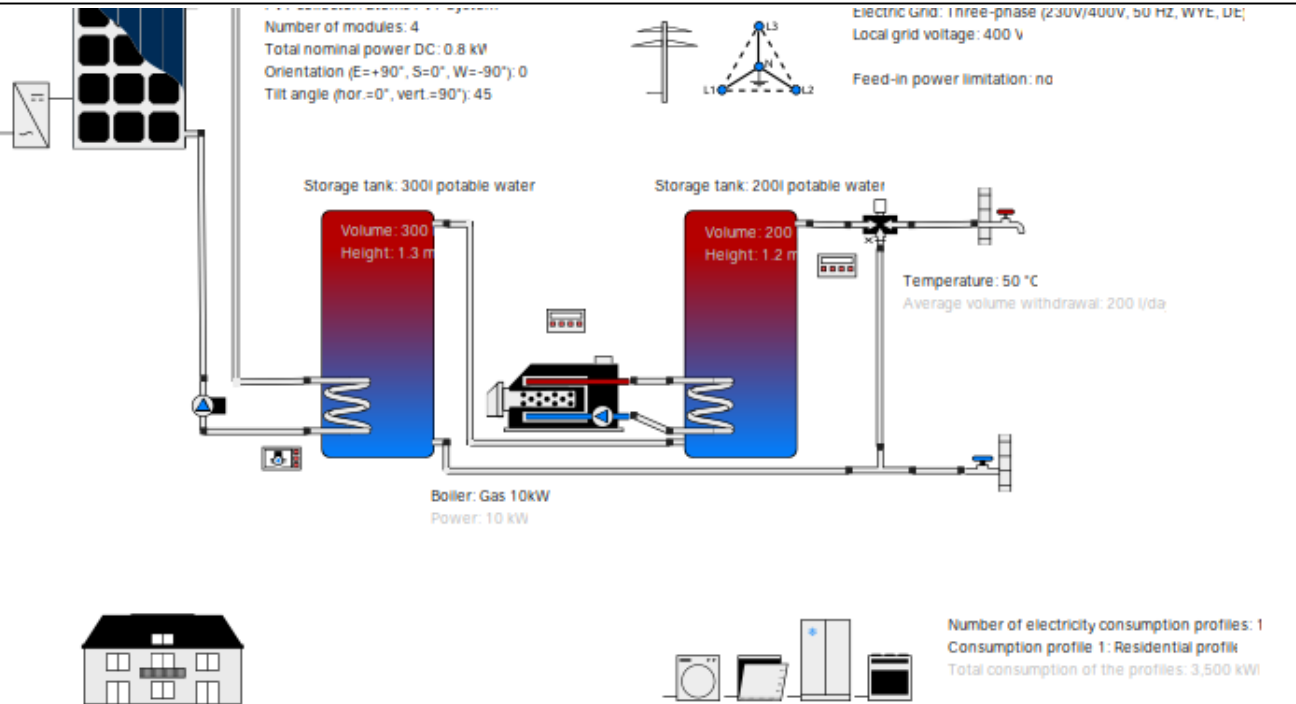


Professional Report

Etems Photovoltaic Thermal (PVT) System

59b: Domestic hot water, preheating by PVT



Location of the system

Map section

Wandsworth Town
Longitude: -0.194°
Latitude: 51.449°
Elevation: 12 m



This report has been created by:

Etems K2354862

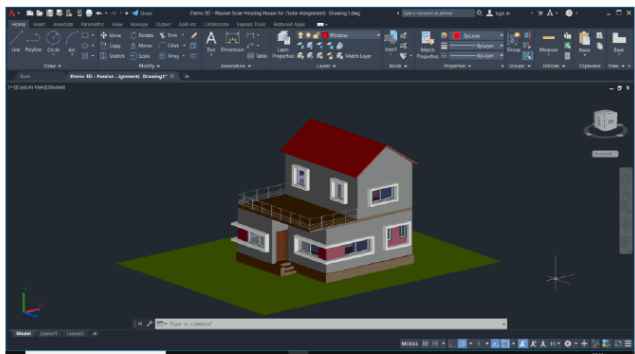
Kingston University
Kingston

Professional Report

Comments on the project

Family house design on AutoCAD 3D for the Photovoltaic Thermal (PVT) Collector system

