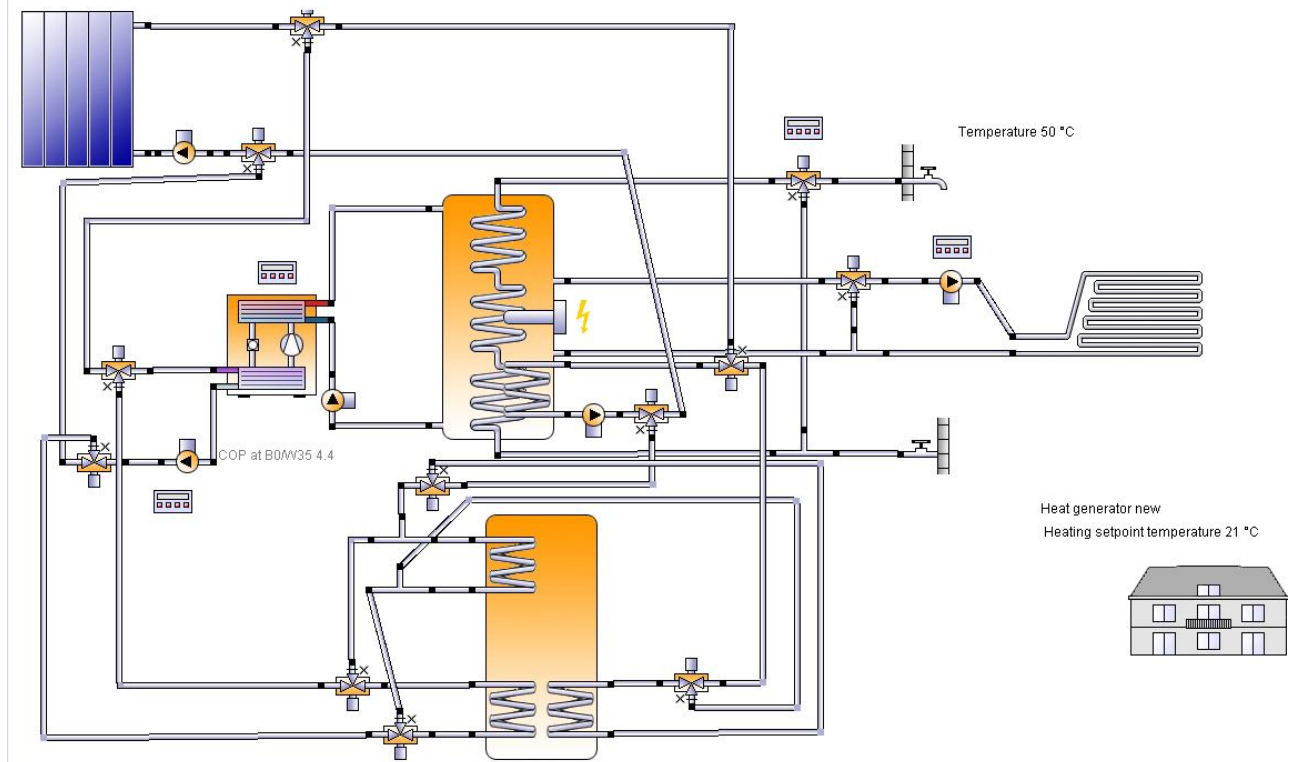


Project Project - System diagram PolarSol koti



Location of the system

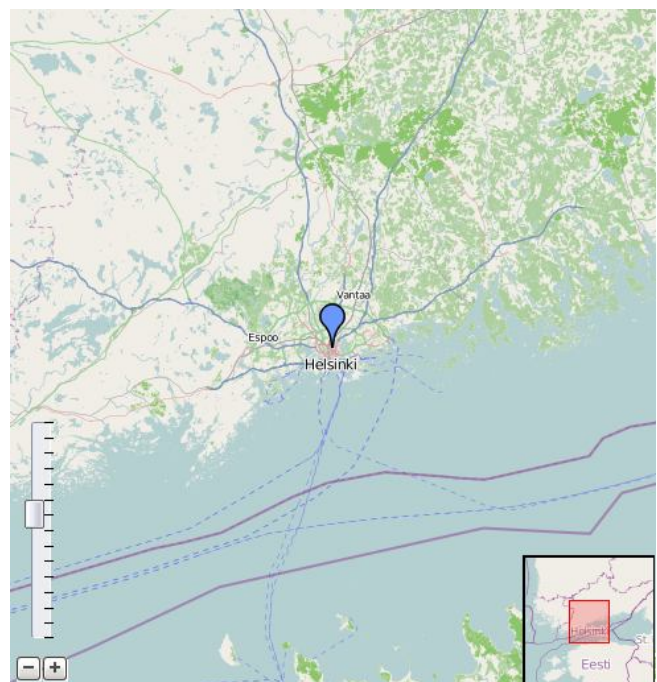
Map section

Onnela
Longitude: 24.95°
Latitude: 60.202°
Elevation: 22 m

This report has been created by:

Anton Serbin

Dealer: www.profil.fi
Annerman Oy



Comments on the project

Projekt in Helsinki

Photograph of property



System overview (annual values)

Total fuel and/or electrical energy consumption of the system [E _{tot}]	13,982.7 kWh
Total energy consumption [Q _{use}]	48,607.4 kWh
System performance (Q _{use} / E _{tot})	3.48
Comfort demand	Energy demand

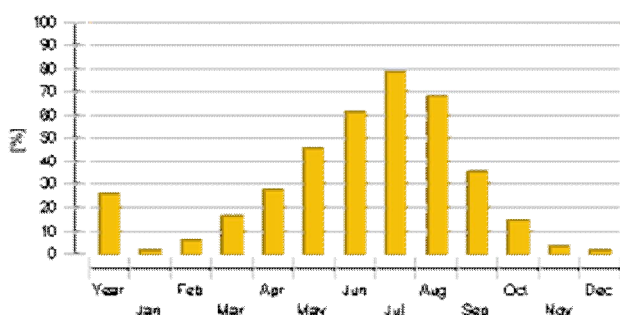
Overview solar thermal energy (annual values)

Collector area	20 m ²
Solar fraction total	99.9%
Solar fraction hot water [SF _{nHw}]	99.9 %
Solar fraction building [SF _{nBd}]	99.9 %
Total annual field yield	17,353.6 kWh
Collector field yield relating to gross area	867.7 kWh/m ² /Year
Collector field yield relating to aperture area	964.1 kWh/m ² /Year
