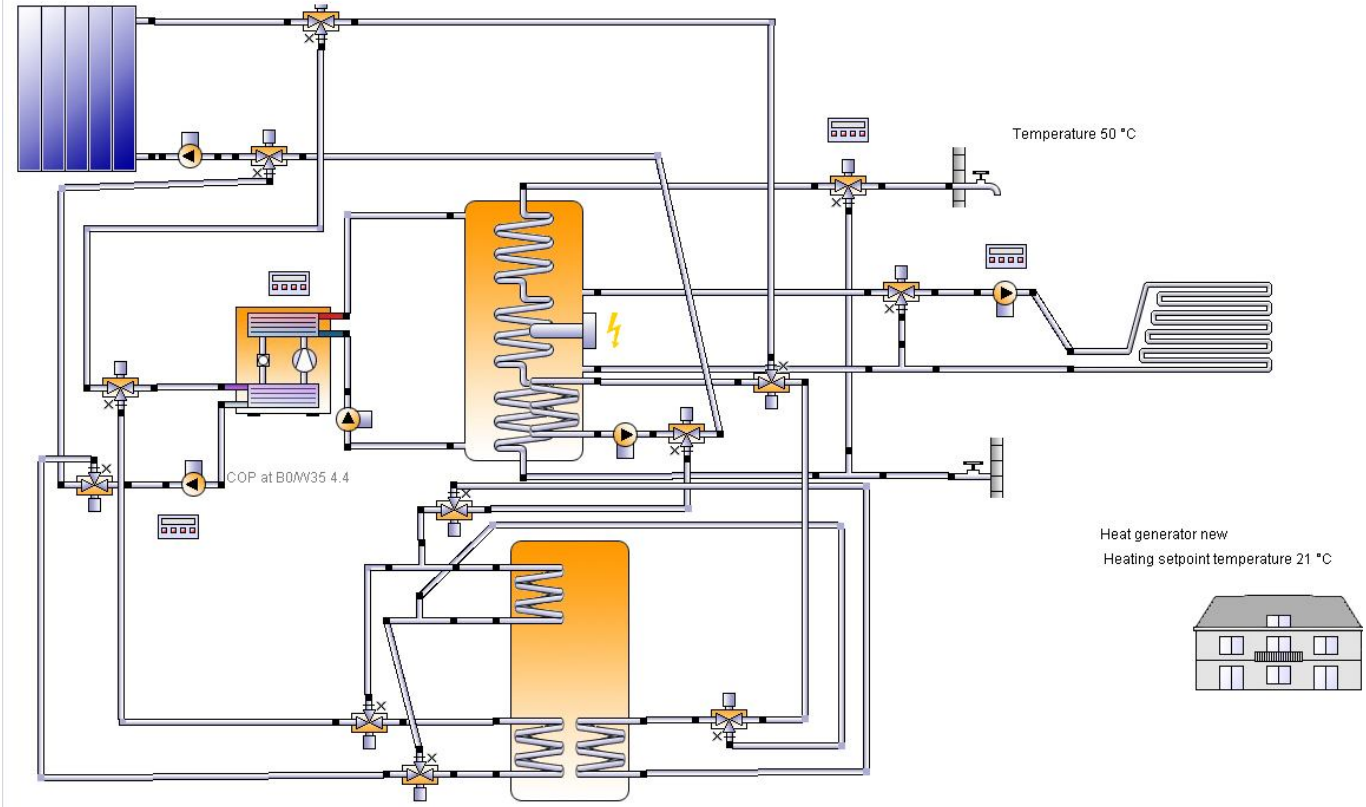
Professional Report

Polarsol
PolarSol Oy
Nurmeksentie 80,
80100, Joensuu, Finland
+358 4405 58098
+358 4420 22028
www.polarsol.com

vela solaris

Project Project - System diagram PolarSol koti



Location of the system

Profil
Longitude: 24.109°
Latitude: 65.841°
Elevation: 11 m

Map section

This report has been created by:

Anton Serbin

Dealer: www.profil.fi
Annerman Oy

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Comments on the project

Projekt Tornio

Photograph of property

System overview (annual values)

Total fuel and/or electrical energy consumption of the system [Etot]	8,033.6 kWh
Total energy consumption [Quse]	26,686.8 kWh
System performance (Quse / Etot)	3.32
Comfort demand	Energy demand of the building and domestic hot water demand not met

Overview solar thermal energy (annual values)

Collector area	20 m²
Solar fraction total	99.9%
Solar fraction hot water [SFnHw]	99.9 %
Solar fraction building [SFnBd]	99.9 %
Total annual field yield	13,590.1 kWh
Collector field yield relating to gross area	679.5 kWh/m²/Year
Collector field yield relating to aperture area	755 kWh/m²/Year
Max. energy savings	4,028.9 kWh
Max. reduction in CO2 emissions	2,161.1 kg

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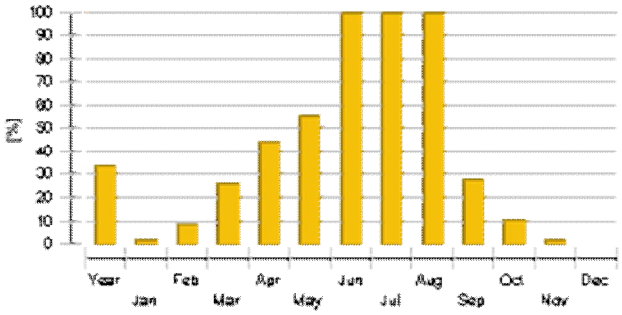
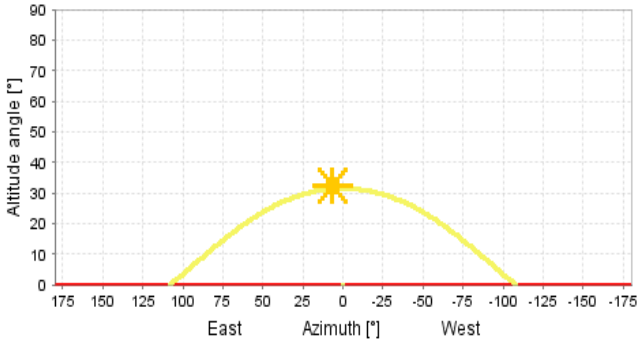
Overview heat pump (annual values)

Seasonal performance factor (without pump energy)	3.4
Total electrical energy consumption when heating [Eaux]	7,948.3 kWh
Total energy savings	18,868.5 kWh
Total reduction in CO2 emissions	10,121.1 kg

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



Horizon line



Meteorological data-Overview

Average outdoor temperature	2.5 °C
Global irradiation, annual sum	858.9 kWh/m²
Diffuse irradiation, annual sum	394.1 kWh/m²

Component overview (annual values)

B/W or W/W heat pump	Thermalia® 10P	
Seasonal performance factor (without pump energy)		3.37
Energy from/to the system [Qaux]	kWh	26,816.9
CO_2 emissions	kg	4,263.5
Fuel and electrical energy consumption [Eaux]	kWh	7,948.3
Energy savings solar thermal	kWh	4,028.4
CO_2 savings solar thermal	kg	2,160.8
Energy savings heat pump	kWh	18,868.5
CO_2 savings heat pump	kg	10,121.1

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Collector 2	Flat-plate collector, premium quality	
Data Source		VTT
Number of collectors		10
Number of arrays		1
Total gross area	m²	20
Total aperture area	m²	18
Total absorber area	m²	18
Tilt angle (hor.=0°, vert.=90°)	°	25
Orientation (E=+90°, S=0°, W=-90°)	°	25
Collector field yield [Qsol]	kWh	13,590.1
Irradiation onto collector area [Esol]	kWh	18,830.1
Collector efficiency [Qsol / Esol]	%	72.2
Direct irradiation after IAM	kWh	10,297.6
Diffuse irradiation after IAM	kWh	7,071.9