Photograph of property



System overview (annual values)

Total fuel and/or electricity consumption of the system [Etot]	6,797 kWh
Total electricity consumption [Ecs]	3,506 kWh
Total gas consumption [Egas]	4,050 kWh
Total energy consumption [Quse]	3,218 kWh
System performance $[(Quse+Einv) / (Eaux+Epar)]$	0.79
Primary energy factor	1.39
Comfort demand	Energy demand covered

Overview solar thermal energy (annual values)

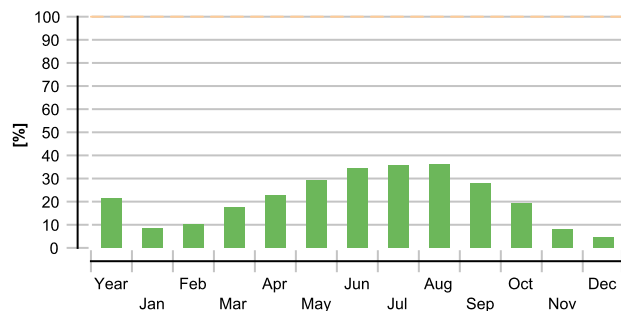
Collector area	5.3 m ²
Solar fraction total	21.4%
Total annual field yield	835.4 kWh
Collector field yield relating to gross area	157 kWh/m ² /Year
Collector field yield relating to aperture area	159.4 kWh/m ² /Year
Max. fuel savings	88.4 m ³ (gas): [Natural gas H]
Max. energy savings	1,687.3 kWh
Max. reduction in CO2 emissions	215 kg

Overview electricity (annual values)

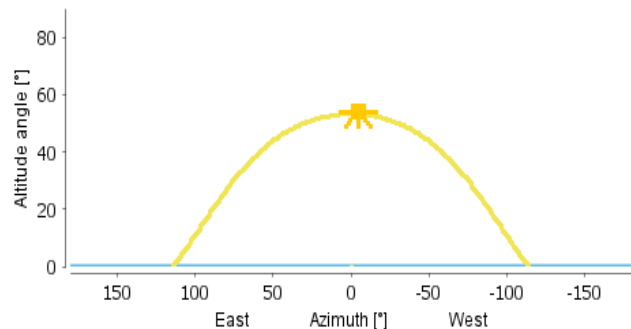
Annual consumption	3,506 kWh
Self-consumption	713 kWh
Self-consumption fraction	93.9 %
Degree of self-sufficiency	20.3 %

Professional Report

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



Horizon line



Meteorological data-Overview

Average outdoor temperature	11.9 °C
Global irradiation, annual sum	998 kWh/m²
Diffuse irradiation, annual sum	548 kWh/m²

Component overview (annual values)

Boiler		Gas 10kW	
Power	kW		10
Total efficiency	%		75.9
Energy from/to the system [Qaux]	kWh		3,073
Fuel and electricity consumption [Eaux]	kWh		4,050
Fuel consumption of the back-up boiler [Baux]	m³(gas)		386
Energy savings solar thermal	kWh		928
CO2 savings solar thermal	kg		215
Fuel savings solar thermal	m³(gas)		88.4
Exhaust fumes losses [Qex]	kWh		405
Electric consumers		Standard	
Electricity consumption [Ecs]	kWh		3,506
Electricity consumption of the profiles [Epcs]	kWh		3,500
Electricity consumption of the thermal components [Ethcs]	kWh		5.8
Self-consumption [Eocs]	kWh		713
Self-consumption fraction [Rocs]	%		93.9
Degree of self-sufficiency [Raut]	%		20.3