Max. energy savings	4,806.5 kWh
Max. reduction in CO ₂ emissions	2,578.2 kg

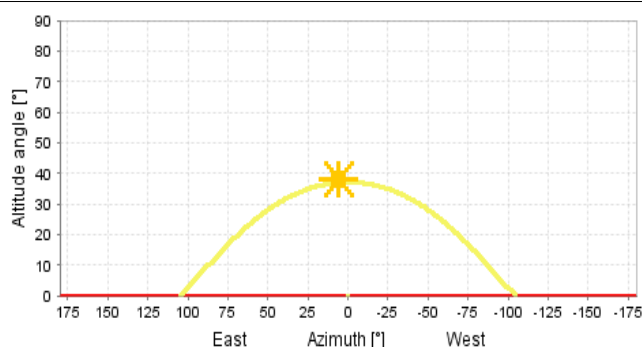
Overview heat pump (annual values)

Seasonal performance factor (without pump energy)	3.6
Total electrical energy consumption when heating [Eaux]	13,881 kWh
Total energy savings	36,267.1 kWh
Total reduction in CO ₂ emissions	19,453.7 kg

Solar fraction: fraction of solar energy to system [SF_n]



Horizon line



Meteorological data-Overview

Average outdoor temperature	5.8 °C
Global irradiation, annual sum	959.6 kWh/m ²
Diffuse irradiation, annual sum	444.7 kWh/m ²

Component overview (annual values)

B/W or W/W heat pump	Thermalia® 12P	
Seasonal performance factor (without pump energy)		3.61
Energy from/to the system [Qaux]	kWh	50,148.1
CO ₂ emissions	kg	7,445.8
Fuel and electrical energy consumption [Eaux]	kWh	13,881
Energy savings solar thermal	kWh	4,802.4
CO ₂ savings solar thermal	kg	2,576
Energy savings heat pump	kWh	36,267.1
CO ₂ savings heat pump	kg	19,453.7

