

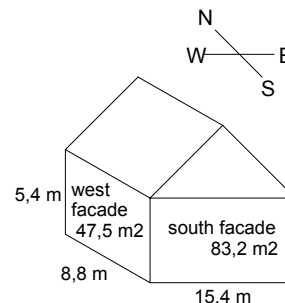
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Data sheet (1):

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:	0,44 W/(m ² K)
South:	0,44 W/(m ² K)
East:	0,44 W/(m ² K)
West:	0,44 W/(m ² K)
Absorption coefficient of the walls:	0,75
Upper floor towards:	totally insulated roof
U value upper floor:	0,21 W/(m ² K)
Lower floor towards:	soil (with border insulation)
U value lower floor:	0,35 W/(m ² K)
Door area:	2,1 m ²
U value door	1,40 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:	1,46 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:	1,46 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:	1,46 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:	1,46 W/(m2 K)
U value frame:	1,30 W/(m2 K)
g value glazing:	0,50
Fraction of frame:	20,0 %
Shading:	0,0 %

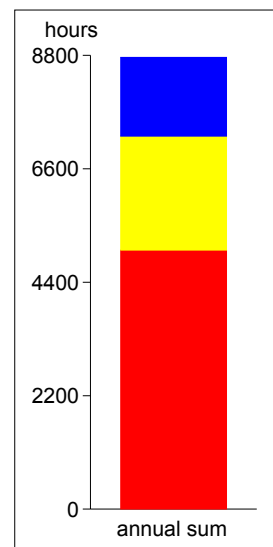
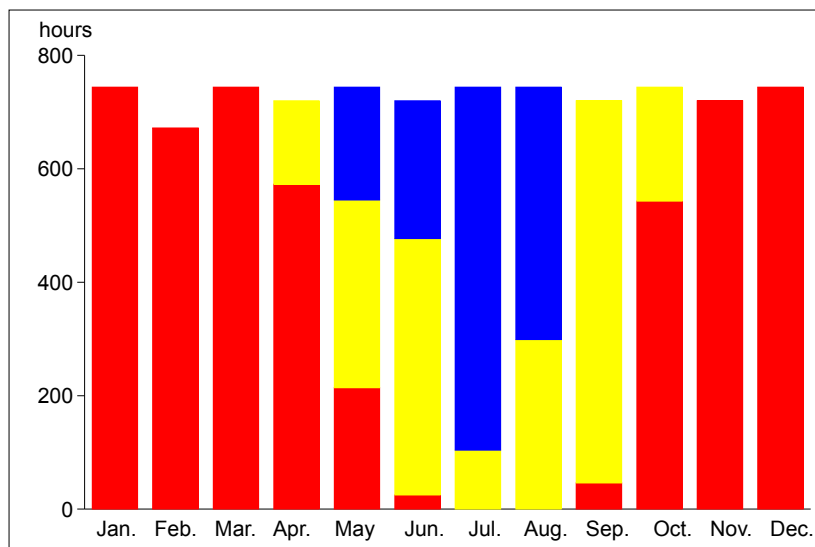
Energy:

Heating system:	low temperature burner, boiler and distribution inside the thermal zone
Heat transfer / system temperature:	radiators (outside walls), thermostatic valves (layout temperature: 1K), system temperature: 70/55°C
Source of energy:	natural gas

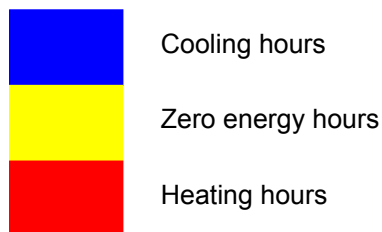
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Output: Heating and cooling hours

	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	573	147	0
May	214	331	199
June	25	452	243
July	0	104	640
August	0	299	445
September	46	674	0
October	543	201	0
November	720	0	0
December	744	0	0
Total in h	5025	2208	1527
Total in %	57,4	25,2	17,4



