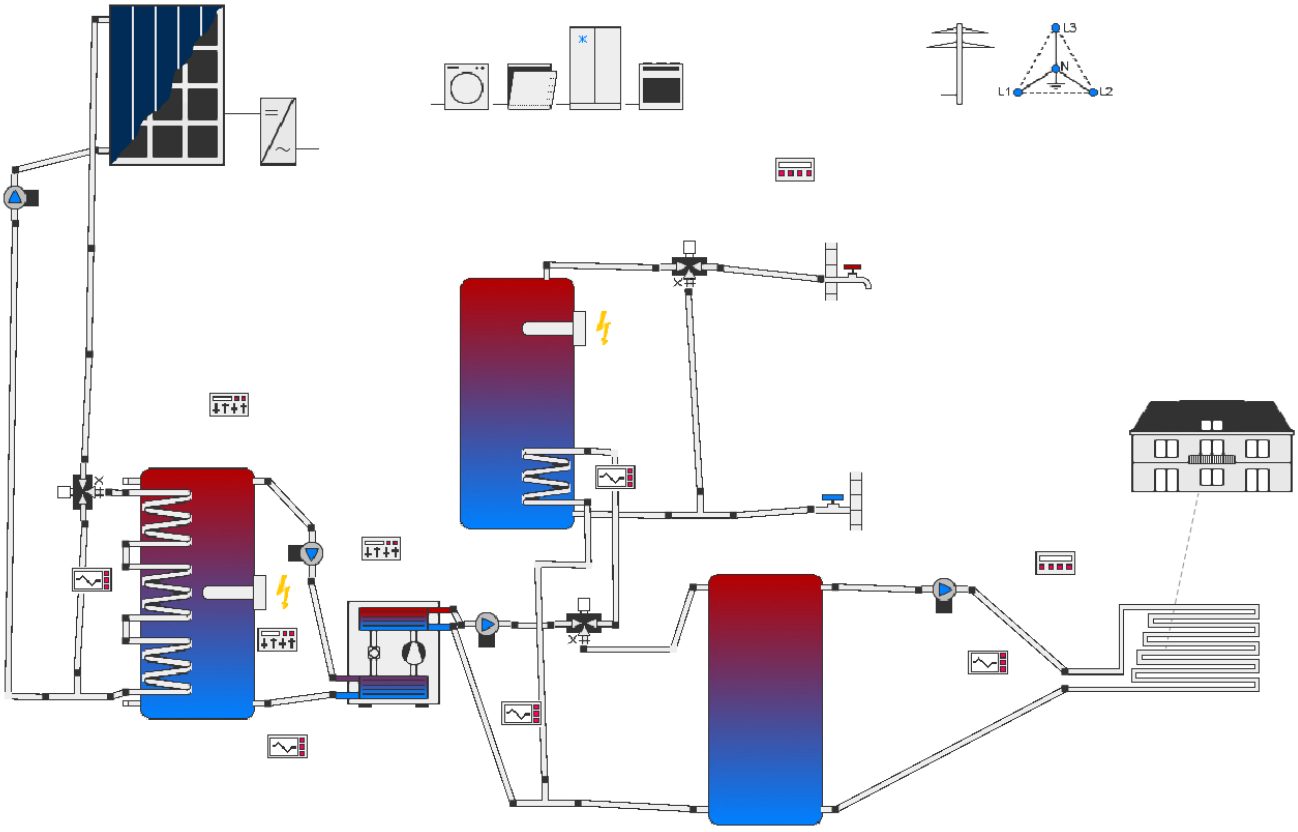


Location of the system

Denmark
København
Longitude: 12.57°
Latitude: 55.72°
Elevation: 19 m

This report has been created by:

COWI

Parallelvej 2
DK-2800 Kongens Lyngby
sem@cowi.dk

System overview (annual values)

Total fuel and/or electricity consumption of the system [Etot]	7,893 kWh
Total electricity consumption [Ecs]	15,722 kWh
Total energy consumption [Quse]	30,061 kWh
Seasonal performance factor (SPF-SHP)	4.3
Primary energy factor	0.42
Comfort demand	Energy demand of the building not met

Overview solar thermal energy (annual values)

