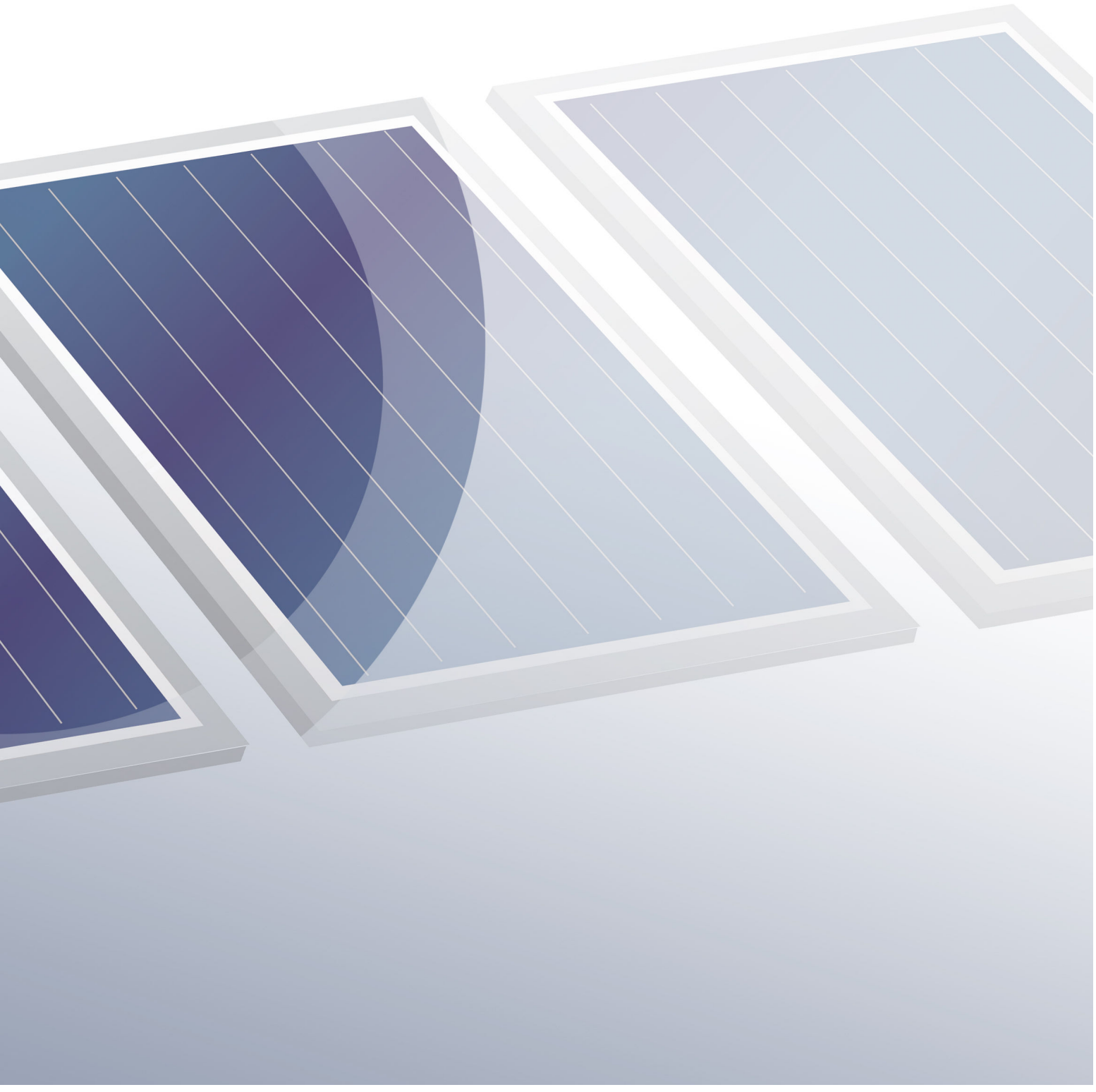
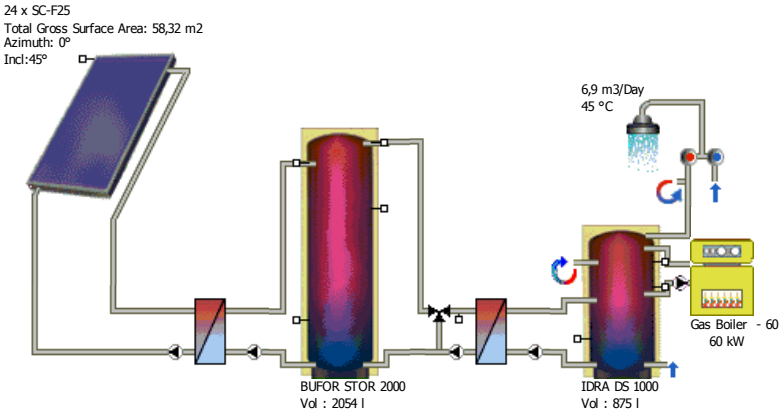
Project Report: Szkola "Objazda"





