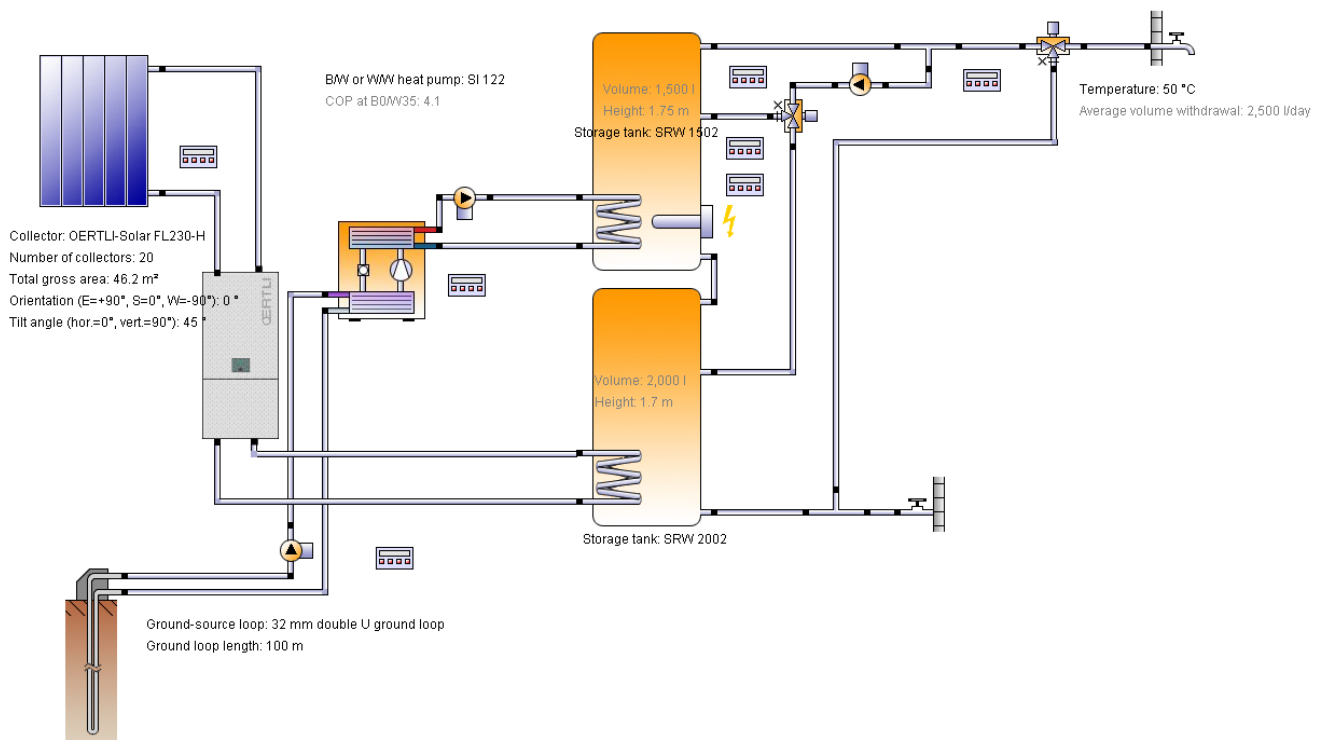


Professional Report

Project Preheating: 2 solar water heaters with 1 coil - DrainMulti, brine-to-water heat pump



Location of the system

Rapperswil SG
Longitude: 8.82°
Latitude: 47.23°
Elevation: 417 m

Map section

"Current report item is not supported in this report format."

This report has been created by:

Vela Solaris AG

System overview (annual values)

Total fuel and/or electrical energy consumption of the system [Etot]	6,926.1 kWh
Total energy consumption [Quse]	44,322.1 kWh
System performance (Quse / Etot)	6.4
Comfort demand	Energy demand covered

Professional Report

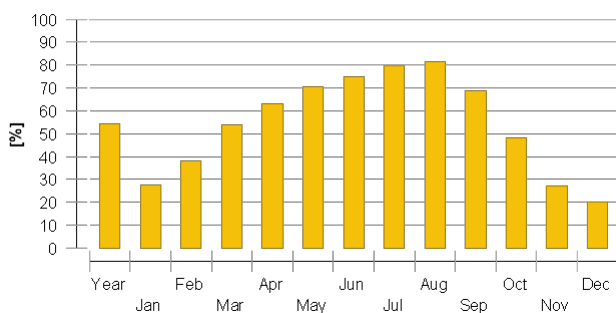
Overview solar thermal energy (annual values)