Professional Report

PVT collector		Etems PVT System	
Data Source			u1703071681847
Number of modules			4
Collector aperture area	m ²		5.2
Tilt angle (hor.=0°, vert.=90°)	°		45
Orientation (E=+90°, S=0°, W=-90°)	°		0
Global irradiation after IAM	kWh		5,812
Diffuse irradiation after IAM	kWh		2,784
Collector field yield [Qsol]	kWh		835
Total nominal power DC	kW		0.8
Performance ratio [PerfR]	%		82
Inverter 1: Name			YC1000-3 - 230V
Inverter 1: Manufacturer			APsystems
Layout 1: Number of inverters			1
Layout 1: A number of strings			1
Layout 1: A modules per string			1
Layout 1: B number of strings			1
Layout 1: B modules per string			1
Layout 1: C number of strings			1
Layout 1: C modules per string			1
Layout 1: D number of strings			1
Layout 1: D modules per string			1
Energy production DC [Qpvf]	kWh		806
Energy production AC [Qinv]	kWh		759
Specific annual yield	kWh/kWp		949
Hot water demand		Daily peaks	
Volume withdrawal/daily consumption	l/d		200
Temperature setting	°C		50
Energy demand [Qdem]	kWh		3,232
Pump Solar loop		Eco, small	
Circuit pressure drop	bar		0.717
Flow rate	l/h		210
Fuel and electricity consumption [Epar]	kWh		5.8
Storage tank Solar tank		300l potable water	
Volume	l		300
Height	m		1.3
Material			Stainless steel
Insulation			Rigid PU foam
Thickness of insulation	mm		80
Heat loss [Qhl]	kWh		16.3
Connection losses	kWh		-4.6

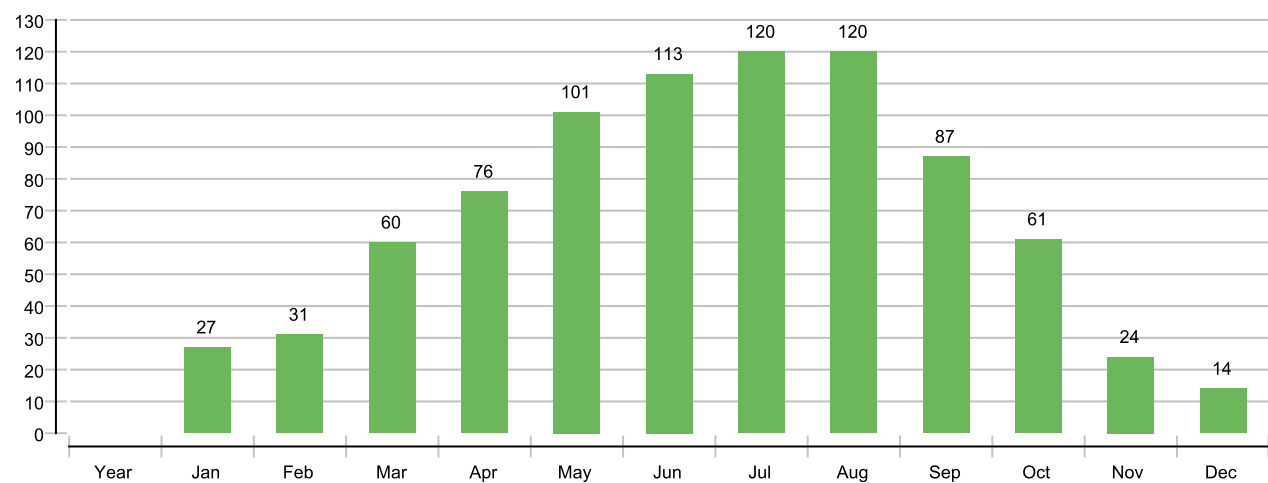
Professional Report

Storage tank	Stand-by storage tank	200l potable water
Volume	l	200
Height	m	1.2
Material		Stainless steel
Insulation		Rigid PU foam
Thickness of insulation	mm	80
Heat loss [Q _{hl}]	kWh	238
Connection losses	kWh	182

Loop

Solar loop		
Fluid mixture		Propylene mixture
Fluid concentration	%	33.3
Fluid domains volume	l	32.3
Pressure on top of the circuit	bar	4

