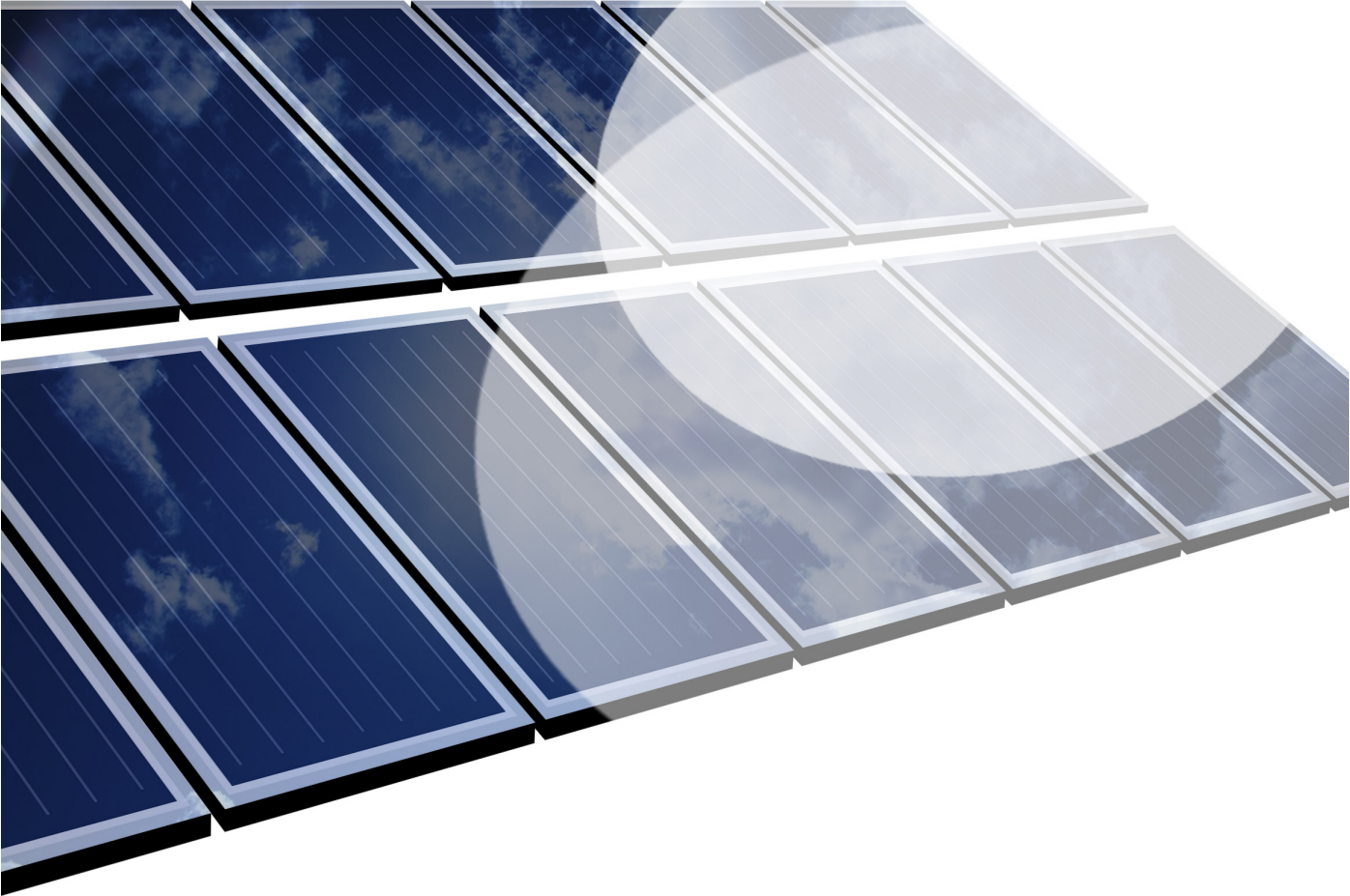
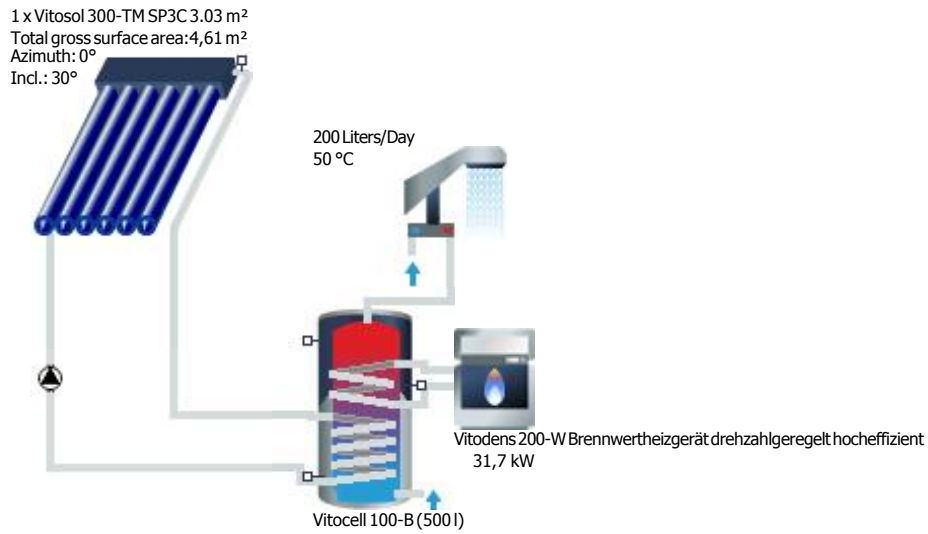

