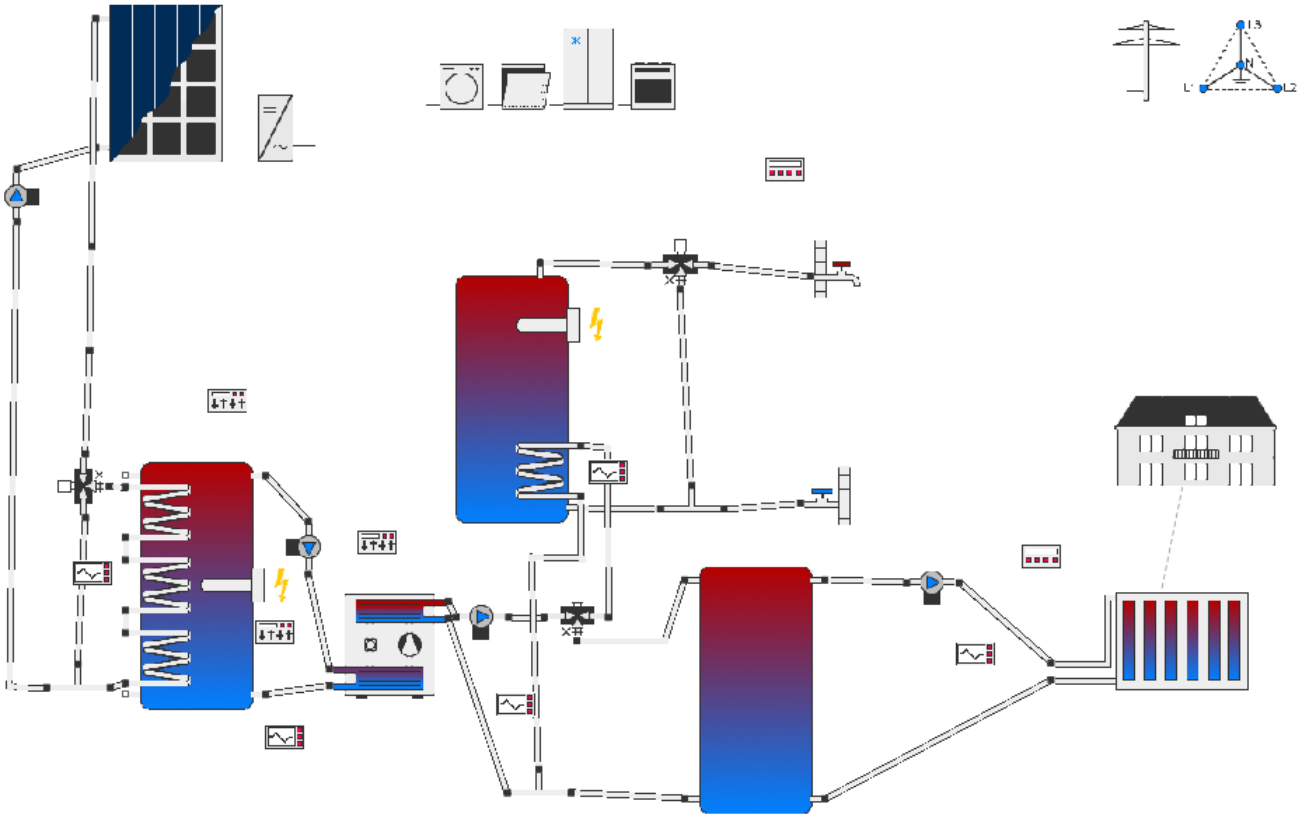


Location of the system

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]	1,843 kWh
Total electricity consumption [Ecs]	13,225 kWh
Total energy consumption [Quse]	23,574 kWh
Seasonal performance factor (SPF-SHP)	3.9
Primary energy factor	0.46
Comfort demand	Energy demand of the building not met

Overview solar thermal energy (annual values)

Collector area	50 m²
Solar fraction total	43.1%
Solar fraction hot water [SFnHw]	45.9 %
Solar fraction building [SFnBd]	42.9 %
Total annual field yield	18,736.4 kWh
Collector field yield relating to gross area	374.7 kWh/m²/Year
Collector field yield relating to aperture area	374.7 kWh/m²/Year
Max. fuel savings	4,491.5 kWh: [Electricity]
Max. energy savings	13,680.4 kWh
Max. reduction in CO2 emissions	2,409 kg