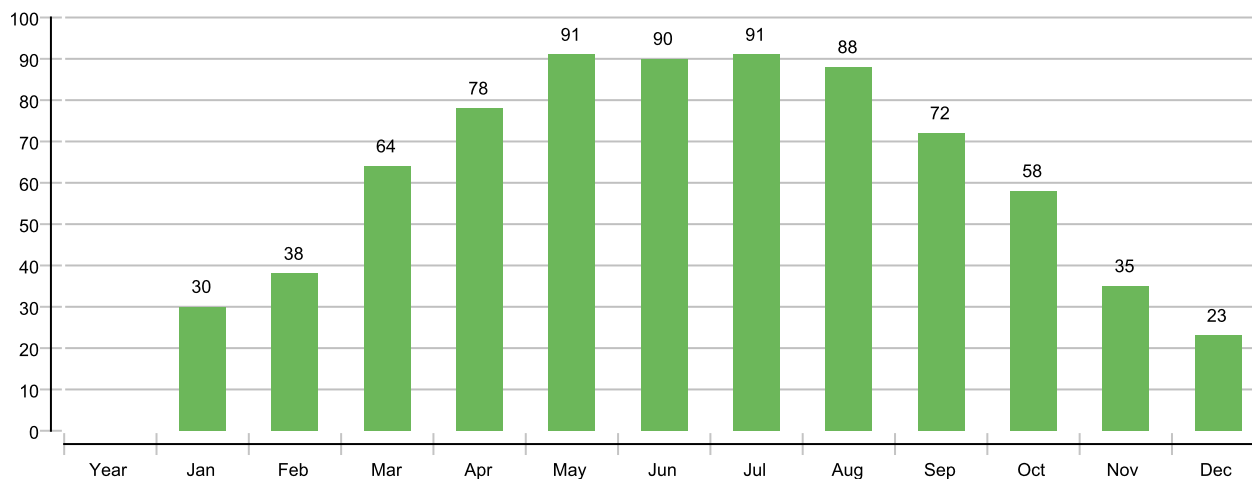
Solar thermal energy to the system [Q_{sol}]kWh



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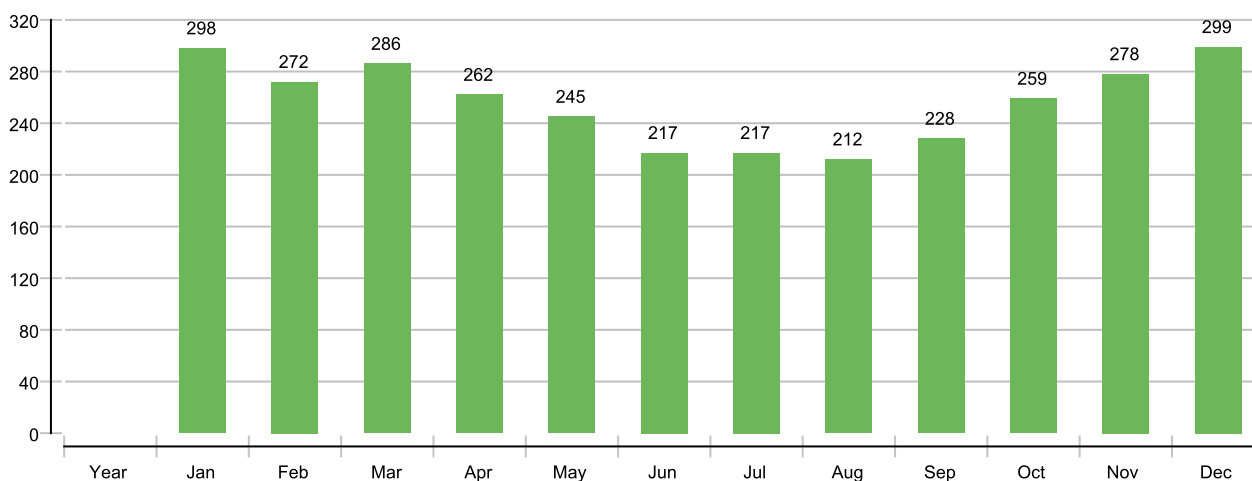
Yield Photovoltaics AC [Q_{inv}]