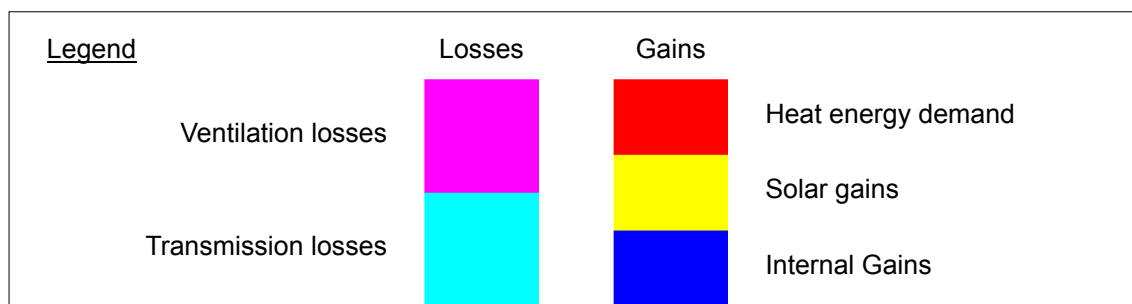
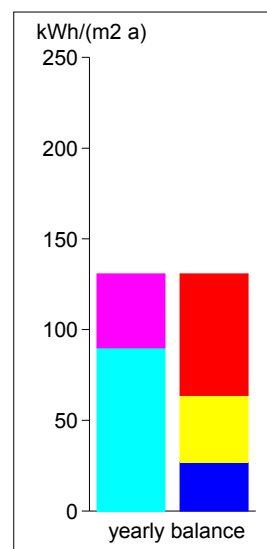
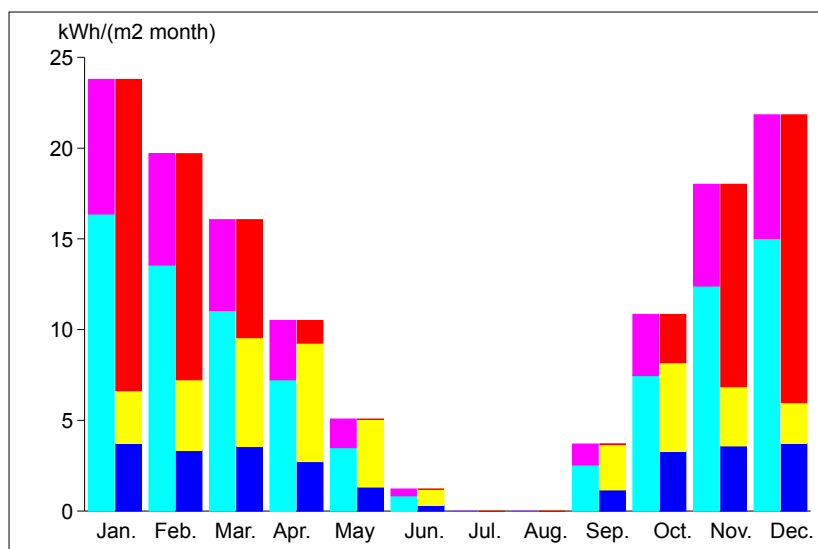
Legend:



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Output: Heat balance

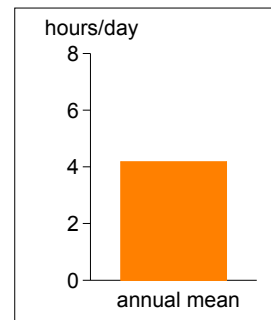
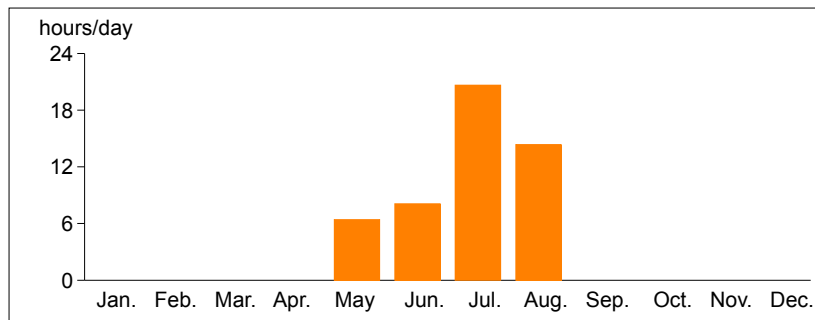
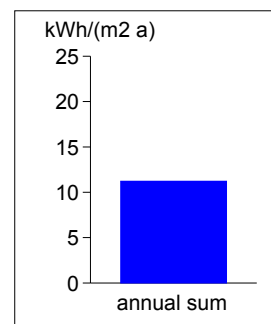
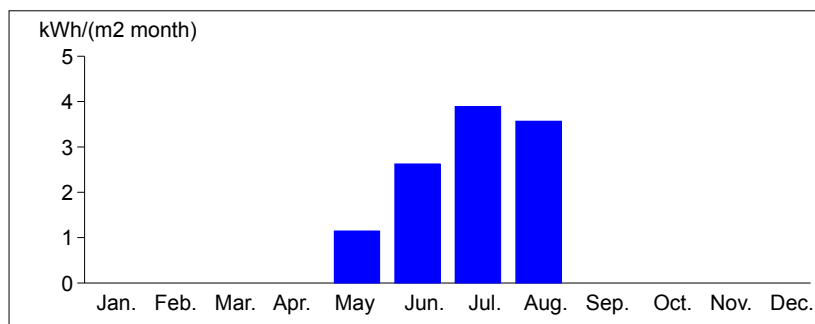
	Transmis- sion losses in kWh/m2	Ventilation losses in kWh/m2	Total heat losses in kWh/m2	Internal gains in kWh/m2	Solar gains in kWh/m2	Usability factor	Heat energy demand in kWh/m2
January	16,4	7,4	23,8	3,7	2,9	1,00	17,2
February	13,6	6,1	19,7	3,4	3,9	0,99	12,5
March	11,1	5,0	16,1	3,6	6,0	0,96	6,5
April	7,2	3,3	10,5	2,7	6,5	0,75	1,3
May	3,5	1,6	5,1	1,3	3,7	0,36	0,0
June	0,8	0,4	1,2	0,3	0,9	0,09	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	2,5	1,2	3,7	1,2	2,5	0,32	0,0
October	7,5	3,4	10,8	3,3	4,9	0,88	2,7
November	12,4	5,6	18,0	3,6	3,3	0,99	11,2
December	15,0	6,8	21,8	3,7	2,2	1,00	15,9
Total (absolute) in kWh/a	19509	8835	28343	5810	7988		14546
Total (specific) in kWh/(m2 a)	90,0	40,7	130,7	26,8	36,8		67,1