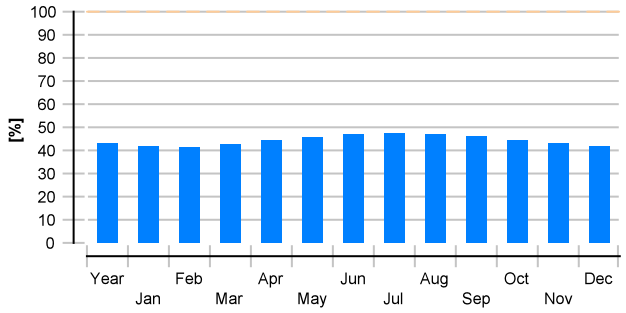
Overview electricity (annual values)

Annual consumption	13,225 kWh
Self-consumption	2,699 kWh
Self-consumption fraction	29.4 %
Degree of self-sufficiency	20.4 %

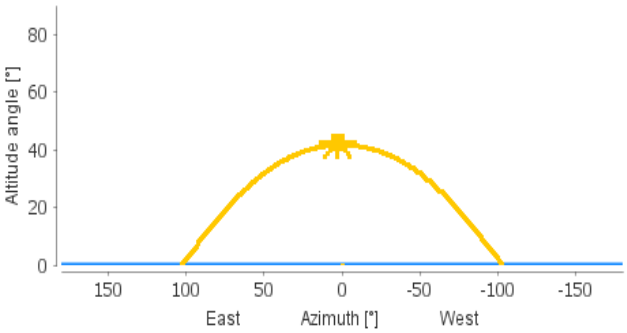
Overview heat pump (annual values)

Seasonal performance factor (without pump energy)	4.2
Total electricity consumption when heating [Eaux]	5,934 kWh
Total energy savings	18,819 kWh
Total reduction in CO2 emissions	10,094 kg

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)		4.17
Energy from/to the system [Qaux]	kWh	24,752
CO2 emissions	kg	3,183
Fuel and electricity consumption [Eaux]	kWh	5,934
Energy savings solar thermal	kWh	4,492
CO2 savings solar thermal	kg	2,409
Energy savings heat pump	kWh	18,819
CO2 savings heat pump	kg	10,094
Electric consumers	**Standard**	
Electricity consumption [Ecs]	kWh	13,225
Electricity consumption of the profiles [Epcs]	kWh	5,000
Electricity consumption of the thermal components [Ethcs]	kWh	8,225
Self-consumption [Eocs]	kWh	2,699
Self-consumption fraction [Rocs]	%	29.4
Degree of self-sufficiency [Raut]	%	20.4

PVT collector	Racell til model katalog 20 maj 19 fri bagside	
Data Source		u1715352592
Number of modules		20
Collector aperture area	m²	50
Tilt angle (hor.=0°, vert.=90°)	°	15
Orientation (E=+90°, S=0°, W=-90°)	°	45
Global irradiation after IAM	kWh	51,579
Diffuse irradiation after IAM	kWh	24,527
Collector field yield [Qsol]	kWh	18,736
Total nominal power DC	kW	10
Performance ratio [PerfR]	%	83.4
Inverter 1: Name		Symo 10.0-3 / 440
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		5
Layout 1: B number of strings		2
Layout 1: B modules per string		5
Energy production DC [Qpvf]	kWh	9,681
Energy production AC [Qinv]	kWh	9,189
Specific annual yield	kWh/kWp	919

Building Bygning varme	Lokes plads 1 blok	
Heated/air-conditioned living area	m²	112
Heating setpoint temperature	°C	20
Heating energy demand excluding DHW [Qdem]	kWh	21,089
Specific heating energy demand excluding DHW [Qdem]	kWh/m²	188
Solar gain through windows	kWh	3,794
Total energy losses	kWh	29,006

Heating/Cooling element varme afgiver	Radiator	
Power per heating/cooling element under standard conditions	W	1,000
Nominal inlet temperature	°C	60
Nominal return temperature	°C	50
Net energy from/to heating/cooling modules	kWh	21,014