kWh



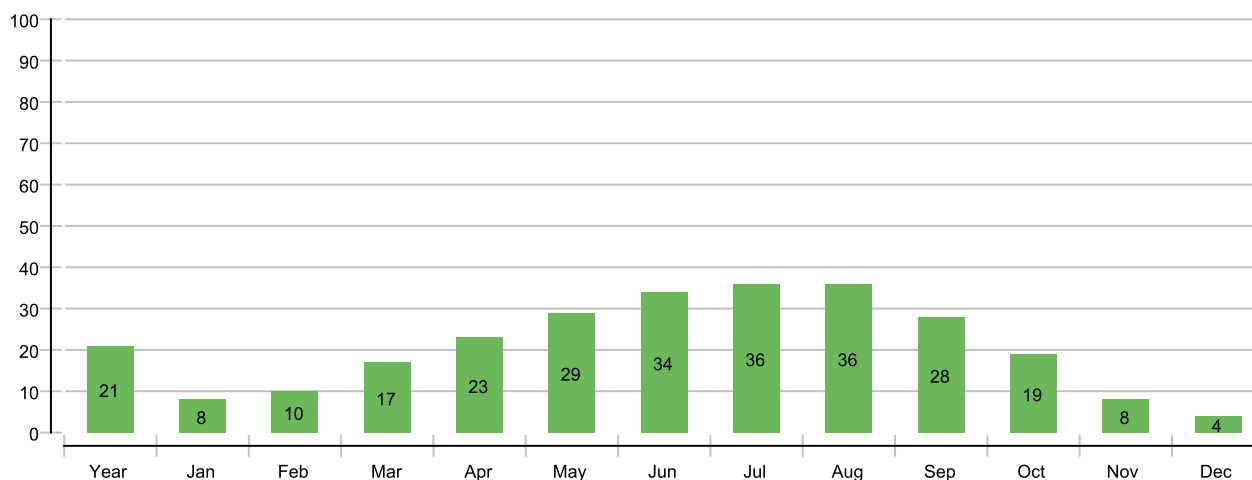
Heat generator energy to the system (solar thermal energy not included) [Q_{aux}]