Collector area	46.2 m ²
Solar fraction total	54.1%
Total annual field yield	25,109.5 kWh
Collector field yield relating to gross area	543.5 kWh/m ² /Year
Collector field yield relating to aperture area	627.7 kWh/m ² /Year
Max. fuel savings	8,066.5 kWh: [Electricity]
Max. energy savings	8,066.5 kWh
Max. reduction in CO2 emissions	4,326.9 kg

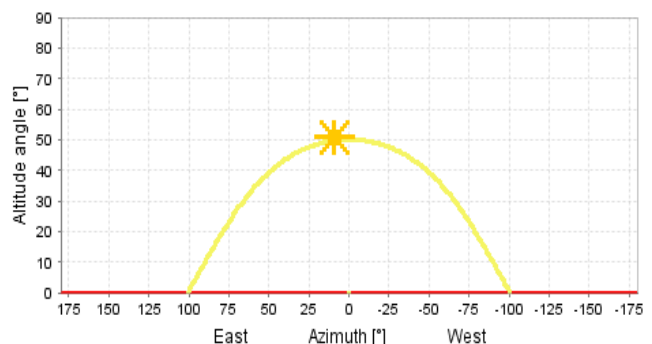
Overview heat pump (annual values)

Seasonal performance factor (without pump energy)	3.1
Total electrical energy consumption when heating [Eaux]	6,850.5 kWh
Ground loop length (Total)	400 m
Energy withdrawal of the ground-source loop	14,425.9 kWh
Total energy savings	14,473.9 kWh
Total reduction in CO2 emissions	7,763.8 kg

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



Horizon line



Meteorological data-Overview

Average outdoor temperature	10.1 °C
Global irradiation, annual sum	1,103.5 kWh/m ²
Diffuse irradiation, annual sum	578 kWh/m ²

Professional Report

Component overview (annual values)

B/W or W/W heat pump		SI 122
Seasonal performance factor (without pump energy)		3.11
Energy from/to the system [Qaux]	kWh	21,324.5
CO2 emissions	kg	3,674.6
Fuel and electrical energy consumption [Eaux]	kWh	6,850.5
Energy savings solar thermal	kWh	8,066.5
CO2 savings solar thermal	kg	4,326.9
Energy savings heat pump	kWh	14,473.9
CO2 savings heat pump	kg	7,763.8
Collector		OERTLI-Solar FL230-H
Data Source		TÜV
Number of collectors		20
Number of arrays		2
Total gross area	m²	46.2
Total aperture area	m²	40
Total absorber area	m²	40
Tilt angle (hor.=0°, vert.=90°)	°	45
Orientation (E=+90°, S=0°, W=-90°)	°	0
Collector field yield [Qsol]	kWh	25,109.5
Irradiation onto collector area [Esol]	kWh	49,446.6
Collector efficiency [Qsol / Esol]	%	50.8
Direct irradiation after IAM	kWh	24,877.1
Ground-source loop		32 mm double U ground loop
Ground loop length	m	100
Number of ground-source loops		4
Distance between ground loops	m	5
Earth layer 1	m	10 / Limestone
Inflow temperature during operation	°C	5.7
Outflow temperature during operation	°C	7.3
Energy withdrawal of the ground-source loop	kWh	14,425.9
Hot water demand		Constant
Volume withdrawal/daily consumption	l/d	2,501.5
Temperature setting	°C	50
Energy demand [Qdem]	kWh	42,348.3
Pump Solar loop		Pump, small, DrainMulti
Circuit pressure drop	bar	0.225
Flow rate	l/h	1,200
Fuel and electrical energy consumption [Epar]	kWh	16.9

Professional Report

Pump Circulation	Eco, small	
Circuit pressure drop	bar	0.141
Flow rate	l/h	3,600
Fuel and electrical energy consumption [Epar]	kWh	4.6

Pump Heat generator pump	Eco, small	
Circuit pressure drop	bar	0.083
Flow rate	l/h	2,700
Fuel and electrical energy consumption [Epar]	kWh	5.7