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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	1,1	6,4	397,7
June	2,6	8,1	1009,6
July	3,9	20,6	1793,7
August	3,6	14,4	1770,0
September	0,0	0,0	0,0
October	0,0	0,0	0,0
November	0,0	0,0	0,0
December	0,0	0,0	0,0
Mean value / yearly sum	11,2	0,2	4971,0



Legend:



Cooling demand
in kWh / m2



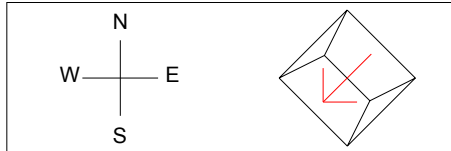
Monthly average of overheated
in hours per day

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Output: Balance of windows

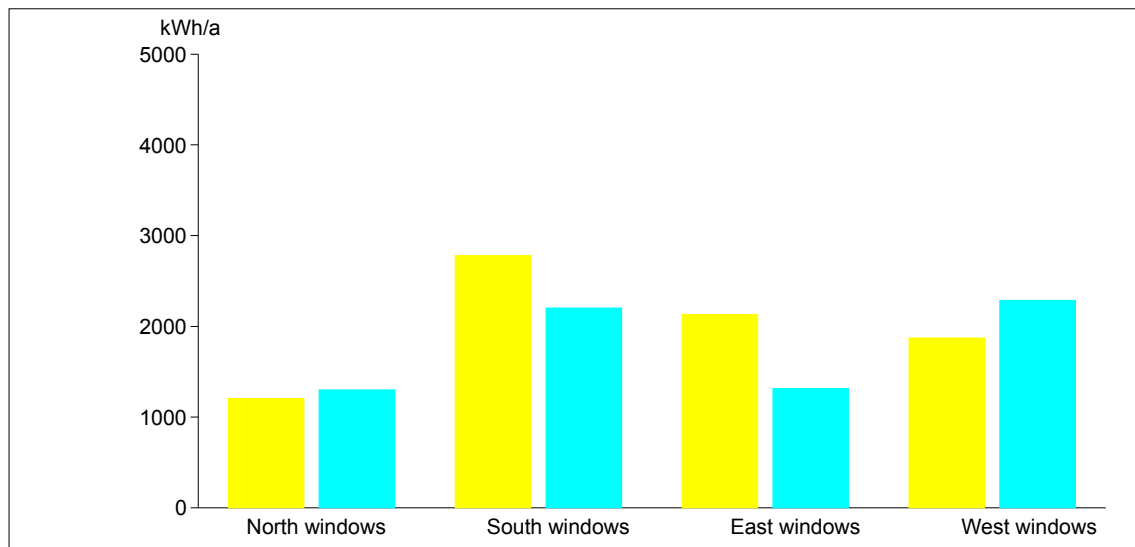
Orientation:

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	1205,1	2779,3	2132,1	1871,3	7987,8
Transmission losses of windows	1300,3	2200,5	1314,6	2286,2	7101,5
Balance	-95,2	578,9	817,5	-414,9	886,3



Legend:

Solar gains



Transmission losses
of windows



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Output: Primary and end energy demand for heating

Heat:

Heat energy demand: 67,1 kWh/(m2 a)
 Losses of the heat storage: 0,0 kWh/(m2 a)
 Heat losses from the distribution: 2,3 kWh/(m2 a)
 Losses at the transmission to the rooms: 1,1 kWh/(m2 a)
 Expense number of heat generation: 1,08