Hot water demand	Daily peaks	
Volume withdrawal/daily consumption	l/d	150
Temperature setting	°C	50
Energy demand [Qdem]	kWh	2,609

Pump 1	Eco, small	
Circuit pressure drop	bar	9.02
Flow rate	l/h	1,076
Fuel and electricity consumption [Epar]	kWh	52.6

Pump P buffer	Eco, small	
Circuit pressure drop	bar	0.126
Flow rate	l/h	3,000
Fuel and electricity consumption [Epar]	kWh	9.9

Pump VP pumpe	Eco, small	
Circuit pressure drop	bar	0.125
Flow rate	l/h	3,000
Fuel and electricity consumption [Epar]	kWh	9.9

Pump RV pumpe	Eco, small	
Circuit pressure drop	bar	0.009
Flow rate	l/h	883
Fuel and electricity consumption [Epar]	kWh	25.4

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	363
Connection losses	kWh	207

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	-18.7
Connection losses	kWh	-21.1

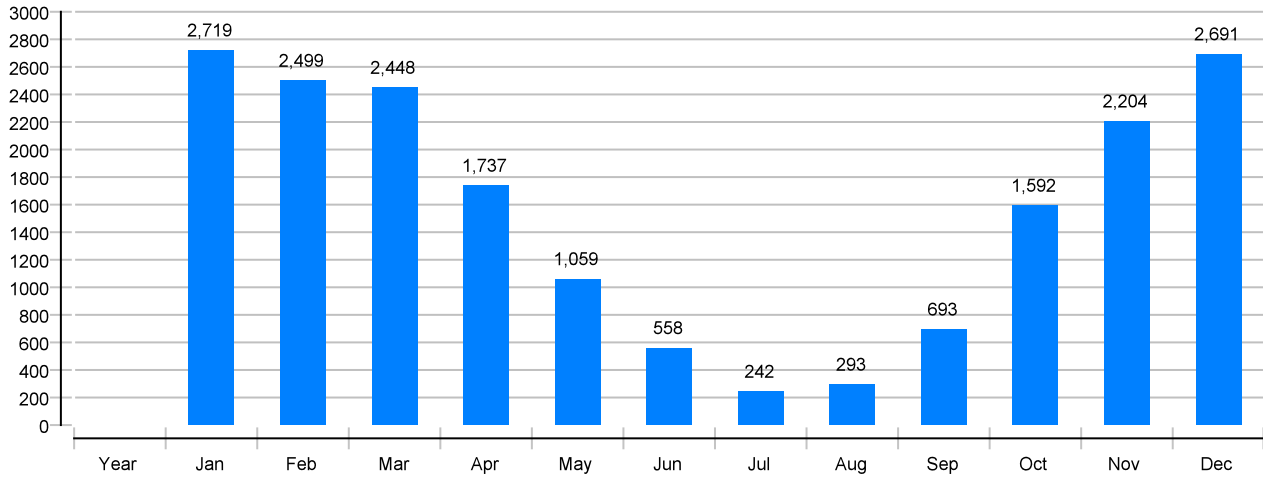
Storage tank VB	Stengården VB 300 l	
Volume	l	300
Height	m	1.7
Material		Stainless steel
Insulation		Rigid PU foam
Thickness of insulation	mm	80
Heat loss [Qhl]	kWh	285
Connection losses	kWh	109

The resource of this report item is not reachable.