Collector area	32 m²
Solar fraction total	43.6%
Solar fraction hot water [SFnHw]	45.1 %
Solar fraction building [SFnBd]	43.5 %
Total annual field yield	24,092.7 kWh
Collector field yield relating to gross area	752.9 kWh/m²/Year
Collector field yield relating to aperture area	752.9 kWh/m²/Year
Max. fuel savings	5,298.8 kWh: [Electricity]
Max. energy savings	11,180.4 kWh
Max. reduction in CO2 emissions	2,842 kg

Overview electricity (annual values)

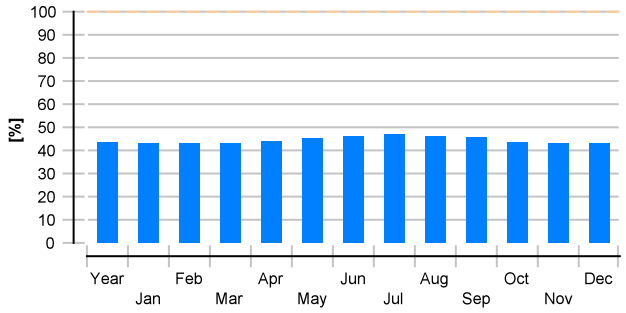
Annual consumption	15,722 kWh
Self-consumption	3,045 kWh
Self-consumption fraction	51.8 %
Degree of self-sufficiency	19.4 %

Overview heat pump (annual values)

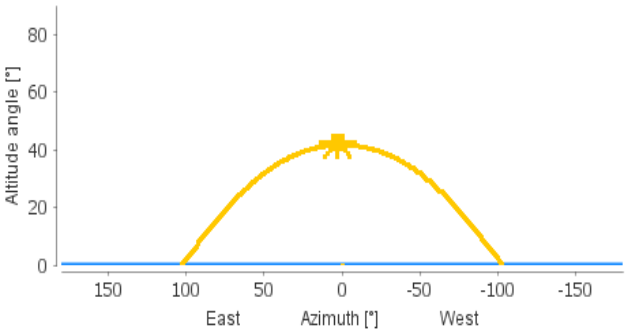
Seasonal performance factor (without pump energy)	4.5
Total electricity consumption when heating [Eaux]	6,855 kWh
Total energy savings	24,313 kWh
Total reduction in CO2 emissions	13,042 kg

The resource of this report item is not reachable.

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



Horizon line



Meteorological data-Overview

Average outdoor temperature	9 °C
Global irradiation, annual sum	1,017 kWh/m²
Diffuse irradiation, annual sum	510 kWh/m²

Component overview (annual values)

B/W or W/W heat pump	**SEM Vitocal 33 g x 2**	
Seasonal performance factor (without pump energy)		4.55
Energy from/to the system [Qaux]	kWh	31,168
CO2 emissions	kg	3,677
Fuel and electricity consumption [Eaux]	kWh	6,855
Energy savings solar thermal	kWh	5,299
CO2 savings solar thermal	kg	2,842
Energy savings heat pump	kWh	24,313
CO2 savings heat pump	kg	13,042
Electric consumers	**Standard**	
Electricity consumption [Ecs]	kWh	15,722
Electricity consumption of the profiles [Epcs]	kWh	6,800
Electricity consumption of the thermal components [Ethcs]	kWh	8,922
Self-consumption [Eocs]	kWh	3,045
Self-consumption fraction [Rocs]	%	51.8
Degree of self-sufficiency [Raut]	%	19.4

PVT collector	Racell til model katalog 20 maj 19 fri bagside	
Data Source		u1715352592
Number of modules		12.8
Collector aperture area	m²	32
Tilt angle (hor.=0°, vert.=90°)	°	15
Orientation (E=+90°, S=0°, W=-90°)	°	0
Global irradiation after IAM	kWh	34,349
Diffuse irradiation after IAM	kWh	15,976
Collector field yield [Qsol]	kWh	24,093
Total nominal power DC	kW	6.4
Performance ratio [PerfR]	%	85.7
Inverter 1: Name		Symo Hybrid 5.0-3-S
Inverter 1: Manufacturer		Fronius International GmbH
Layout 1: Number of inverters		1
Layout 1: A number of strings		2
Layout 1: A modules per string		6
Energy production DC [Qpvf]	kWh	6,084
Energy production AC [Qinv]	kWh	5,882
Specific annual yield	kWh/kWp	919