VIESSMANN



Variante 1



Results of annual simulation

Installed collector power:		3,23 kW
Installed solar surface area (gross):		4,61 m ²
Irradiation on collector surface (active):	5.324,91 kWh	1.155,08 kWh/m ²
Energy delivered by collectors:	2.115,04 kWh	458,79 kWh/m ²
Energy delivered by collector loop:	1.867,84 kWh	405,17 kWh/m ²
DHW heating energy supply:		3.374,17 kWh
Solar energy contribution to DHW:		1.790,24 kWh
Energy from auxiliary heating:		1.962,2 kWh
Natural gas (H) savings:		173,5 m³
CO2 emissions avoided:		366,86 kg
DHW solar fraction:		47,7 %
Relative savings of supplementary energy (DIN EN 12977):		49,5 %
System efficiency:		33,6 %

Variante 1

Site Data

Climate data

Location:	Uccle
Climate data record:	Uccle
Total annual global irradiation:	1015,006 kWh/m ²
Latitude:	50,8 °
Longitude:	-4,35 °

Domestic hot water

Average daily consumption:	0,2 m ³
Desired temperature:	50 °C
Consumption profile:	Detached house (evening max)
Cold water temperature:	February: 8 °C August: 12 °C
Circulation:	no

Variante 1

System

Collector loop

Manufacturer:	Viessmann Werke GmbH & Co
Type:	Vitosol 300-TM SP3C 3.03 m ²
Number:	1,00
Total gross surface area:	4,61 m ²
Total active solar surface area:	4,61 m ²
Inclination (Tilt Angle):	30 °
Orientation:	180 °
Azimuth:	0 °

Speicher-Wasserewärmer mit zwei Heizwendeln

Manufacturer:	Viessmann
Type:	Vitocell 100-B (500 l)
Volume:	0,5 m ³

Auxiliary heating

Manufacturer:	Viessmann Werke GmbH & Co
Type:	Vitodens 200-W Brennwertheizgerät drehzahl geregelt hocheffizient
Nominal output:	31,7 kW