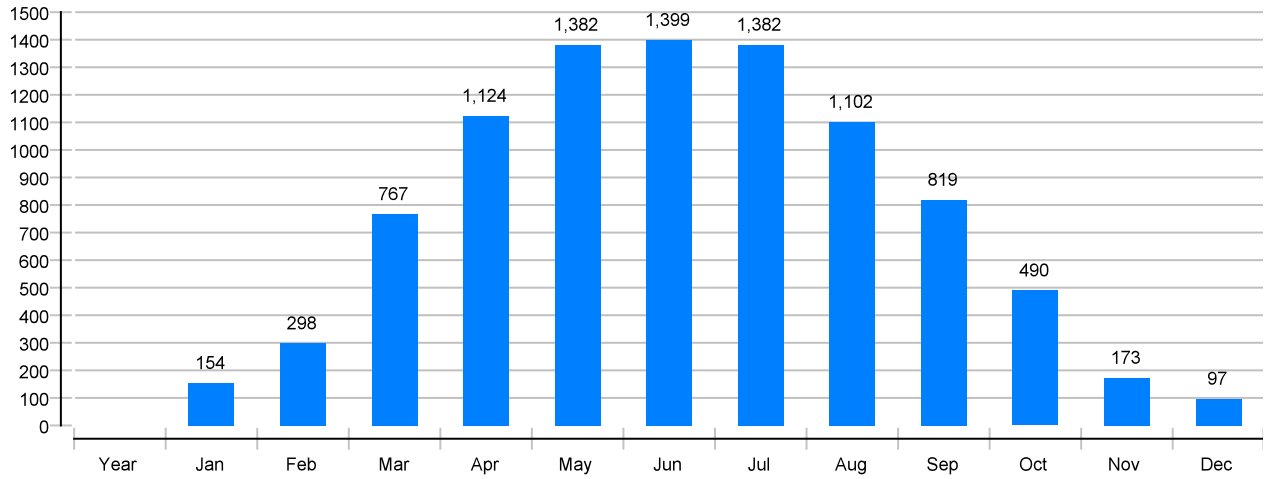
Loop

Solar loop		
Fluid mixture		Propylene mixture
Fluid concentration	%	33
Fluid domains volume	l	108.6
Pressure on top of the circuit	bar	4

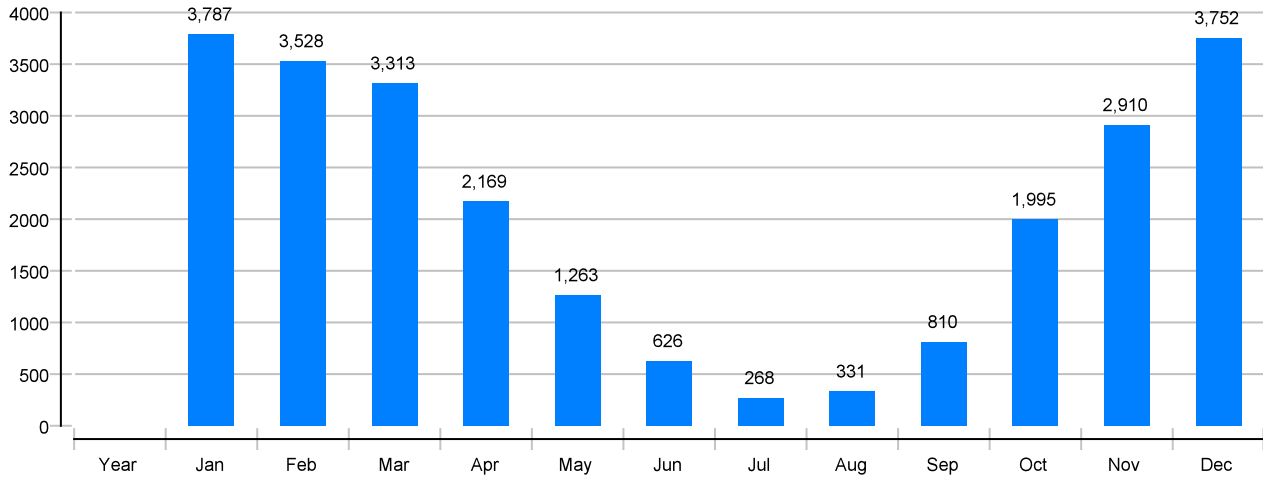
Solar thermal energy to the system [Qsol] kWh