Building Bygning varme	Lokes plads 1 blok	
Heated/air-conditioned living area	m²	154
Heating setpoint temperature	°C	20
Heating energy demand excluding DHW [Qdem]	kWh	28,931
Specific heating energy demand excluding DHW [Qdem]	kWh/m²	188
Solar gain through windows	kWh	4,939
Total energy losses	kWh	36,470

Heating/Cooling element varme afgiver	Floor heating	
Power per heating/cooling element under standard conditions	W	1,000
Nominal inlet temperature	°C	45
Nominal return temperature	°C	35
Net energy from/to heating/cooling modules	kWh	26,620

Hot water demand	Daily peaks	
Volume withdrawal/daily consumption	l/d	200
Temperature setting	°C	50
Energy demand [Qdem]	kWh	3,480

Pump 1	Eco, small	
Circuit pressure drop	bar	4.511
Flow rate	l/h	755
Fuel and electricity consumption [Epar]	kWh	52.6

Pump P buffer	Eco, small	
Circuit pressure drop	bar	0.129
Flow rate	l/h	3,000
Fuel and electricity consumption [Epar]	kWh	20.5

Pump VP pumpe	Eco, small	
Circuit pressure drop	bar	0.145
Flow rate	l/h	3,000
Fuel and electricity consumption [Epar]	kWh	20.5

Pump RV pumpe	Eco, small	
Circuit pressure drop	bar	0.018
Flow rate	l/h	1,256
Fuel and electricity consumption [Epar]	kWh	26.1

Storage tank VVB med el	RACELL model 200 l	
Volume	l	200
Height	m	3
Material		Steel
Insulation		Rigid PU foam
Thickness of insulation	mm	80
Heat loss [Qhl]	kWh	368
Connection losses	kWh	221

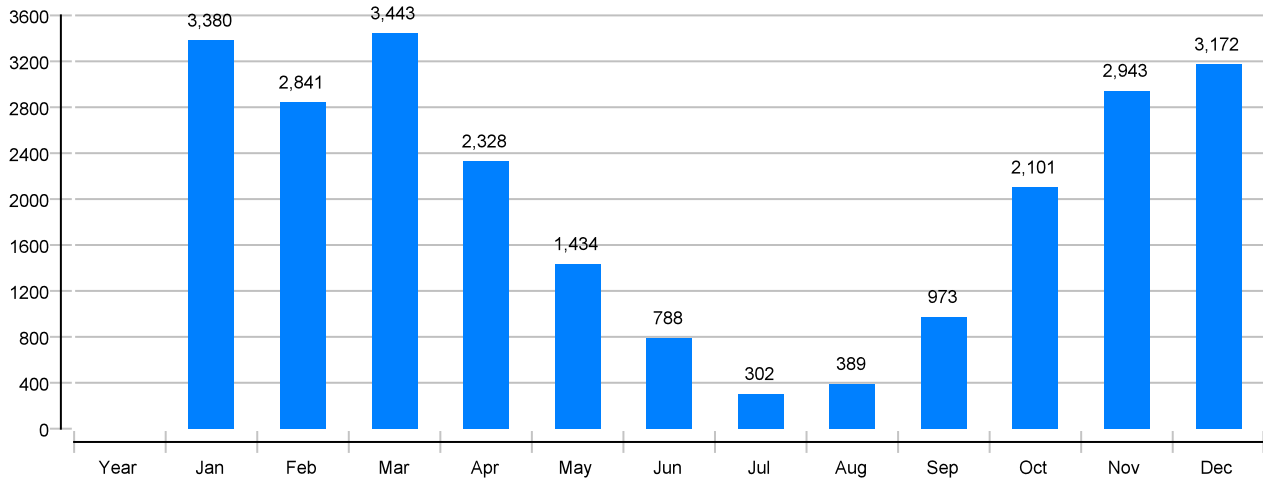
Storage tank VPB med el	Stenløse VPB 500 med el 20 kW	
Volume	l	500
Height	m	3
Material		Stainless steel
Insulation		Rigid PU foam
Thickness of insulation	mm	160
Heat loss [Qhl]	kWh	-54.4
Connection losses	kWh	-24.5

Storage tank VB	Stengården VB 300 l	
Volume	l	300
Height	m	1.7
Material		Stainless steel
Insulation		Rigid PU foam
Thickness of insulation	mm	80
Heat loss [Qhl]	kWh	230
Connection losses	kWh	89.5