Collector 2	Flat-plate collector, premium quality	
Data Source		SPF
Number of collectors		10
Number of arrays		1
Total gross area	m ²	20
Total aperture area	m ²	18
Total absorber area	m ²	18
Tilt angle (hor.=0°, vert.=90°)	°	30
Orientation (E=+90°, S=0°, W=-90°)	°	0
Collector field yield [Qsol]	kWh	17,353.6
Irradiation onto collector area [Esol]	kWh	20,905.7
Collector efficiency [Qsol / Esol]	%	83
Direct irradiation after IAM	kWh	11,504.7
Diffuse irradiation after IAM	kWh	8,041.3

Building	-	
Heated/air-conditioned living area	m ²	330
Heating setpoint temperature	°C	20
Heating energy demand excluding DHW [Qdem]	kWh	45,000
Annual specific heating energy demand	kWh/m ²	136.4
Useful heat gain	kWh	90,000.4
Total energy losses	kWh	135,000.3

Convactor	Floor heating 1000W	
Number of heating/cooling modules	-	37
Power per heating module under standard conditions	W	1,000
Nominal inlet temperature	°C	45
Nominal return temperature	°C	35
Net energy from/to heating/cooling modules	kWh	44,475.8

Hot water demand	Constant	
Volume withdrawal/daily consumption	l/d	251
Temperature setting	°C	50
Energy demand [Qdem]	kWh	4,708.7

Pump 2	Pump Eco, small	
Circuit pressure drop	bar	0.02
Flow rate	l/h	1,470
Fuel and electrical energy consumption [Epar]	kWh	23.6

Pump 4	Pump Eco, small	
Circuit pressure drop	bar	0.039
Flow rate	l/h	1,801.7
Fuel and electrical energy consumption [Epar]	kWh	18.1

Pump 5	Pump Eco, small	
Circuit pressure drop	bar	0.418
Flow rate	l/h	5,880
Fuel and electrical energy consumption [Epar]	kWh	23.8

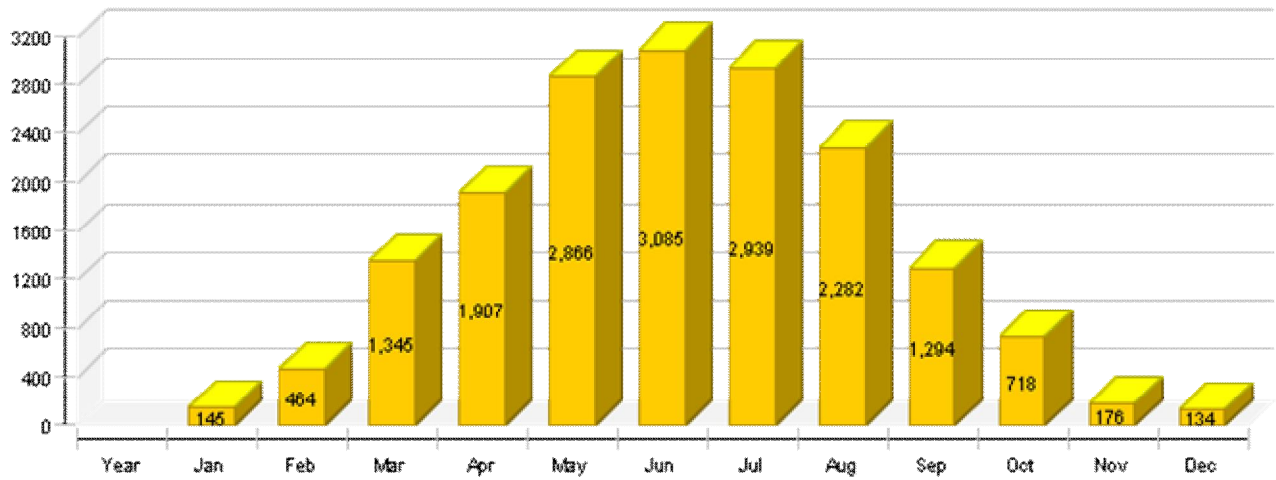
Pump 6	Pump Eco, small	
Circuit pressure drop	bar	240.014
Flow rate	l/h	3,600
Fuel and electrical energy consumption [Epar]	kWh	13.1