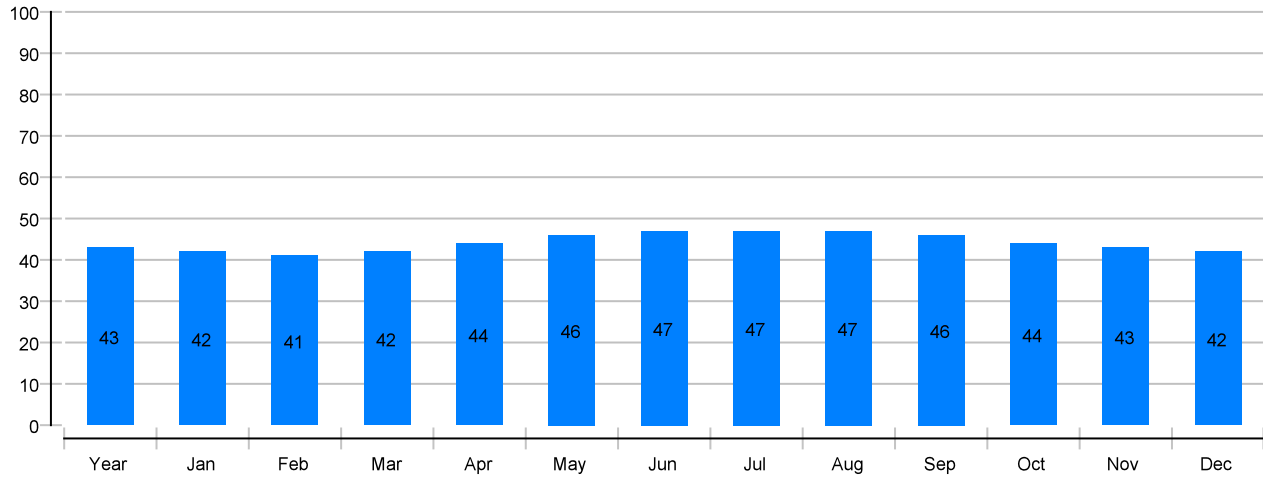
Yield Photovoltaics AC [Qinv] kWh



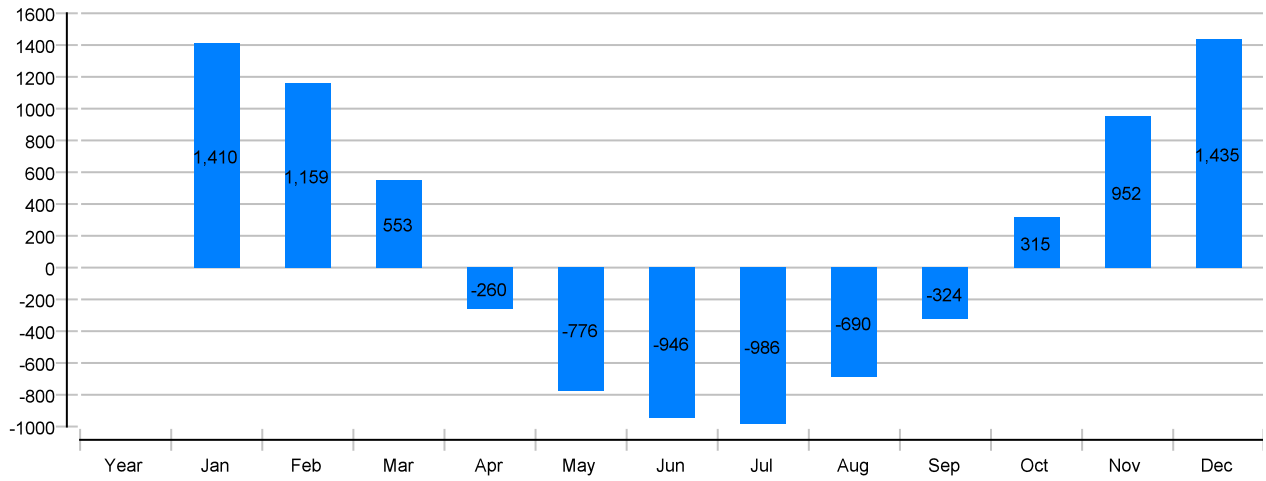
Heat generator energy to the system (solar thermal energy not included) [Qaux] kWh