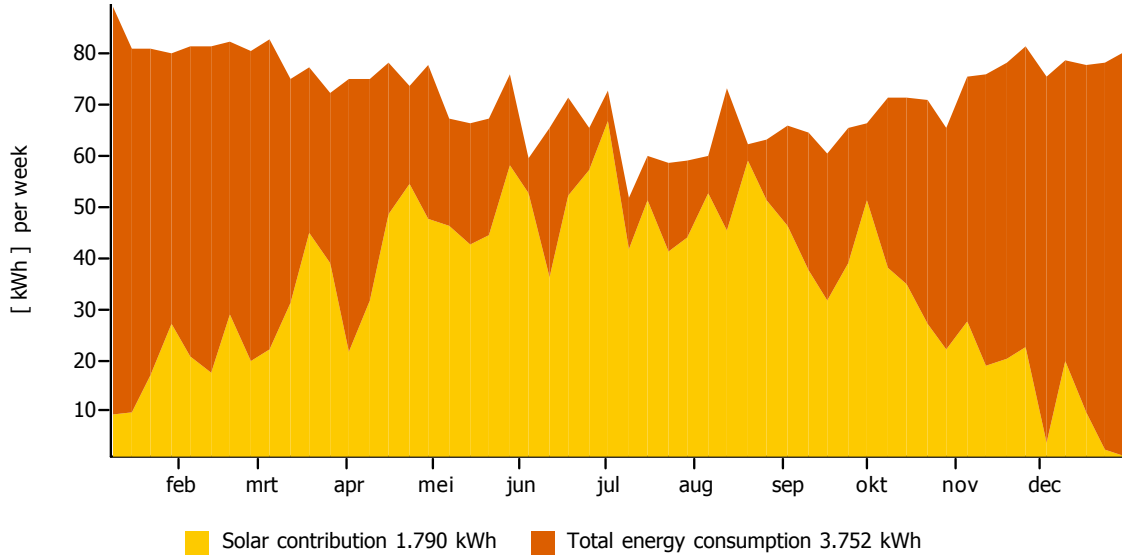
Legend

With test report
Solar Keymark

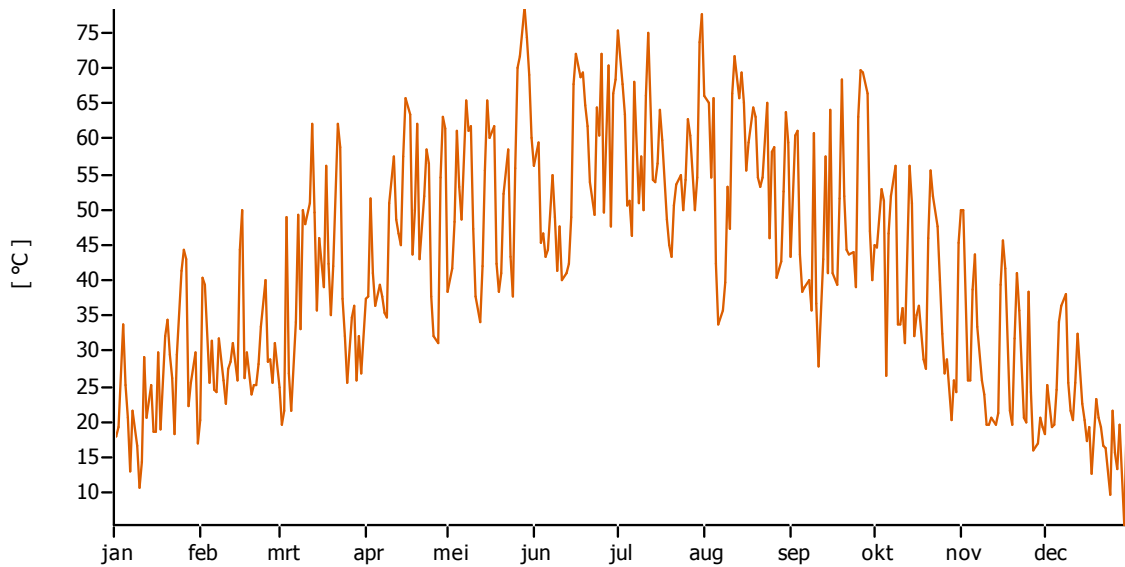


Variante 1

Solar energy consumption as percentage of total consumption



Daily maximum collector temperature



These calculations were carried out by T*SOL 2017 (R5) - the simulation program 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.