Storage tank 11	Combined solar tank HTS 1450	
Volume	l	1,450
Height	m	2.19
Material		Steel
Insulation		Rigid PU foam
Thickness of insulation	mm	80
Heat loss	kWh	656.7
Connection losses	kWh	444.8

Storage tank 13		
Volume	l	6,000
Height	m	2.7
Material		Stainless steel
Insulation		Rigid PU foam
Thickness of insulation	mm	200
Heat loss	kWh	-5,019.9
Connection losses	kWh	-77.7

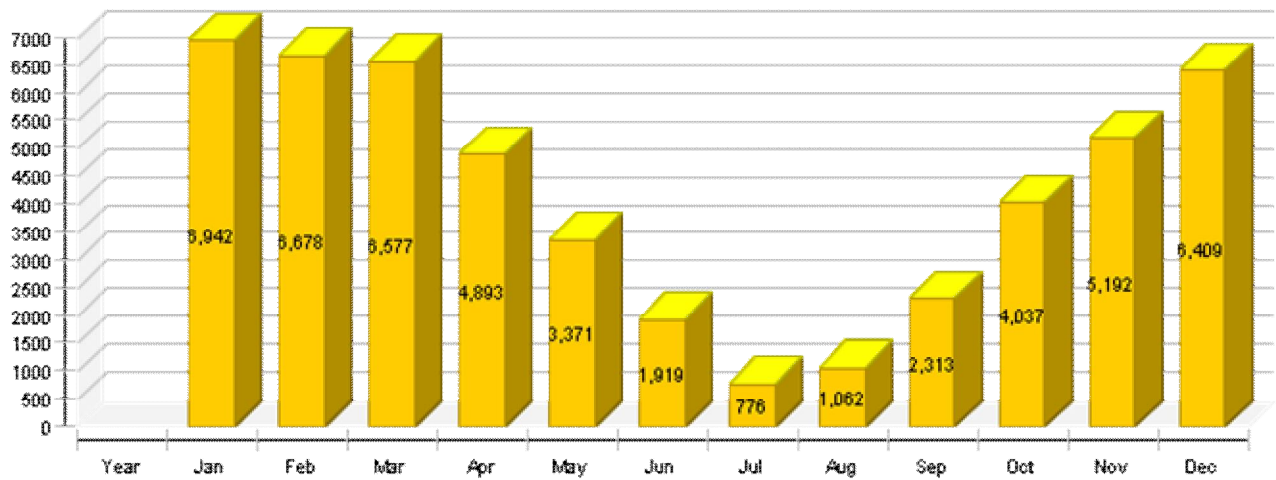
Solar thermal energy to the system [Qsol]

kWh



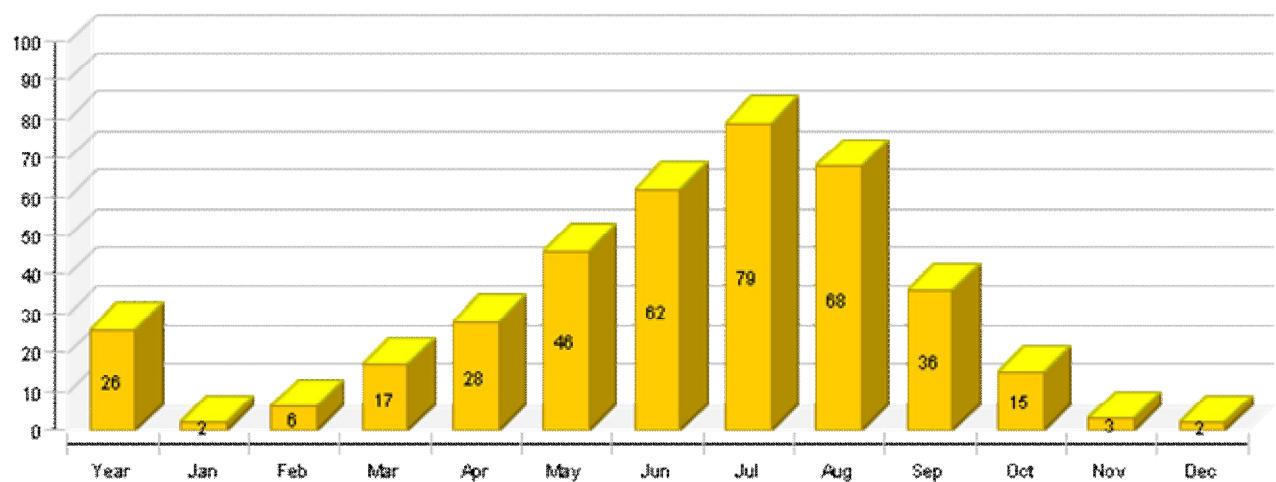
Heat generator energy to the system (solar thermal energy not included) [Qaux]