Results of Annual Simulation

Installed Collector Power:	40,82 kW	
Installed Gross Solar Surface Area:	58,32 m2	
Collector Surface Area Irradiation (Active Surface):	62,82 MWh	1 192,47 kWh/m2
Energy Produced by Collectors:	30,67 MWh	582,28 kWh/m2
Energy Produced by Collector Loop:	29,96 MWh	568,70 kWh/m2
DHW Heating Energy Supply:	105,21 MWh	
Solar Contribution to DHW:	29,89 MWh	
Energy from Auxiliary Heating:	76,77 MWh	
Natural Gas (H) Savings:		**5 216,0 m3**
CO2 Emissions Avoided:		**11 030,04 kg**
DHW Solar Fraction:		**28,0 %**
Fractional Energy Saving (EN 12976):		**29,7 %**
System Efficiency:		**47,6 %**

Basic Data

Climate File

Location:	Szczecin-Dabie
Climate Data Record:	"Szczecin-Dabie"
Total Annual Global Radiation:	1046,64 kWh
Latitude:	53,4 °
Longitude:	-14,62 °

Domestic Hot Water

Average Daily Consumption:	6,9 m3
Desired Temperature:	45 °C
Load Profile:	Student Accommodation with Canteen
Cold Water Temperature:	February:8 °C / August:10 °C
Circulation:	Yes

System Components

Collector Loop

Manufacturer:	Beretta
Type:	SC-F25
Number:	24,00
Total Gross Surface Area:	58,32 m2
Total Active Solar Surface Area:	52,68 m2
Tilt Angle:	45 °
Azimuth:	0 °