Variante 1

Financial analysis

System

Active solar surface:	4,61 m ²
System yield:	1.790,24 kWh
Annual fuel savings:	173,5 m ³ Natural gas (H)

Financial analysis parameters

Life span:	20 Years
Interest on capital:	2,0 %
Reinvestment return:	2,0 %
Energy cost escalation rate:	3,0 %
Running cost escalation rate:	1,0 %

Financing

Total investments:	1.844 €
Subsidies:	0 €
Loan capital:	0 €
Remaining investment:	1.844 €
Running costs in first year:	0 €
Savings in first year:	87 €

Financial analysis

Cost of solar energy:	0,063 €/kWh
Capital return time:	16,7 Years
Amortization period:	19,8 Years

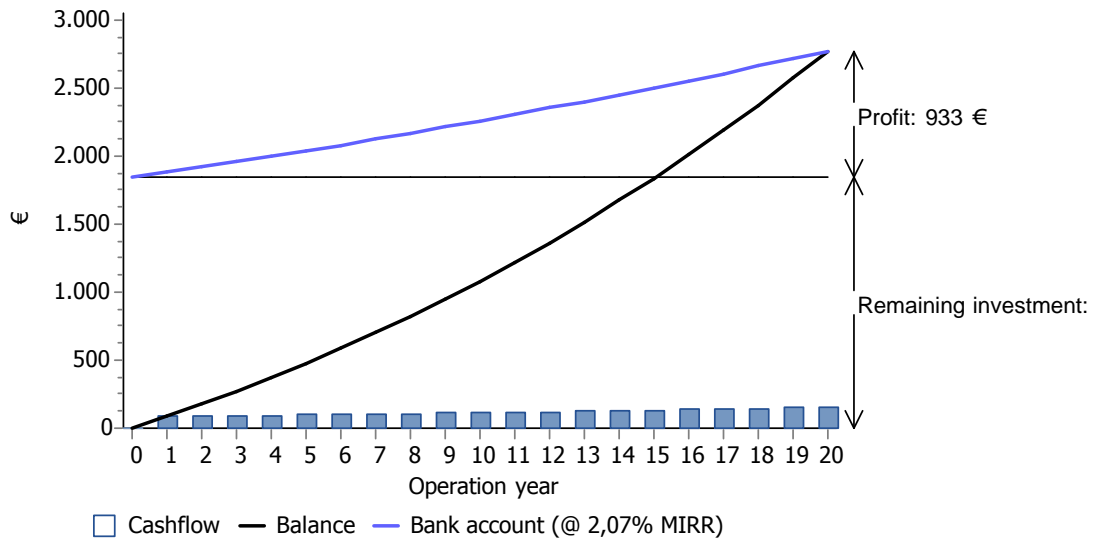
Profitability

Return on assets:	126,4 %
Return on equity:	126,4 %
Internal rate of return rate, IRR:	2,13 %
Net present value:	25 €