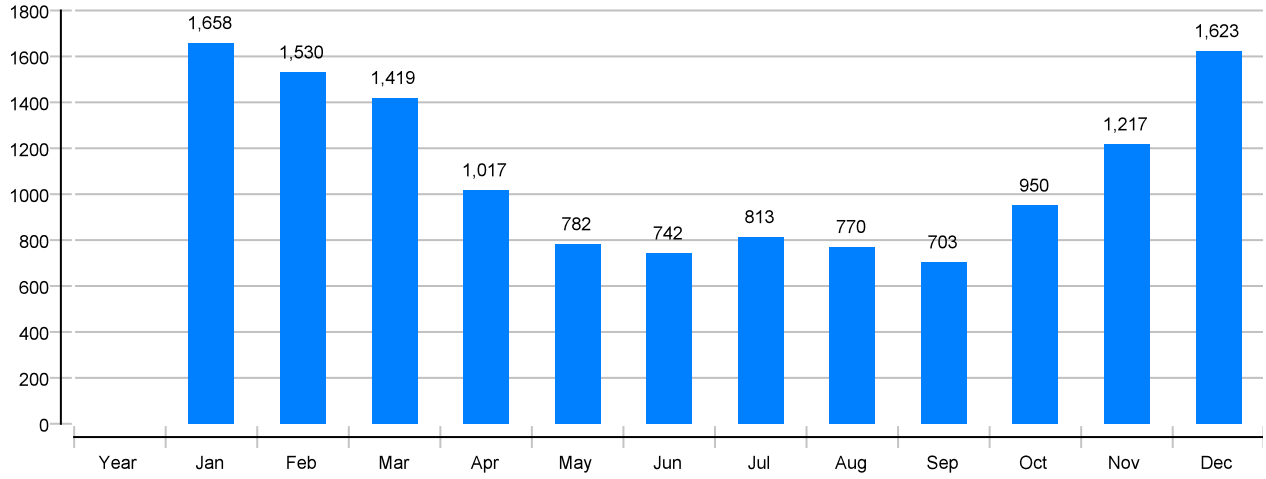
Solar fraction: fraction of solar energy to system [SFn] %



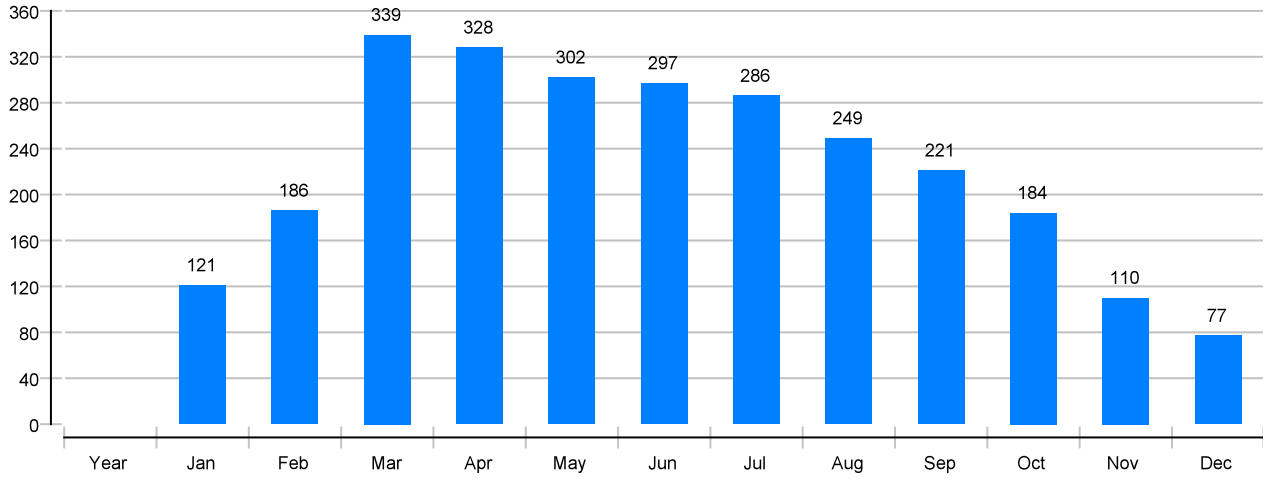
Total fuel and/or electricity consumption of the system [Etot] kWh



