Trivelli Energia srl

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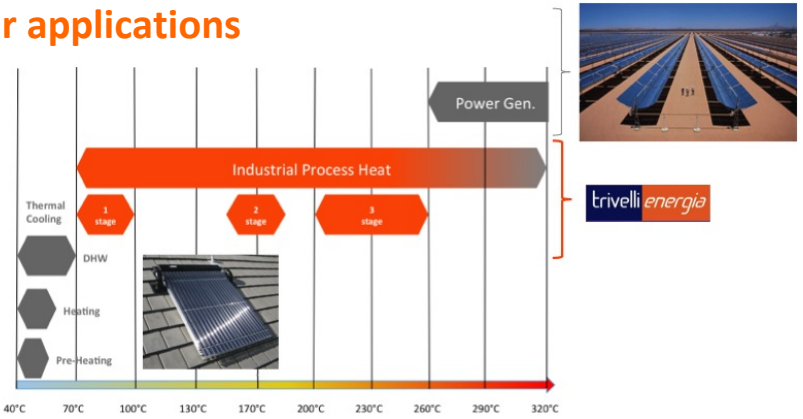
Solar Wing EVO

Temperature range of typical solar applications



The micro-CSP technology from Trivelli Energia for the generation of process heat and solar cooling

In Europe about 70% of the energy consumed by industry is heat, most of this heat is required at temperatures below 250°C (1). Concentrating Solar power collector as our Solar System Wing EVO are the most appropriate and the more productive technology to generate, with the help of the sun, this huge amount of energy in a quickly, efficient and clean way.

According to the most recent and important market studies, the generation of industrial process heat systems by means of the micro-CSP has a potential for growth, calculated on a global scale, at least of a factor of 2500. In particular for Africa and the Latin America growth factor reaches values even larger, amounting to 4600 by 2050 (2).

Industrial Process Heat is a new market full of challenges to which Trivelli Energia srl has been addressing addressed, since the last years, his research efforts and innovation.

Our parabolic trough concentrating solar collectors Solar Wing EVO have been designed with the aim to address the industry in order to ensure a valid response to the generation of process heat and solar cooling.

Easy to install, inherently safe against overheating, adaptable to a wide range of temperatures (80-250°C) and working fluids (pressurized water, steam, thermal oil) offer payback times in the order of 3-5 years, IRR of 30% and very limited running costs and maintenance.

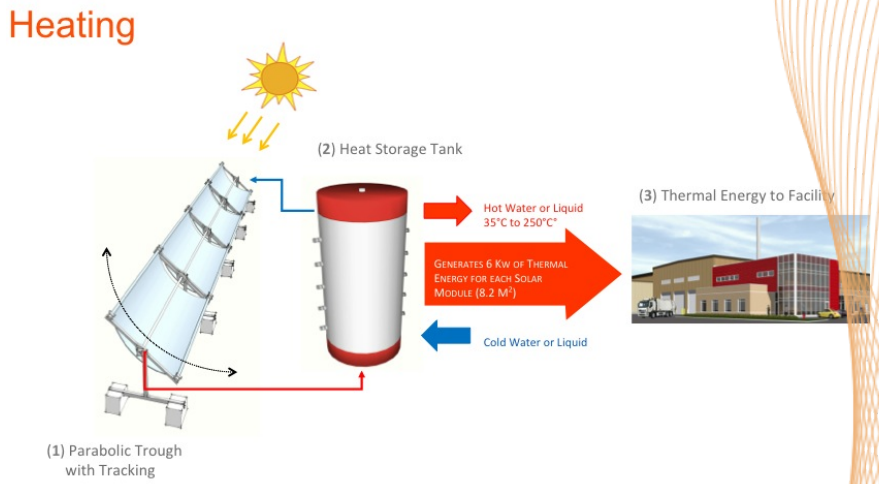
The collectors Solar Wing EVO are 100% Made in Italy.

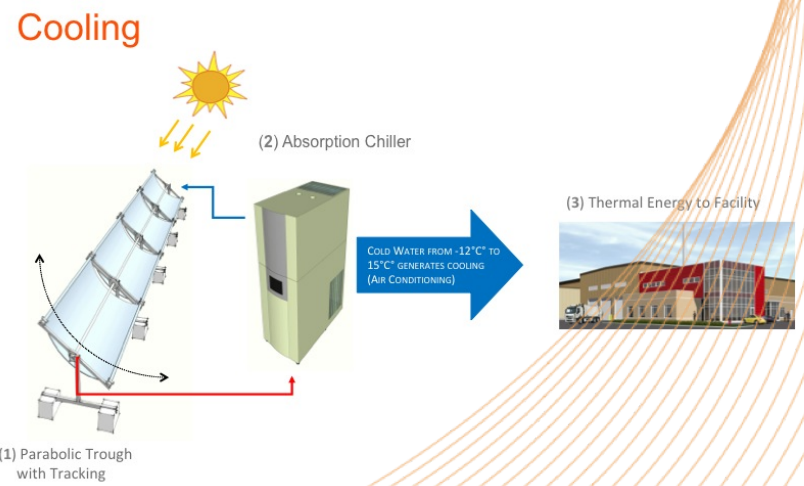
(1) Potential for solar heat in indutrial process, IEA SHC Task 33 Solar Paces and Task IV, 2008
(2) Small scale concentrated solar power, CARBON TRUST 2013