Building	-	
Heated/air-conditioned living area	m²	150
Heating setpoint temperature	°C	22
Heating energy demand excluding DHW [Qdem]	kWh	25,000
Annual specific heating energy demand	kWh/m²	166.7
Useful heat gain	kWh	50,000.1
Total energy losses	kWh	74,999.9

Convector	Floor heating 1000W	
Number of heating/cooling modules	-	20
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	23,415.5

Hot water demand	Constant	
Volume withdrawal/daily consumption	l/d	202.1
Temperature setting	°C	50
Energy demand [Qdem]	kWh	4,012.1

Pump 1	Pump Eco, small	
Circuit pressure drop	bar	0.007
Flow rate	l/h	270
Fuel and electrical energy consumption [Epar]	kWh	4.9

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Pump 2	Pump Eco, small	
Circuit pressure drop	bar	0.013
Flow rate	l/h	1,190
Fuel and electrical energy consumption [Epar]	kWh	16.2

Pump 4	Pump Eco, small	
Circuit pressure drop	bar	0.022
Flow rate	l/h	1,280
Fuel and electrical energy consumption [Epar]	kWh	32.9

Pump 5	Pump Eco, small	
Circuit pressure drop	bar	0.28
Flow rate	l/h	4,760
Fuel and electrical energy consumption [Epar]	kWh	16.7

Pump 6	Pump Eco, small	
Circuit pressure drop	bar	251.437
Flow rate	l/h	3,600
Fuel and electrical energy consumption [Epar]	kWh	10

Storage tank 11	100gal US universal tank	
Volume	l	378.5
Height	m	1.8
Material		Enameled steel
Insulation		Flexible polyurethane foam
Thickness of insulation	mm	101.6
Heat loss	kWh	193.2
Connection losses	kWh	235.9

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	-1,640.1
Connection losses	kWh	-52.1