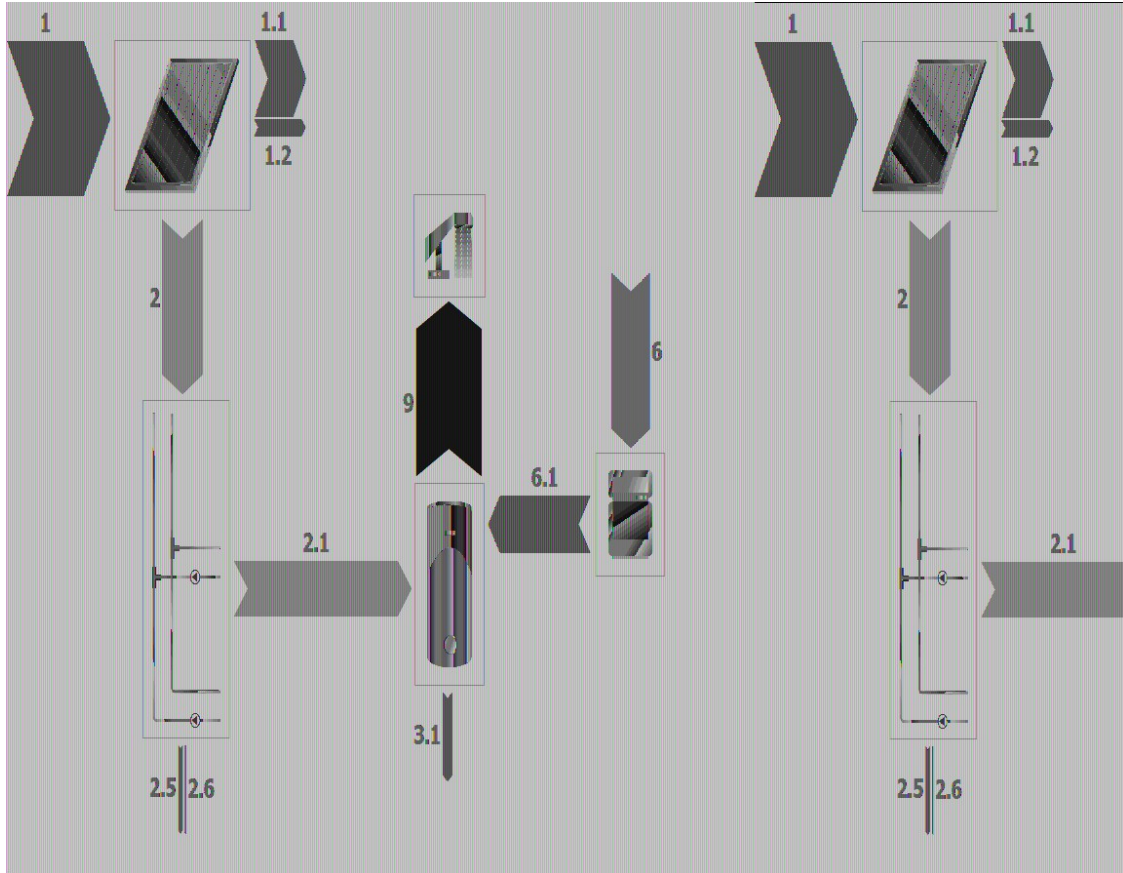
Reinvestment premise

Profit:	933 €
Modified internal rate of return, MIRR:	2,07 %

Variante 1



Energy balance schematic



Legend

1	Irradiation on collector surface (active)	5.325 kWh
1.1	Optical collector losses	2.643 kWh
1.2	Thermal collector losses	567 kWh
2	Energy from collector array	2.115 kWh
2.1	Solar energy to storage tank	1.868 kWh
2.5	Internal piping losses	203 kWh
2.6	External piping losses	44 kWh
3.1	Tank losses	456 kWh
6	Final energy	1.978 kWh
6.1	Supplementary energy to tank	1.962 kWh
9	DHW energy from tank	3.374 kWh

Glossary

- 1 Irradiation on collector surface (active)
Solar energy irradiated onto tilted collector area (active surface area)
- 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 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
- 6 Final energy
Final energy supply to system. This can be supplied from natural gas, oil or electricity (not including solar energy) and takes efficiency into account.
- 6.1 Supplementary energy to tank
Supplementary energy (e.g. boiler) to tank
- 9 DHW energy from tank
Heat from tank (excluding circulation) for DHW consumption