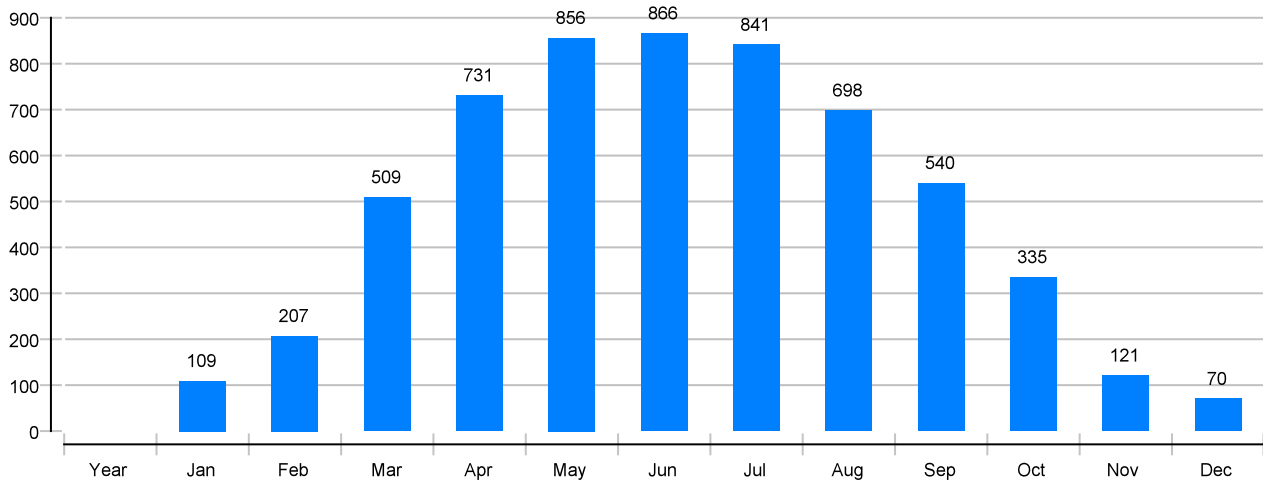
Loop

Solar loop		
Fluid mixture		Propylene mixture
Fluid concentration	%	33
Fluid domains volume	l	94.2
Pressure on top of the circuit	bar	4

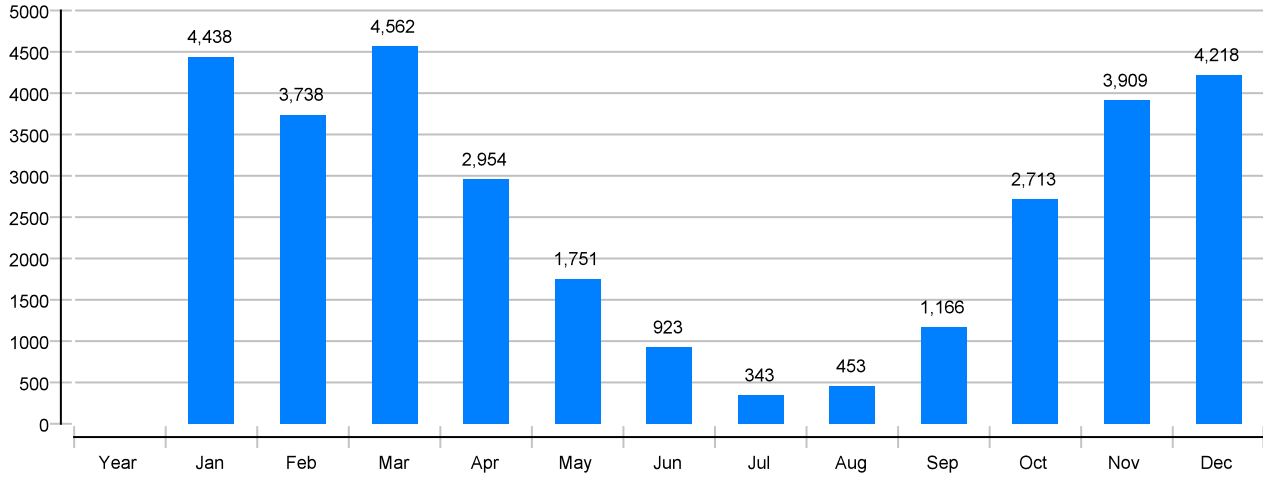
Solar thermal energy to the system [Qsol] kWh