DHW Standby Tank

Manufacturer:	BERETTA
Type:	IDRA DS 1000
Volume:	875 l

Buffer Tank

Manufacturer:	BERETTA
Type:	BUFOR STOR 2000
Volume:	2054 l

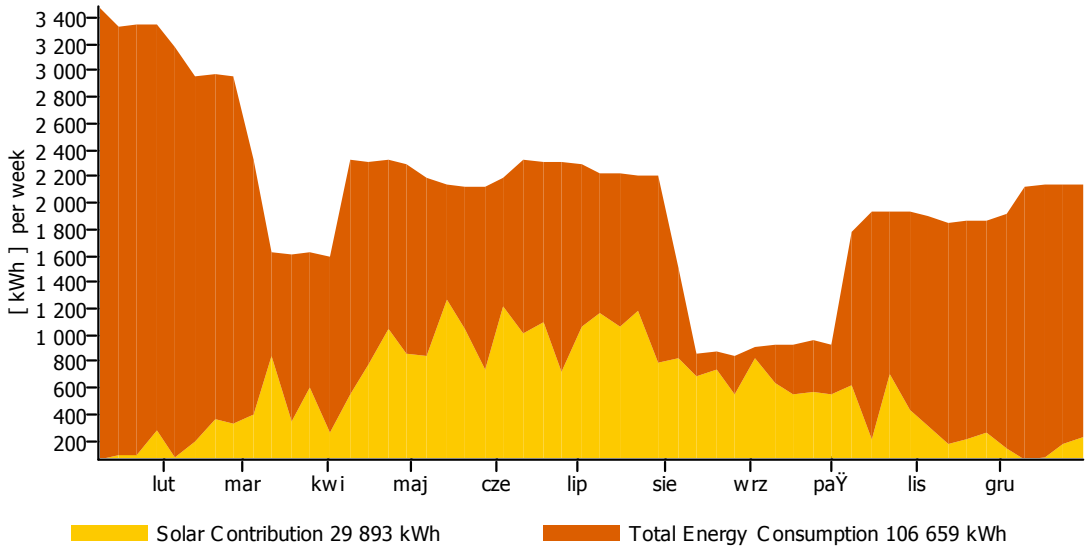
Auxiliary Heating

Manufacturer:	T*SOL Database
Type:	Gas Boiler - 60
Nominal Output:	60 kW

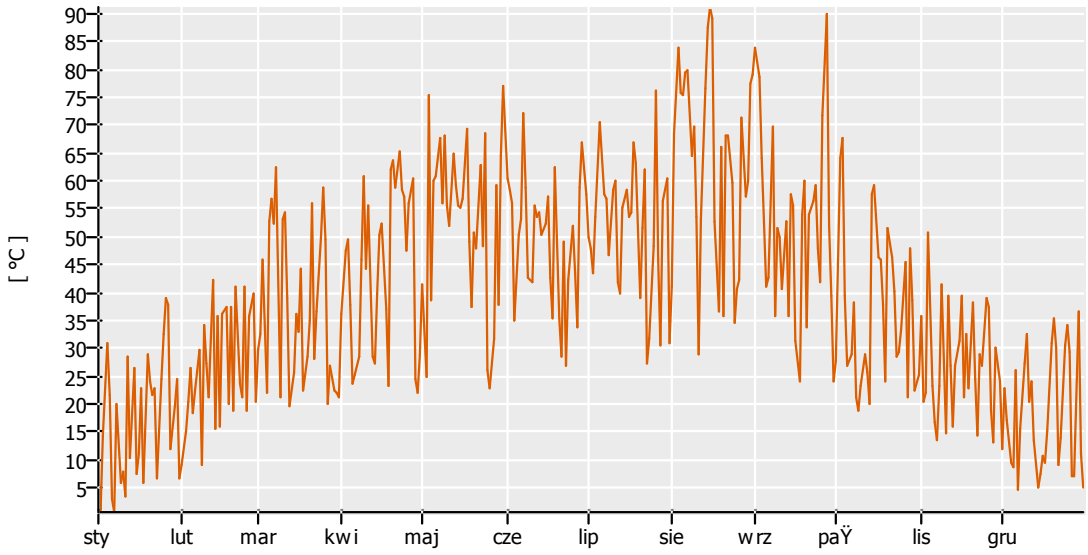
Legend

Original T*SOL Database
With Test Report
Solar Keymark

Solar Energy Consumption as Percentage of Total Consumption

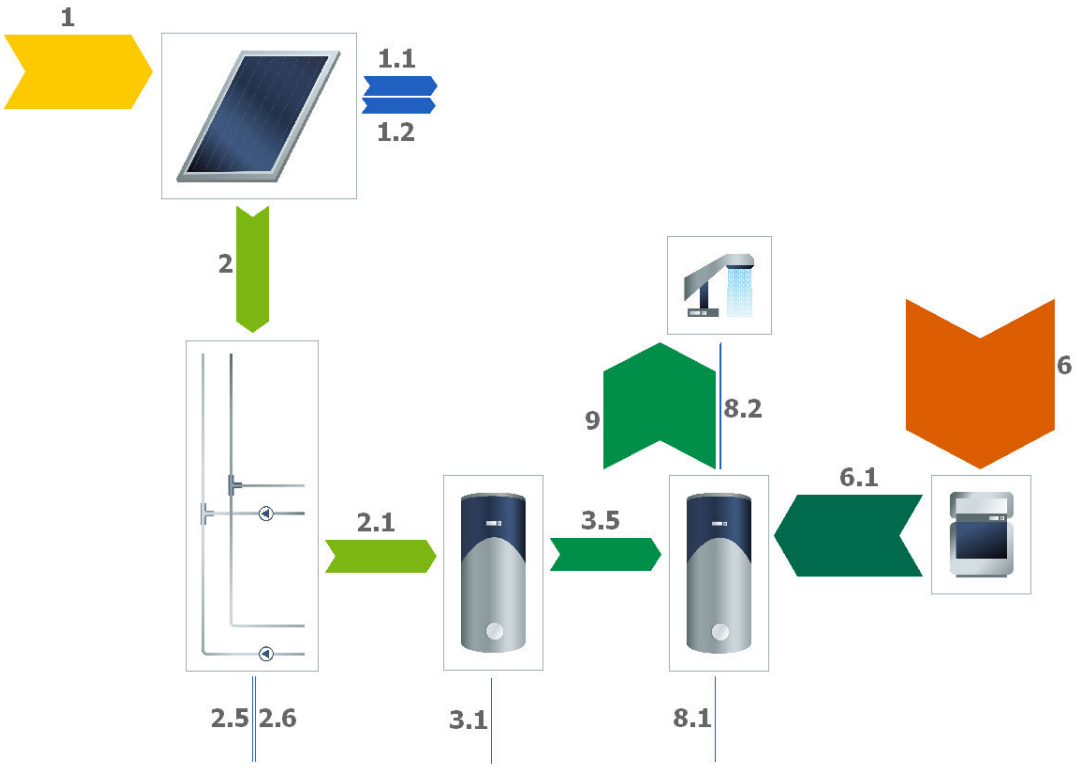


Daily Maximum Collector Temperature



These calculations were carried out by T*SOL Pro 4.5 - the Simulation Programme for Solar Thermal Heating Systems. The results are determined by a mathematical model calculation with variable time steps of up to 6 minutes. Actual yields can deviate from these values due to fluctuations in climate, consumption and other factors.The system schematic diagram above does not represent and cannot replace a full technical drawing of the solar system.

Energy Balance Schematic



Legend

1	Collector Surface Area Irradiation (Gross Surface)	70 MWh
1.1	Optical Collector Losses	17 667 kWh
1.2	Thermal Collector Losses	14 477 kWh
2	Energy from Collector Array	30 675 kWh
2.1	Solar Energy to Storage Tank	29 959 kWh
2.5	Internal Piping Losses	396 kWh
2.6	External Piping Losses	320 kWh