kWh



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

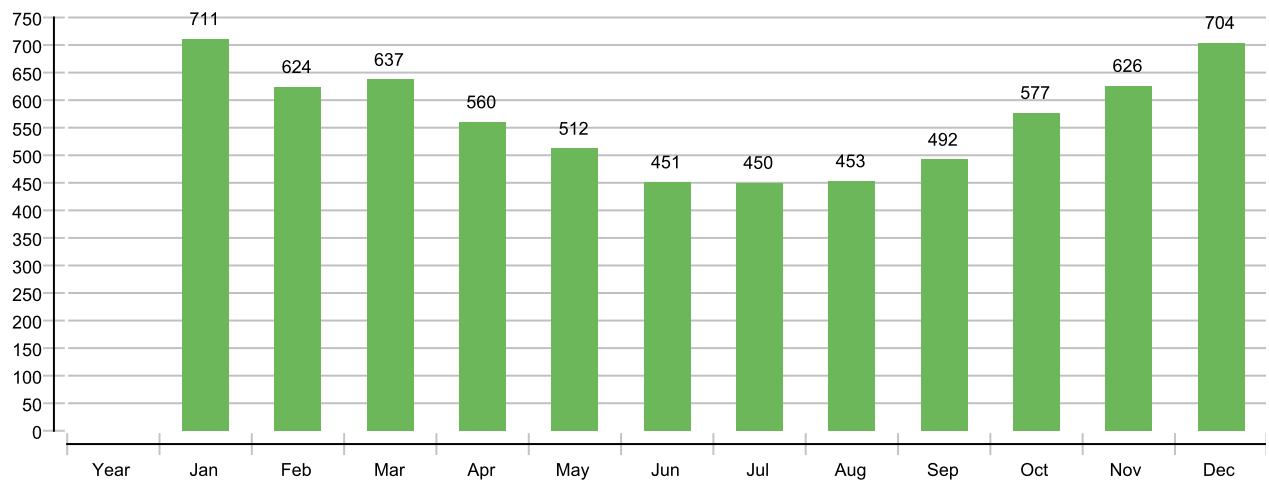
%



Professional Report

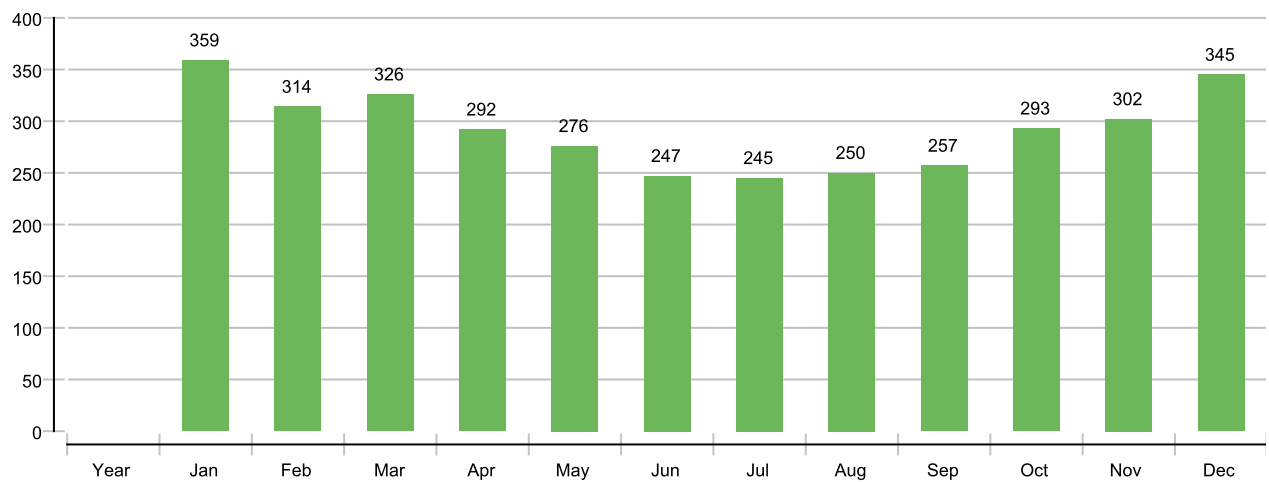
Total fuel and/or electricity consumption of the system [Etot]

kWh



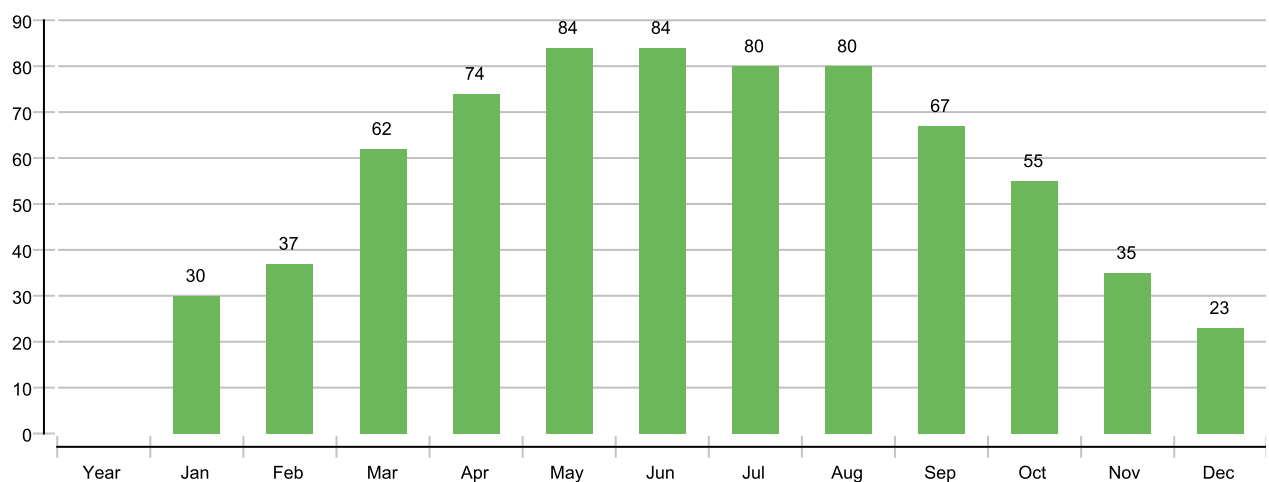
Total electricity consumption [Ecs]