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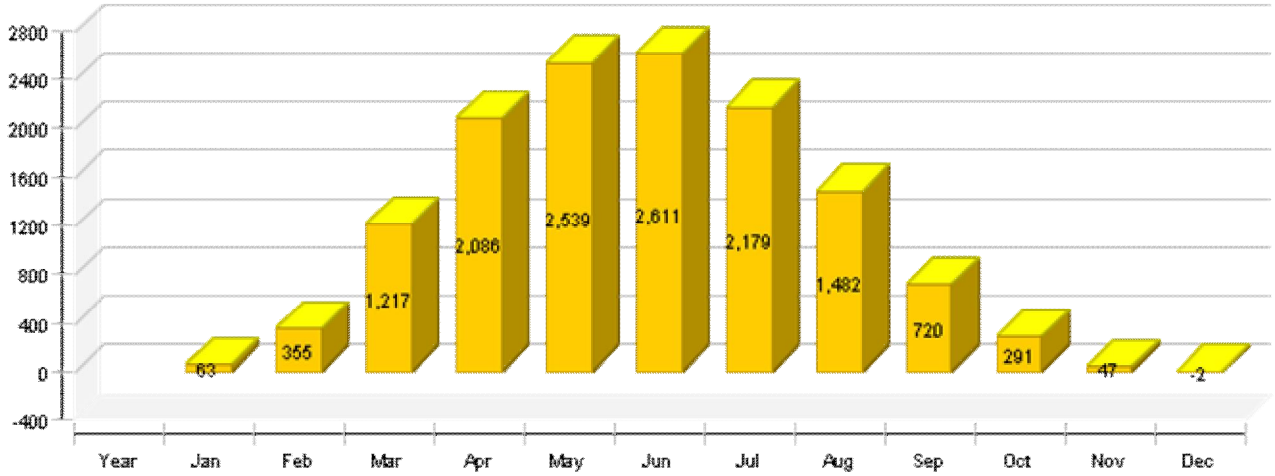
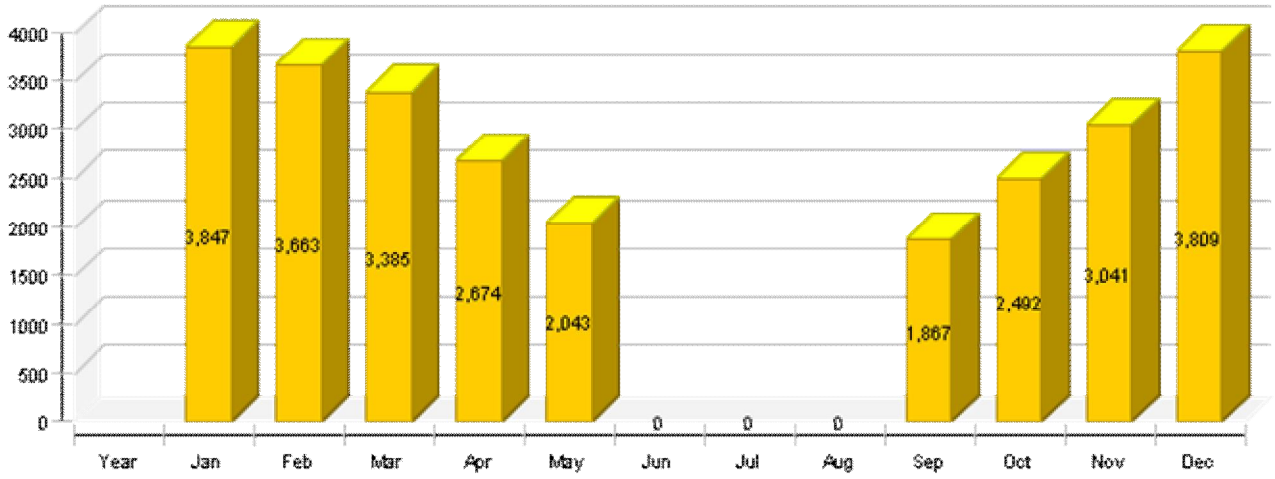
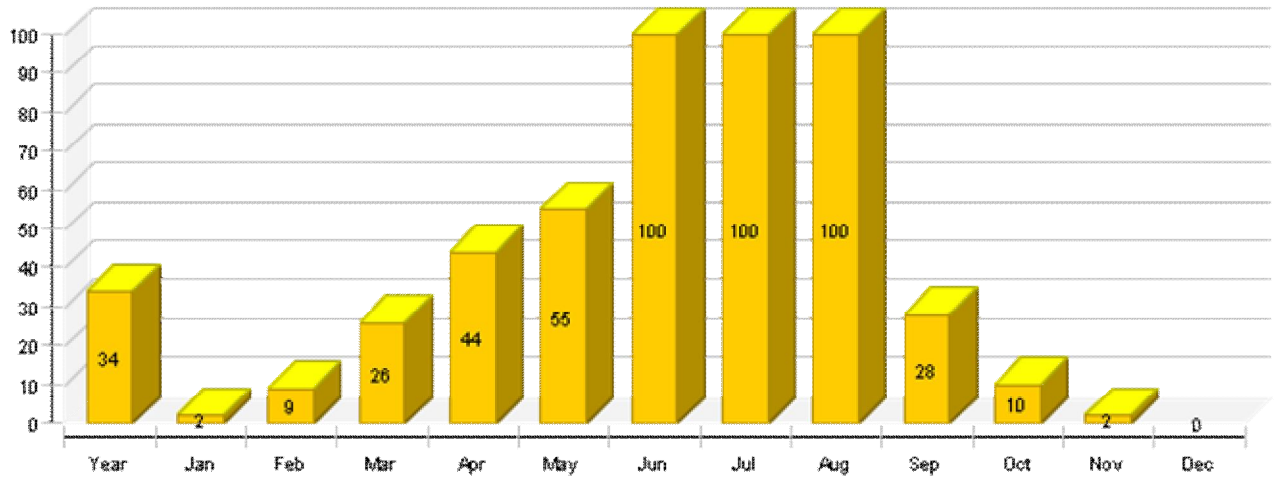
Solar thermal energy to the system [Qsol] kWh