3.1	Tank Losses	69 kWh
3.5	Tank to Standby Tank	29 893 kWh
6	Final Energy	140 MWh
6.1	Supplementary Energy to Tank	77 MWh
8.1	Standby Tank Losses	465 kWh
8.2	Circulation Losses	979 kWh
9	DHW Energy from Standby Tank	105 MWh

Glossary

1 Collector Surface Area Irradiation (Gross Surface)
Energy Irradiated onto Tilted Collector Area (Total Solar Surface)

1.1 Optical Collector Losses
Reflection and Other Losses

1.2 Thermal Collector Losses
Heat Conduction and Other Losses

2 Energy from Collector Array
Energy Output at Collector Array Outlet (i.e. Before the Piping)

2.1 Solar Energy to Storage Tank
Energy from Collector Loop to Storage Tank (Minus Piping Losses)

2.5 Internal Piping Losses
Internal Piping Losses

2.6 External Piping Losses
External Piping Losses

3.1 Tank Losses
Heat Losses via Surface Area

3.5 Tank to Standby Tank
Heat from Tank to DHW Standby Tank

6 Final Energy
Final Energy Current into System. This can flow in as natural gas, oil or electricity (not including solar energy) taking efficiency levels into account

6.1 Supplementary Energy to Tank
Supplementary Energy (e.g. Boiler) to Tank

8.1 Standby Tank Losses
Standby Tank Heat Losses

8.2 Circulation Losses
Circulation Piping Losses

9 DHW Energy from Standby Tank
Heat from Standby Tank to DHW Appliances without circulation requirement