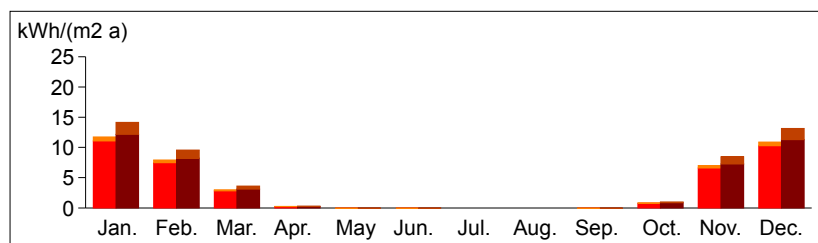
End energy demand natural gas: 39,2 kWh/(m2 a)
 Primary energy factor natural gas: 1,1
 Primary energy demand natural gas: 43,1 kWh/(m2 a)

Auxiliary energy (electricity):

Auxiliary energy for heat generation: 0,6 kWh/(m2 a)
 Auxiliary energy for heat storage: 0,0 kWh/(m2 a)
 Auxiliary energy for heat distribution: 1,8 kWh/(m2 a)

End energy demand auxiliary energy (electricity): 2,4 kWh/(m2 a)
 Primary energy factor electricity: 3,0
 Primary energy demand auxiliary energy (electricity): 7,1 kWh/(m2 a)

	End energy demand in kWh/m2	End energy demand in kWh/m2	End energy demand in kWh/m2	Primary demand in kWh/m2	Primary demand in kWh/m2	Primary demand in kWh/m2
January	11,1	0,7	11,7	12,2	2,0	14,2
February	7,5	0,4	7,9	8,2	1,3	9,6
March	2,8	0,2	3,0	3,1	0,5	3,6
April	0,2	0,0	0,2	0,2	0,0	0,3
May	0,0	0,0	0,0	0,0	0,0	0,0
June	0,0	0,0	0,0	0,0	0,0	0,0
July	0,0	0,0	0,0	0,0	0,0	0,0
August	0,0	0,0	0,0	0,0	0,0	0,0
September	0,0	0,0	0,0	0,0	0,0	0,0
October	0,8	0,0	0,8	0,9	0,1	1,0
November	6,6	0,4	7,0	7,3	1,2	8,4
December	10,3	0,6	10,9	11,3	1,9	13,1
Sum specific in kWh/(m2 a)	39,2	2,4	41,6	43,1	7,1	50,2
Sum absolute in kWh/a	8499	512	9011	9349	1536	10885



Legend:

End energy demand electricity (orange)
 End energy demand natural gas (red)
 Primary energy demand electricity (orange)
 Primary energy demand natural gas (red)

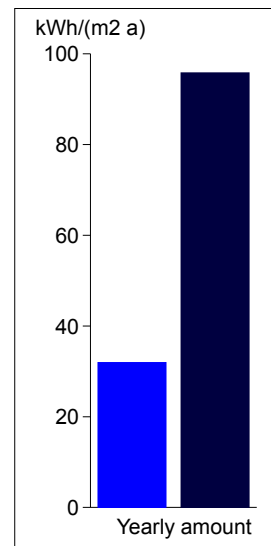
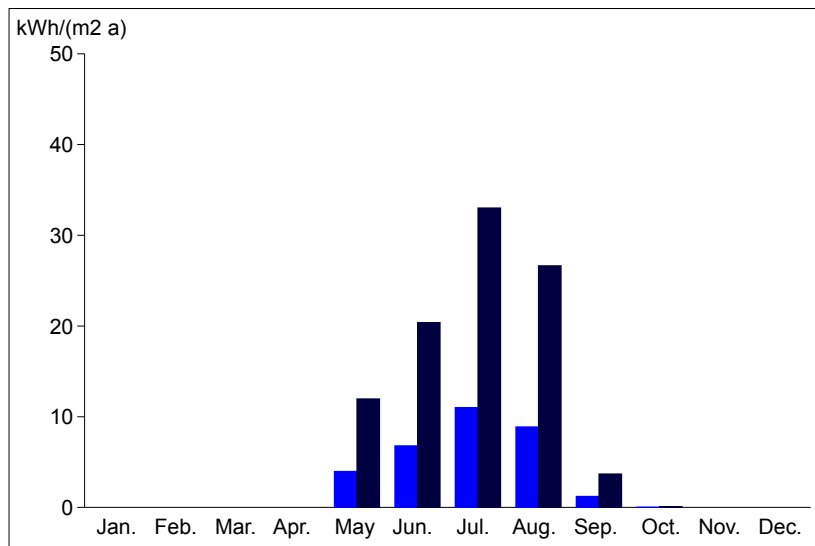
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Output: Primary and end energy demand for cooling

Efficiency factor air-conditioning:

0,5 kWh cooling / kWh electricity

	Cooling demand in kWh/m2	End energy demand cooling (electricity) in kWh/m2	Primary energy demand (electricity) in kWh/m2
January	0,0	0,0	0,0
February	0,0	0,0	0,0
March	0,0	0,0	0,0
April	0,0	0,0	0,0
May	2,0	4,0	12,0
June	3,4	6,8	20,4
July	5,5	11,0	33,0
August	4,4	8,9	26,6
September	0,6	1,2	3,7
October	0,0	0,0	0,1
November	0,0	0,0	0,0
December	0,0	0,0	0,0
Sum specific in kWh/(m2 a)	16,0	31,9	95,8
Sum absolute in kWh/a	3463,2	6926,5	20779,4



Legend:

Cooling energy demand



Primary energy demand