Pump Ground-source loop	Eco, large	
Circuit pressure drop	bar	1.053
Flow rate	l/h	8,100
Fuel and electrical energy consumption [Epar]	kWh	48.4

Storage tank Pre-heating	SRW 2002	
Volume	l	2,000
Height	m	1.7
Material		S235 JR G2
Insulation		Flexible polyurethane foam
Thickness of insulation	mm	100
Heat loss	kWh	220.1
Connection losses	kWh	101

Storage tank Potable water tank	SRW 1502	
Volume	l	1,500
Height	m	1.75
Material		S235 JR G2
Insulation		Flexible polyurethane foam
Thickness of insulation	mm	100
Heat loss	kWh	666.9
Connection losses	kWh	440.1

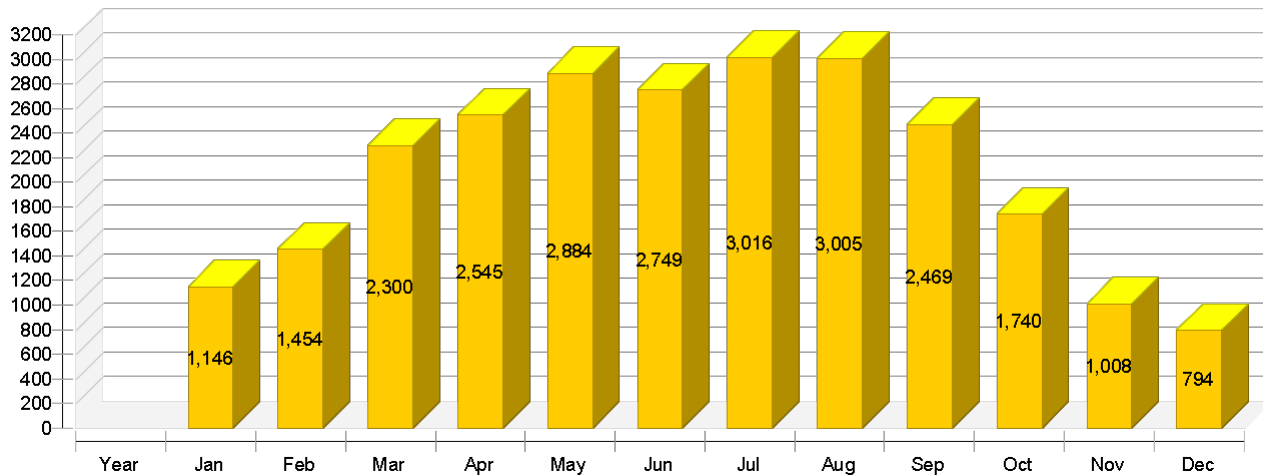
Loop

Solar loop		
Fluid mixture		Propylene mixture
Fluid concentration	%	33.3
Fluid domains volume	l	83.6
Pressure on top of the circuit	bar	1

Professional Report

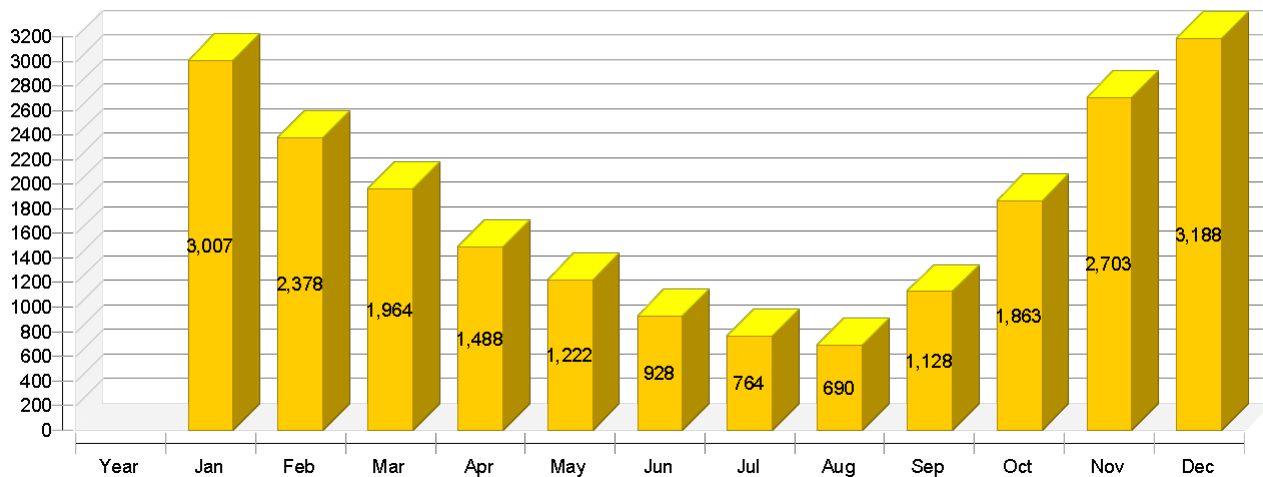
Solar thermal energy to the system [Qsol]