kWh



Self-consumption [Eocs]

kWh



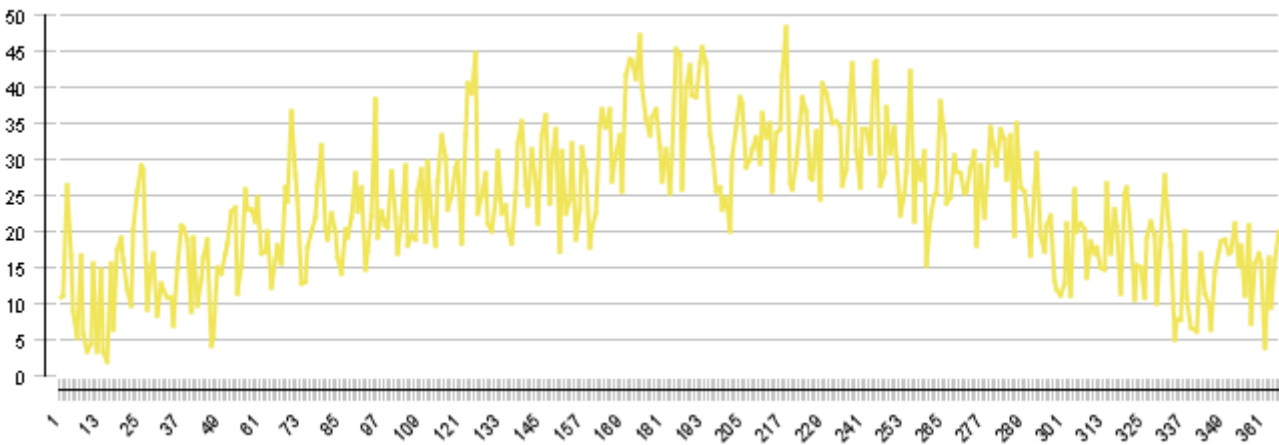
Professional Report

	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Solar thermal energy to the system [Qsol]													
kWh	835	27	31	60	76	101	113	120	120	87	61	24	14
Heat generator energy to the system (solar thermal energy not included) [Qaux]													
kWh	3073	298	272	286	262	245	217	217	212	228	259	278	299
Heat generator fuel and electricity consumption [Eaux]													
kWh	4050	382	348	375	346	327	294	295	291	307	342	359	383
Solar fraction: fraction of solar energy to system [SF_n]													
%	21.4	8.3	10.3	17.4	22.5	29.2	34.3	35.7	36.1	27.7	19.1	7.9	4.4
Total fuel and/or electricity consumption of the system [E_{tot}]													
kWh	6797	711	624	637	560	512	451	450	453	492	577	626	704
Irradiation onto collector area [E_{sol}]													
kWh	6062	237	294	497	615	722	732	742	720	581	458	279	187
Yield Photovoltaics DC [Q_{pvf}]													
kWh	806	32	40	68	83	96	96	96	94	76	61	38	25
Radiation onto module area [E_{sol} PV]													
kWh	6062	237	294	497	615	722	732	742	720	581	458	279	187
Yield Photovoltaics AC [Q_{inv}]													
kWh	759	30	38	64	78	91	90	91	88	72	58	35	23
Electricity consumption of pumps [E_{par}]													
kWh	5.8	0.2	0.3	0.4	0.5	0.7	0.7	0.8	0.8	0.6	0.4	0.2	0.1
Total energy consumption [Q_{use}]													
kWh	3218	289	266	297	281	280	259	257	251	243	258	259	278
Heat loss to indoor room (including heat generator losses) [Q_{int}]													
kWh	1234	82	73	98	100	112	117	124	129	117	110	90	82
Heat loss to surroundings (without collector losses) [Q_{ext}]													
kWh	35	2	2	3	3	4	4	4	5	4	3	1	1
Total electricity consumption [E_{cs}]													
kWh	3506	359	314	326	292	276	247	245	250	257	293	302	345
Self-consumption [E_{ocs}]													
kWh	713	30	37	62	74	84	84	80	80	67	55	35	23

Professional Report

PVT collector

Daily maximum temperature [°C]



Energy flow diagram (annual balance)