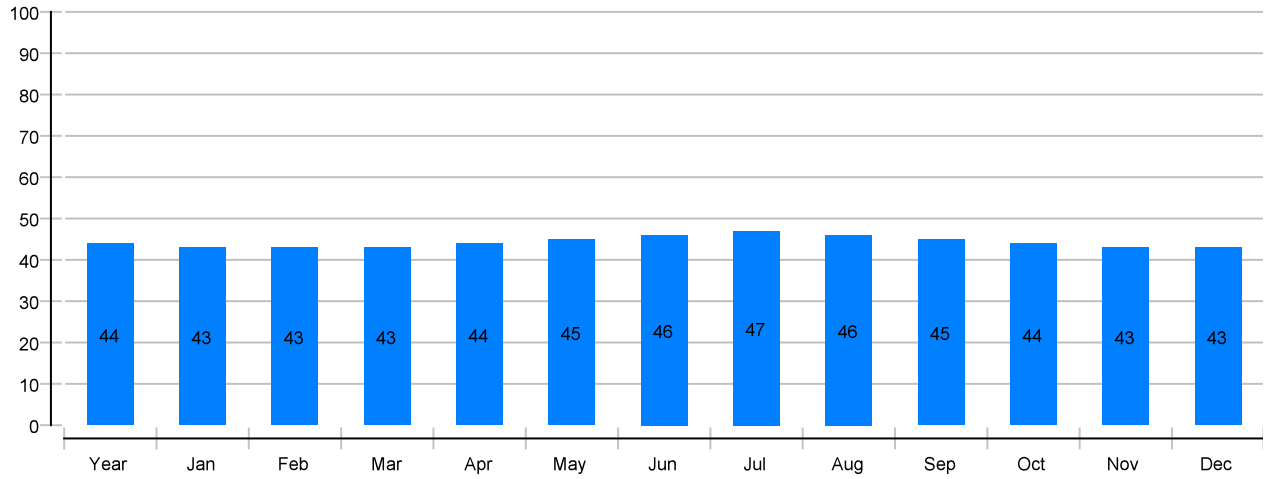
Yield Photovoltaics AC [Qinv] kWh



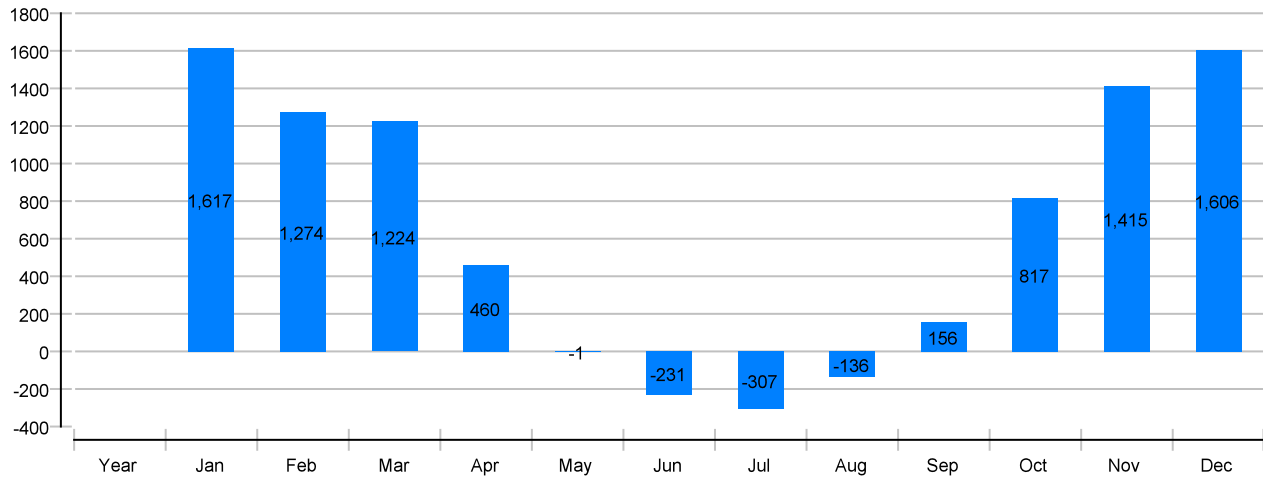
Heat generator energy to the system (solar thermal energy not included) [Qaux] kWh