kWh



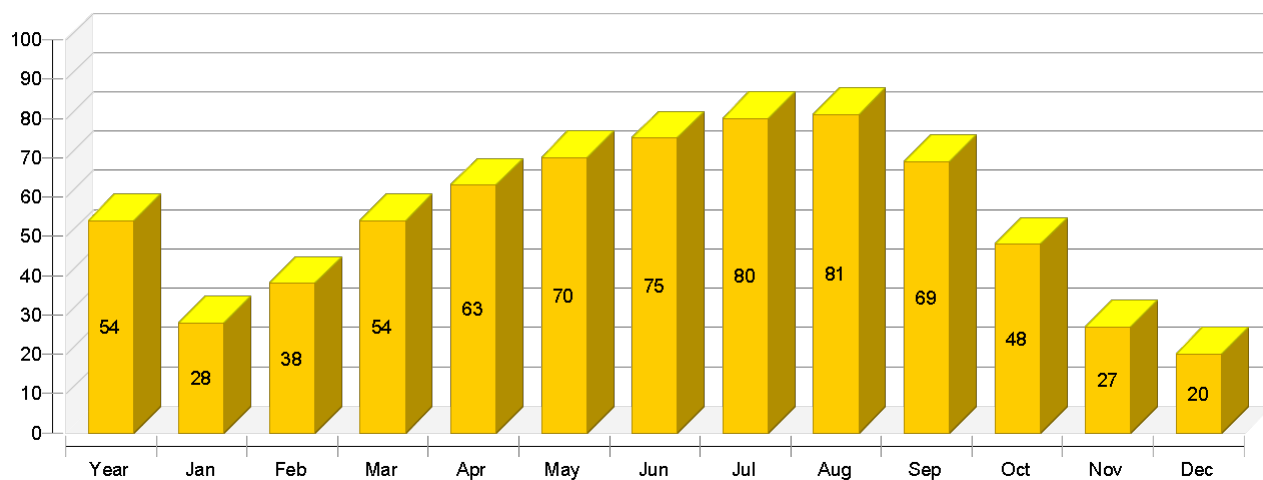
Heat generator energy to the system (solar thermal energy not included) [Qaux]