Total electricity consumption [Ecs] kWh



Self-consumption [Eocs] kWh



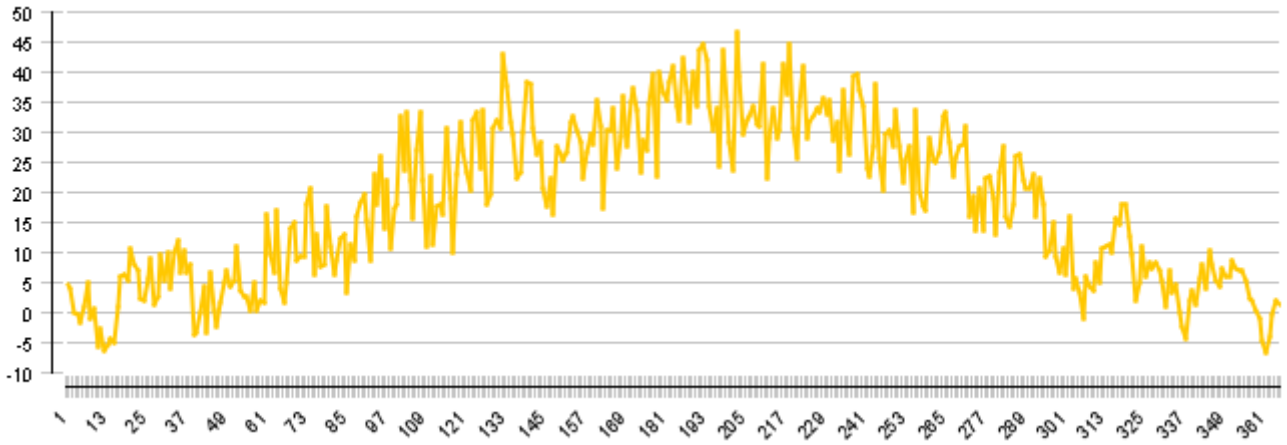
	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Solar thermal energy to the system [Qsol]													
kWh	18736	2719	2499	2448	1737	1059	558	242	293	693	1592	2204	2691
Heat generator energy to the system (solar thermal energy not included) [Qaux]													
kWh	24752	3787	3528	3313	2169	1263	626	268	331	810	1995	2910	3752
Heat generator fuel and electricity consumption [Eaux]													
kWh	5934	1040	999	845	439	206	96	42	51	123	379	684	1028
Solar fraction: fraction of solar energy to system [SFn]													
%	43.1	41.8	41.5	42.5	44.5	45.6	47.1	47.5	46.9	46.1	44.4	43.1	41.8
Total fuel and/or electricity consumption of the system [Etot]													
kWh	1843	1410	1159	553	-260	-776	-946	-986	-690	-324	315	952	1435
Irradiation onto collector area [Esol]													
kWh	55093	959	1750	4370	6512	8185	8416	8483	6791	4953	2952	1091	632
Yield Photovoltaics DC [Qpvf]													
kWh	9681	171	321	809	1177	1446	1465	1447	1158	863	522	191	111

	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Radiation onto module area [Esol PV]													
kWh	55093	959	1750	4370	6512	8185	8416	8483	6791	4953	2952	1091	632
Yield Photovoltaics AC [Qinv]													
kWh	9189	154	298	767	1124	1382	1399	1382	1102	819	490	173	97
Electricity consumption of pumps [Epar]													
kWh	97.7	12.3	10.9	10.2	7.9	7.1	5.5	4.6	4.8	6.1	8.1	8.9	11.4
Total energy consumption [Quse]													
kWh	23574	3655	3402	3189	2068	1175	561	207	269	739	1890	2799	3620
Heat loss to indoor room (including heat generator losses) [Qint]													
kWh	413	36	32	37	39	38	37	34	33	34	31	28	33
Heat loss to surroundings (without collector losses) [Qext]													
kWh	788	79	74	80	71	63	56	51	50	54	63	69	78
Total electricity consumption [Ecs]													
kWh	13225	1658	1530	1419	1017	782	742	813	770	703	950	1217	1623
Self-consumption [Eocs]													
kWh	2699	121	186	339	328	302	297	286	249	221	184	110	77

The resource of this report item is not reachable.

PVT collector

Daily maximum temperature [°C]



Energy flow diagram (annual balance)