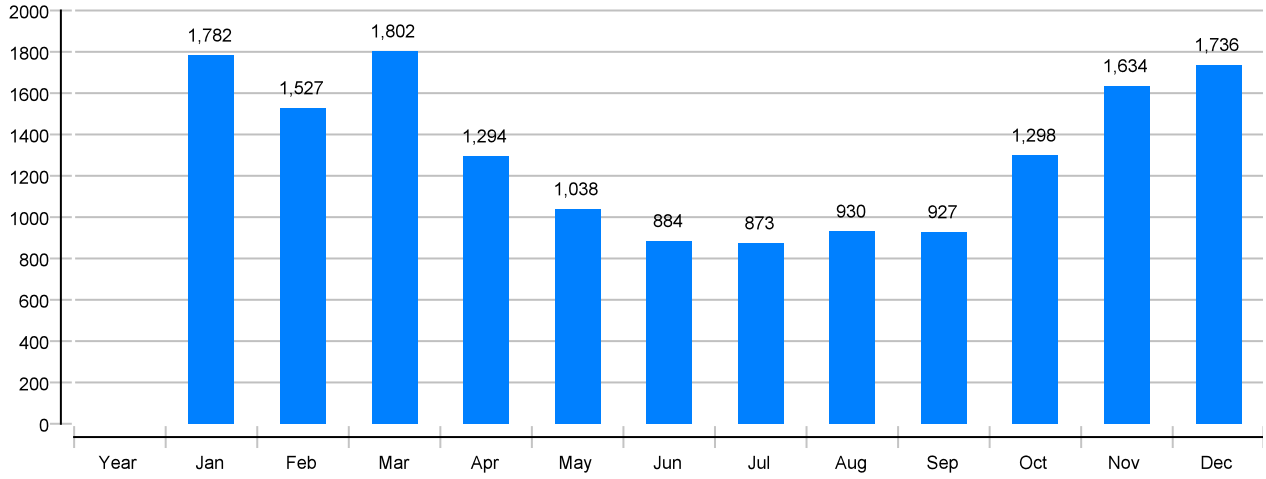
Solar fraction: fraction of solar energy to system [SFn] %



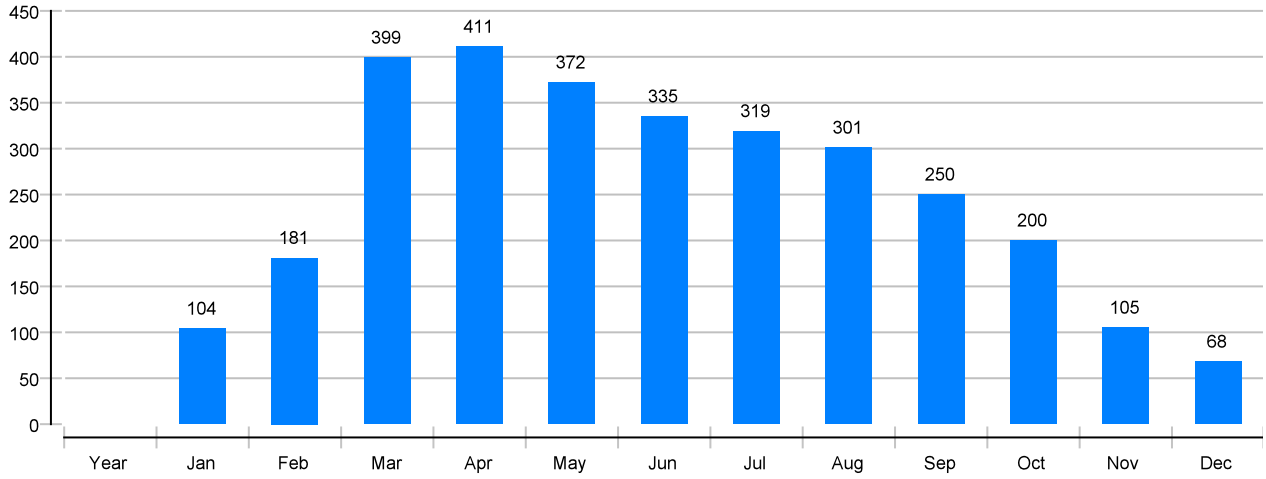
Total fuel and/or electricity consumption of the system [Etot] kWh