kWh



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

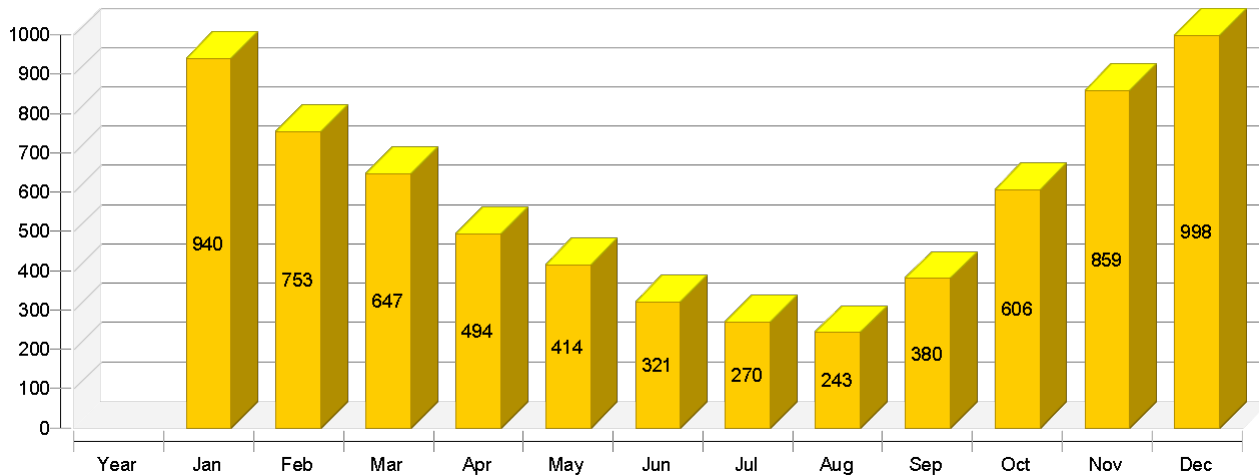
%



Professional Report

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	25109	1146	1454	2300	2545	2884	2749	3016	3005	2469	1740	1008	794
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Heat generator energy to the system (solar thermal energy not included) [Qaux]

kWh	21324	3007	2378	1964	1488	1222	928	764	690	1128	1863	2703	3188
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Heat generator fuel and electrical energy consumption [Eaux]

kWh	6851	931	746	640	488	409	317	266	239	375	600	851	989
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Solar fraction: fraction of solar energy to system [SF_n]

%	54.1	27.6	37.9	53.9	63.1	70.2	74.8	79.8	81.3	68.6	48.3	27.2	19.9
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Total fuel and/or electrical energy consumption of the system [Etot]

kWh	6926	940	753	647	494	414	321	270	243	380	606	859	998
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Irradiation onto collector area [Esol]

kWh	49447	2279	2884	4440	5058	5602	5459	5994	5835	4765	3411	2059	1661
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Electrical energy consumption of pumps [Epar]

kWh	76	9	7	7	6	6	5	4	4	5	6	8	9
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Total energy consumption [Quse]

kWh	44322	4003	3686	4081	3865	3840	3553	3530	3449	3342	3545	3569	3859
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Heat loss to indoor room (including heat generator losses) [Qint]

kWh	2015	119	118	153	169	193	206	223	231	191	169	127	116
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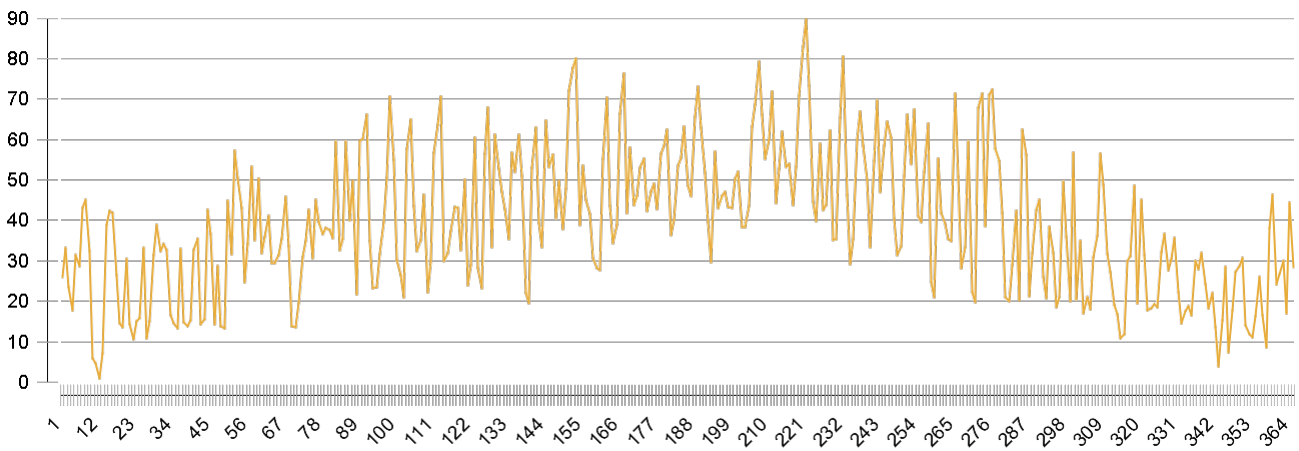
Heat loss to surroundings (without collector losses) [Qext]

kWh	36	2	2	3	4	4	4	4	4	3	3	2	1
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Professional Report

Collector

Daily maximum temperature [°C]



Energy flow diagram (annual balance)