How it works

Heat generation:
The parabolic trough solar collectors Solar Wing EVO chase the movement of the sun at all times of day and in all seasons, capturing the direct radiation. All the solar energy arriving on the opening of the parabola is reflected and concentrated in the focal axis where is positioned the receiver tube which, in fact, receive such energy and transfers it to the carrier fluid flowing inside. The heat obtained from the sun can therefore be easily stored and, eventually, also used in the hours when the solar radiation is not present.
Today there are many valid technologies for the storage of heat: ranging from simple storage of water in isolated reservoirs, to the use of materials with high thermal capacity and phase change materials.

Solar cooling:
In the case of solar cooling system, the heat produced by the solar collectors is sent to special machines called absorption chillers that are able to transform the sun's heat in usable cool, both for use in the environmental conditioning during the warm seasons, or freezing which, in turn, offers the possibility to store the cold in the form of ice to be used, for example, during the night hours, or for the preservation of food.
Depending on the power and the required application, there is a wide range of absorption chillers with different efficiencies and operating temperatures. In any case, the solar cooling is one of the most interesting applications for the micro-CSP technology, in fact, the need for cooling is always in phase with the presence of the sun situation that guarantees always the high value of solar integration and, therefore, the economy of the systems.





True experience

Trivelli Energia srl is a leading company in Italy and in Europe in the field of the generation of industrial process heat and solar cooling (3). With various systems installed already since 2009, we are so far the only reality that without incentives of any kind, succeeded in convincing the Italian customers to choose and install solar thermal concentrating systems based on the collectors Solar Wing EVO.
Since the end of 2013 we started a major process of internationalization of our business, particularly in the USA, MENA and Brazil, which has allowed us to grow our business and further enhance our technological know-how.

(3) Search Sun & Wind Energy p. 36-45 of 03/2014

Lightness, strength and uniqueness

The innovative and unique concept of the collectors Solar Wing EVO is made from composite materials, 100% recyclable, guaranteeing extreme lightness and strength as to withstand, with no consequences, the most extreme climatic conditions.
The receiver tube in stainless steel, essential for the performance of the collector is coated with a coating highly absorbing solar radiation obtained by a deposition process called F-Ox. This process is without carried out negative impacts on the environmental and it was developed entirely in-house by our researchers.

OPERATING TEMP. ° C	APPLICATIONS	INDUSTRY
30° to 50°C	• Swimming pool heating • Hot water	• Sport arenas (swimming) • School campus (dormitories) • Residential (apartment complexes) • Food and beverages (drying, heat treatment)
50° to 90°C	• Hot water • Heating buildings • Food processing • Water treatment	• Residential and commercial buildings • Government buildings • Food processing plants • Water treatment facilities
90°C to 120°C	• Industrial process heat • Solar cooling with single-stage lithium bromide • Steam generation low-enthalpy	• Manufacturing facilities. • Food and beverages (pasteurizing) • Metal treatment (cleaning)
120° to 180°C	• Industrial process heat/refrigeration • Industrial ammonia absorbers and air-conditioning • Desalination	• Food and beverages (sterilizing) • Timber (wood pulp) • Rubber (vulcanization) • Chemicals (plastics, distilling and synthetics)
180° to 200°C	• Process heat • Steam generation and medium enthalpy solar cooling with two-stage lithium bromide absorption	• Chemicals (distilling, soap, plastics and synthetic rubbers)
Over 200°C	• Process heat • Steam at medium energy • Power generation • Thermal energy storage with molten salt	• Chemicals (distilling, soap and plastics). • Power (turbine generation, energy storage) • Energy transmission (steam)