Total electricity consumption [Ecs] kWh



Self-consumption [Eocs] kWh



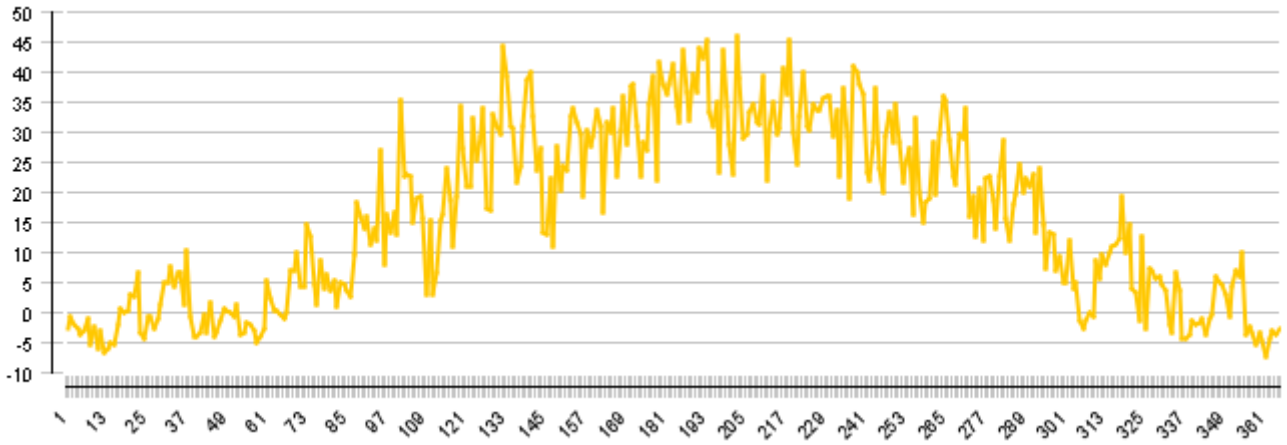
	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Solar thermal energy to the system [Qsol]													
kWh	24093	3380	2841	3443	2328	1434	788	302	389	973	2101	2943	3172
Heat generator energy to the system (solar thermal energy not included) [Qaux]													
kWh	31168	4438	3738	4562	2954	1751	923	343	453	1166	2713	3909	4218
Heat generator fuel and electricity consumption [Eaux]													
kWh	6855	1012	856	1086	616	314	151	53	72	192	574	936	990
Solar fraction: fraction of solar energy to system [SFn]													
%	43.6	43.2	43.2	43	44.1	45	46.1	46.9	46.2	45.5	43.6	43	42.9
Total fuel and/or electricity consumption of the system [Etot]													
kWh	7893	1617	1274	1224	460	-1	-231	-307	-136	156	817	1415	1606
Irradiation onto collector area [Esol]													
kWh	36582	679	1230	2953	4358	5300	5457	5418	4502	3395	2073	768	450
Yield Photovoltaics DC [Qpvf]													
kWh	6084	116	216	526	753	883	893	867	721	558	348	129	76

	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Radiation onto module area [Esol PV]													
kWh	36582	679	1230	2953	4358	5300	5457	5418	4502	3395	2073	768	450
Yield Photovoltaics AC [Qinv]													
kWh	5882	109	207	509	731	856	866	841	698	540	335	121	70
Electricity consumption of pumps [Epar]													
kWh	119.6	17	14.9	14.3	8.6	6.9	5.6	4.6	4.8	5.9	8.8	12.3	15.8
Total energy consumption [Quse]													
kWh	30061	4309	3638	4445	2853	1668	858	287	392	1094	2606	3807	4104
Heat loss to indoor room (including heat generator losses) [Qint]													
kWh	377	37	31	29	31	33	33	32	32	31	29	28	32
Heat loss to surroundings (without collector losses) [Qext]													
kWh	650	53	52	59	60	58	52	49	49	51	56	54	56
Total electricity consumption [Ecs]													
kWh	15722	1782	1527	1802	1294	1038	884	873	930	927	1298	1634	1736
Self-consumption [Eocs]													
kWh	3045	104	181	399	411	372	335	319	301	250	200	105	68

The resource of this report item is not reachable.

PVT collector

Daily maximum temperature [°C]



Energy flow diagram (annual balance)