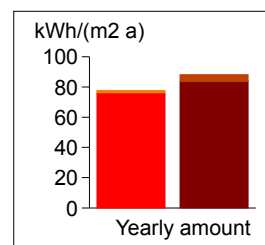
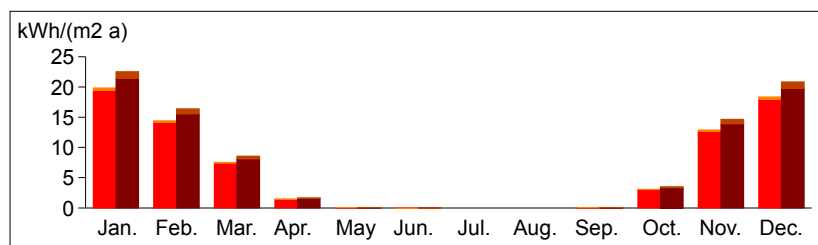
End energy demand natural gas: 76,1 kWh/(m2 a)
 Primary energy factor natural gas: 1,1
 Primary energy demand natural gas: 83,7 kWh/(m2 a)

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: 0,9 kWh/(m2 a)

End energy demand auxiliary energy (electricity): 1,5 kWh/(m2 a)
 Primary energy factor electricity: 3,0
 Primary energy demand auxiliary energy (electricity): 4,4 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	19,5	0,4	19,8	21,4	1,1	22,5
February	14,1	0,3	14,4	15,6	0,8	16,4
March	7,4	0,1	7,5	8,1	0,4	8,5
April	1,4	0,0	1,4	1,6	0,1	1,6
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	3,0	0,1	3,1	3,3	0,2	3,5
November	12,6	0,2	12,9	13,9	0,7	14,6
December	18,0	0,3	18,3	19,8	1,0	20,8
Sum specific in kWh/(m2 a)	76,1	1,5	77,6	83,7	4,4	88,1
Sum absolute in kWh/a	16498	318	16816	18148	955	19102



Legend:

End energy demand electricity
 End energy demand natural gas
 Primary energy demand electricity
 Primary energy demand natural gas

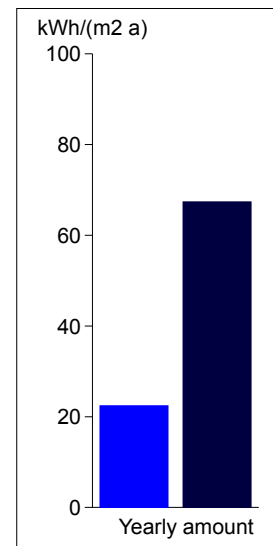
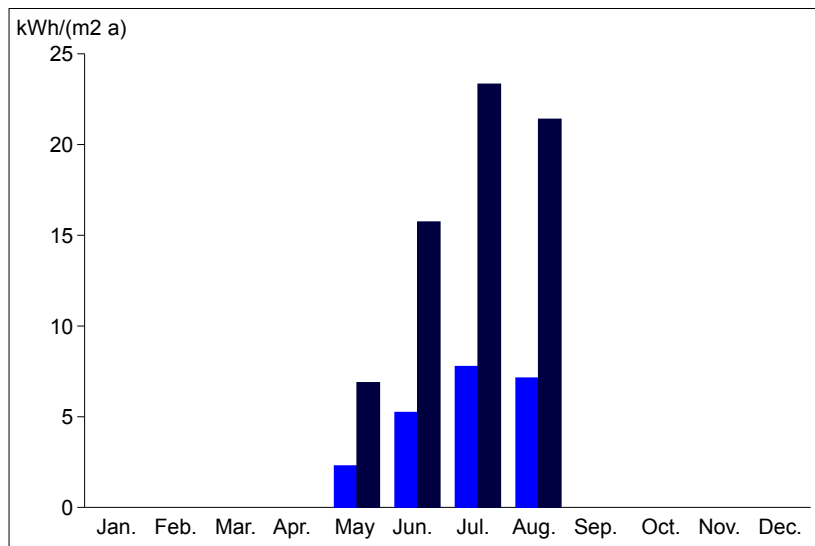
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Output: Primary and end energy demand for cooling

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	1,1	2,3	6,9
June	2,6	5,2	15,7
July	3,9	7,8	23,3
August	3,6	7,1	21,4
September	0,0	0,0	0,0
October	0,0	0,0	0,0
November	0,0	0,0	0,0
December	0,0	0,0	0,0
Sum specific in kWh/(m2 a)	11,2	22,5	67,4
Sum absolute in kWh/a	2434,4	4868,8	14606,5



Legend:

Cooling energy demand



Primary energy demand