kWh



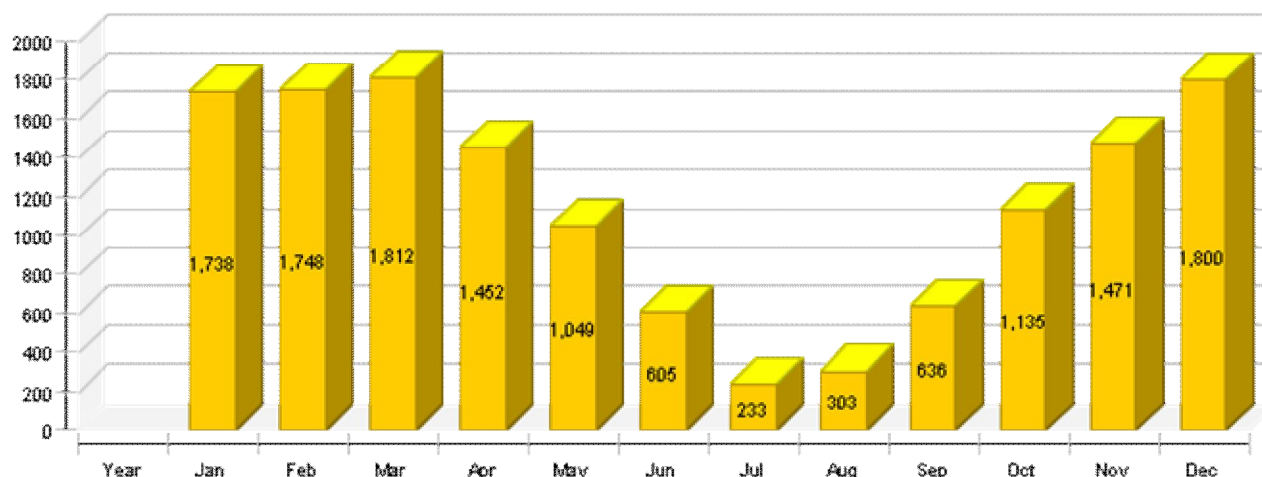
Solar fraction: fraction of solar energy to system [SF_n]

%



Total fuel and/or electrical energy consumption of the system [Etot]

kWh



Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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Solar thermal energy to the system [Qsol]

kWh	17354	145	464	1345	1907	2866	3085	2939	2282	1294	718	176	134
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Heat generator energy to the system (solar thermal energy not included) [Qaux]

kWh	50170	6942	6678	6577	4893	3371	1919	776	1062	2313	4037	5192	6409
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Heat generator fuel and electrical energy consumption [Eaux]

kWh	13904	1730	1740	1802	1444	1042	600	230	300	632	1129	1465	1791
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Solar fraction: fraction of solar energy to system [SFn]

%	25.7	2	6.5	17	28	45.9	61.7	79.1	68.2	35.9	15.1	3.3	2
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Total fuel and/or electrical energy consumption of the system [Etot]

kWh	13983	1738	1748	1812	1452	1049	605	233	303	636	1135	1471	1800
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Irradiation onto collector area [Esol]

kWh	20906	371	837	1817	2308	3213	3365	3186	2616	1647	1029	311	205
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Electrical energy consumption of pumps [Epar]

kWh	79	8	9	10	9	7	5	3	3	4	5	7	10
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Heat loss to indoor room (including heat generator losses) [Qint]

kWh	-3581	-32	-237	-441	-488	-490	-387	-269	-162	-108	-172	-295	-501
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Heat loss to surroundings (without collector losses) [Qext]

kWh	0	0	0	0	0	0	0	0	0	0	0	0	0
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Total energy consumption [Quse]

kWh	48607	6786	6606	6442	4794	3210	1773	634	908	2186	3876	5074	6317
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