

Photovoltaic Thermal Collector

Factsheet 5: Integration of solar energy in district heating

General Information



Switzerland's largest solar thermal installation consist of about 3500 m² of PVT collectors regenerating borehole storages of the low temperature network for the Suurstoffi blocks.

General

Photovoltaic Thermal (PVT) collectors are a type of solar technology that combines the benefits of solar photovoltaic (PV) panels and solar thermal collectors. PVT collectors are suitable to be integrated in low temperature or "anergy" grids providing energy in the temperature range of 10-40°C. A typical application is to regenerate large borehole fields which serve as low temperature source for anergy networks and the decentralized heat pumps connected to the grid. For this typical application thermal outputs in the range of 300-400 kWh/m² can be expected in Switzerland, however the output of uncovered PVT collectors is strongly dependent on the operation temperature. Covered PVT collectors for higher temperature applications are part of ongoing research and development. PVT collectors generate both electricity and low grade thermal energy, making them an attractive option for use in new settlements with a demand of electricity and low temperature heat.

Construction



- 1 PV-Module
- 2 Bonded joint
- 3 Absorber

Most of the commercially available uncovered photovoltaic thermal collectors consist of a front cover similar to a conventional PV module with a thermal absorber on the backside.

Some products use the absorber also as heat exchanger with the ambient air to source heat pumps. They cannot normally reach temperatures above 70°C because they have no insulation.

Area 1 - 2 m²
 Investment cost ^a 270 - 400 CHF/m²
 Temperature range -5 - 40 °C
 Life expectancy 20 - 30 years

^a without planning and heat exchanger cost

Materials

Absorber PV cell
 Piping Alu/copper 12 - 40 mm
 Cover Low Iron glass 3 - 4 mm
 Insulation Uninsulated
 Casing Metal (Alu/Steel)

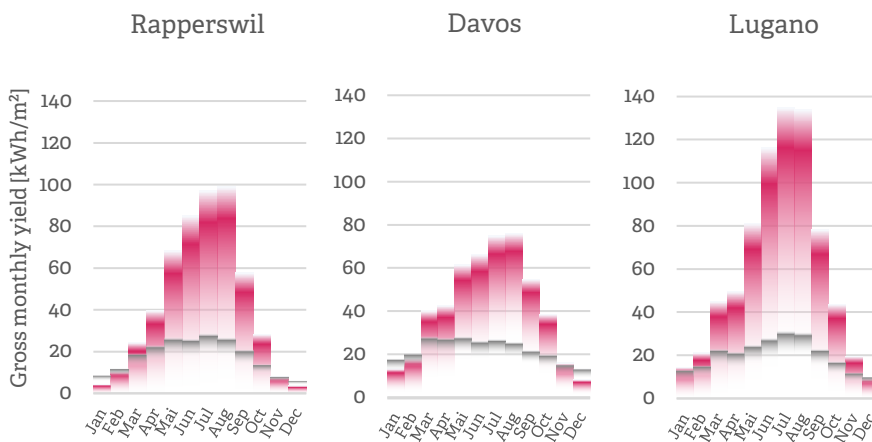
Advantages

- Generate thermal and electrical energy
- Low stagnation temperatures, no overheating protection needed
- Cooling provides slightly higher electrical output of PV part

Disadvantages

- Only for low temperature applications
- Low thermal output at low outdoor temperatures/in winter

Typical collector output



Annual thermal yield* [kWh/m²]

	20 °C	30 °C
Rapperswil	478	214
Davos	464	233
Lugano	680	345

* Yield of a good product at a constant average operating temperature for a 30° tilted collector facing south. Values refer to gross collector area. The gray bars in the graph show the electric yield.

Situation in Switzerland and worldwide

The main application of PVT collectors is the regeneration of geothermal borehole fields connected to buildings, building complexes or districts supplied by low temperature networks. Switzerland is a pioneer in this technology and therefore the largest solar thermal installation in Switzerland is the 3500 m² PVT field connected to the low temperature network at "Suurstoffi" in Rotkreuz.

Examples:

Name	Country	Area	Year
Suurstoffi	CH	3'500 m ²	2014
Oberfeld Ostermundigen	CH	1'320 m ²	2013
REKA Blatten	CH	672 m ²	2016

Collector manufacturers

- PVT Solar
 - Solator
 - DualSun
 - Abora
 - Naked Energy
 - AGC Solar
 - Solimpeks
 - Ensol
 - Fath
- (not exhaustive list)

Relevant sources & further information

- [PVTwrapup Summary on PVT systems in Switzerland](#)
- [Webpage on solar district heating](#)
- [IEA-SHC Task68: Efficient Solar District Heating Systems](#)

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