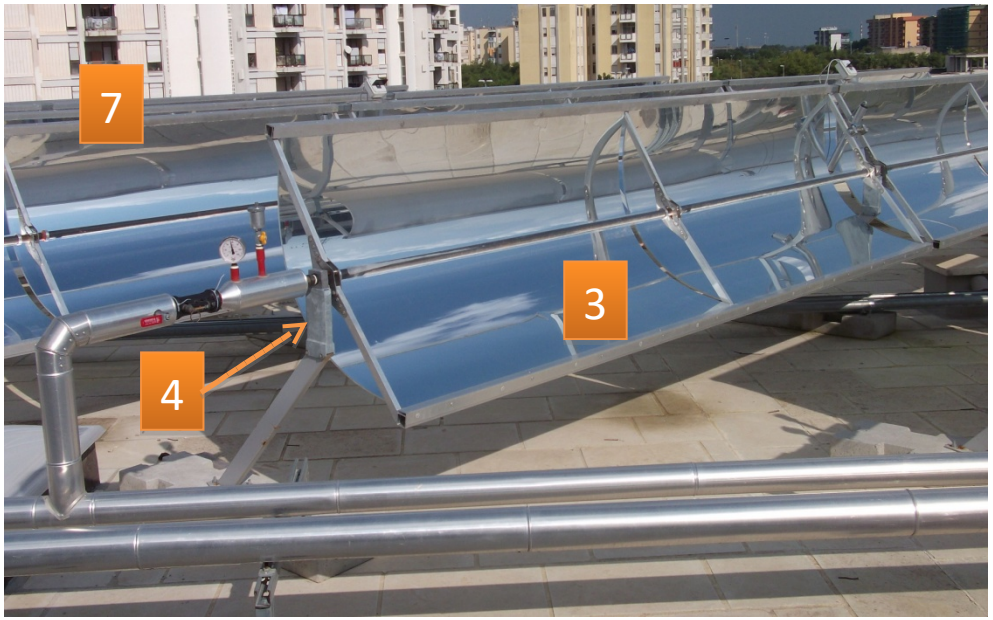
Applications

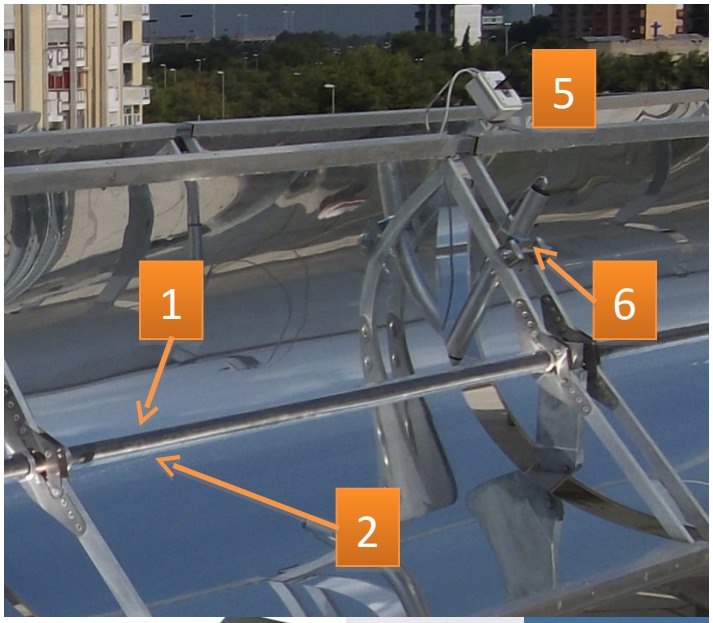
Large and diverse is the scope of the collectors Solar Wing EVO.

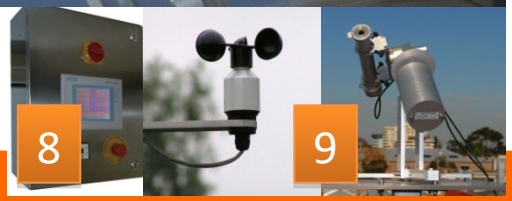
Our collectors are quick and easy to integrate into any process on new or existing systems. Not only they provide an immediate savings in the bill, but also they allow you to cut your carbon footprint corporate while enhancing your corporate identity with inevitable positive impact on the marketing of your services and products.

Solar Wing EVO

Technical specifications (referred to one standard module)	
Nominal capturing surface	8,25 m^2
Collector length	8,24 m
Aperture	1,2 m
OD of the receiver tube	22 mm
Optical efficiency	70%
Peak thermal power (DNI 1000 W/m^2)	6 kW
Max. operative temperature	250°C (programmable according to the application)
Weight for linear meter	12 kg
Max. wind speed in operative conditions	70 km/h
Max. wind speed in safety conditions	150 km/h
Tracking	Mono axial
Overheating protection	Automatic
Working fluid	Water, water/glicol, pressurized water, steam, diathermic oil
Life expectancy	+20 years







Materials and components of the Solar Wing EVO

1. Stainless steel receiver tube coated with high solar absorber coating F-Ox (patent pending)
2. High solar transmittance borosilicate glass envelope
3. Aluminum mirror with protective coating
4. Extruded polycarbonate honeycomb parabola
5. Mono axial high precision tracking system
6. Electric linear actuator
7. Extruded aluminum frame
8. Control system (fully automatic, on/off, sun tracking, safety defocusing, remote control and data logger
9. Solar station (sun radiation, wind speed, outdoor temperature)

Robust and proven technologies, inspired by innovation, safe, durable and easy to maintain: our products are our commitment for a better future of new generations.

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