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



Solar fraction: fraction of solar energy to system [SFn] %



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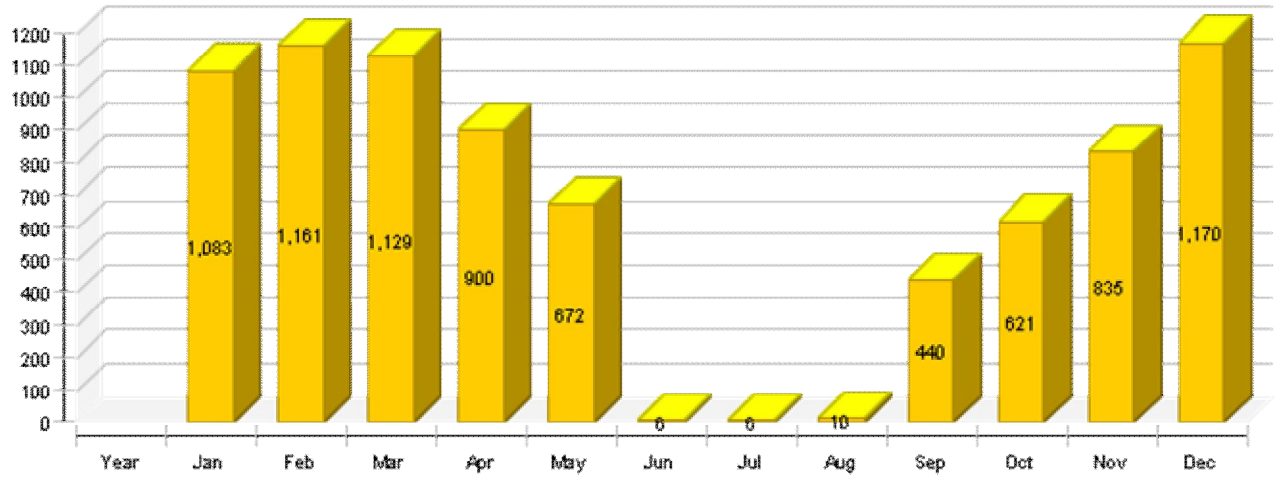
Total fuel and/or electrical energy consumption of the system [Etot] kWh



	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Solar thermal energy to the system [Qsol]													
kWh	13590	63	355	1217	2086	2539	2611	2179	1482	720	291	47	-2
Heat generator energy to the system (solar thermal energy not included) [Qaux]													
kWh	26821	3847	3663	3385	2674	2043	0	0	0	1867	2492	3041	3809
Heat generator fuel and electrical energy consumption [Eaux]													
kWh	7953	1076	1153	1121	893	666	0	0	0	436	616	830	1163
Solar fraction: fraction of solar energy to system [SFn]													
%	33.6	1.6	8.8	26.4	43.8	55.4	100	100	100	27.8	10.5	1.5	0
Total fuel and/or electrical energy consumption of the system [Etot]													
kWh	8034	1083	1161	1129	900	672	6	6	10	440	621	835	1170
Irradiation onto collector area [Esol]													
kWh	18830	161	691	1621	2545	3035	3203	2963	2290	1384	709	226	0
Electrical energy consumption of pumps [Epar]													
kWh	81	7	7	9	7	6	6	6	10	4	5	5	7
Heat loss to indoor room (including heat generator losses) [Qint]													
kWh	-790	-35	-188	-315	-291	-212	-161	31	143	238	155	10	-165
Heat loss to surroundings (without collector losses) [Qext]													
kWh	1	0	0	0	0	0	0	0	1	0	0	0	0
Total energy consumption [Quse]													
kWh	26687	3746	3572	3292	2584	1928	117	118	546	1762	2379	2933	3710

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Collector 2

Daily maximum temperature [°C]