

Surprisingly popular



This Fresnel collector system made by Industrial Solar provides direct steam for a pharmaceutical factory in Jordan. The project received funding from the German Society for International Cooperation (GIZ).

PHOTO:
INDUSTRIAL SOLAR

Solar heat is far from being a standard in production processes yet, but it is more widespread than you might think: System designers and collector manufacturers report more than 500 systems worldwide. The 2017 World Map of Solar Process Heat Specialists shows 71 companies in 22 countries.

Some three years after the German market research agency solrico produced its first World Map of Solar Process Heat Collector Industry in 2013/14 (see S&WE 3/2014), the organisation conducted a second comprehensive survey of the market. This time, the world map is also part of the Solar Payback project, which aims to raise awareness and improve the economic and policy conditions for solar process heat in Brazil, Mexico, India and South Africa. The 3-year project is coordinated by the German Solar Industry Association (BSW-Solar) and funded by the International Climate Initiative of the German Federal Environment Ministry. It runs until September of 2019. The world map is also published in a 16-page technology brochure in English, Spanish and Portuguese for distribution at Solar Payback events.

The target group has been changed somewhat since the first world map of the solar process heat collector industry based on a survey conducted in late 2013. The first survey specifically targeted manufacturers of high-temperature collectors up to 250 °C, but this time system planners and engineering offices were also invited to participate. The prerequisite for inclusion in the survey was that they had to offer turnkey process heat plants to their customers. The questionnaire defined turnkey as a plant planned, supplied and installed by the seller or, the installation of which is monitored by the manufacturer.

Of the approximately 130 companies contacted, 71 provided data and took part in the survey.

The questions were similar to those in the first survey in 2013: We wanted to find out how big the global solar process heat market is, how satisfied providers are with the current business climate, and how the situation in different countries and regions differs.

What counts as solar process heat?

Participants were first asked how many turnkey projects providing solar heat for industrial processes they have installed to date. Defining a precise question turned out to be rather complex. Common applications such as solar cooling and power generation that use solar heat had to be excluded specifically in order to estimate the global market for solar thermal energy used in manufacturing industries. The numerous solar dish systems for commercial kitchens in India were also excluded from the statistics for this reason. The same applied to hotels and hospitals, where hot water for guests and patients was connected to the hot water supply for the kitchen or laundry. In contrast, we counted agricultural uses, even though these few projects included low-temperature applications such as heaters for piglet stalls. These

applications were included, on the one hand because in the broad sense pig breeding falls under the heading of food production. On the other hand, the exclusion of such applications would have been a conscious departure from the definition of process heat in the sense of the German Market Rebate Programme (MAP) and would have made the survey more difficult.

This time, in contrast to the previous survey, we decided not to make temperature a criterion. Thus, both vacuum-tube and flat-plate collector system manufacturers and planners appear on the World Map of Solar Process Heat Specialists 2017 (page 26), because in the textile industry, agriculture and mining process temperatures are often significantly lower than 100 °C.

Due to the narrow definition of “turnkey”, many of the 71 participants in the survey had to be content to be listed with the caveat “ready-to-offer” instead of presenting a list of reference projects. Some of these firms are newcomers, such as Krypton Energy from Pakistan, New Heat from France, Inersur from Spain and Artic Solar from the USA. However, even experienced providers of concentrating solar plants fall into this category. For example, Chromasun (USA) and Trivelli (Italy) have already built solar-thermal systems for commercial customers, but neither provides process heat in the narrow sense of the term. Other vendors like NEP Solar (now in Australia, formerly in Switzerland), even show up in the SHIP-plants.info, an online portal operated by the Austrian Institute AEE INTEC featuring a database of 195 solar process heat plants worldwide where companies can list their reference projects. However, for the current world map we were looking for providers of turnkey systems, a criterion not fulfilled by the systems NEP Solar has installed in Europe.

More than 500 plants for solar process heat worldwide

The number of reference plants of all companies listed on the world map were checked for plausibility. Where discrepancies were found, detailed information was requested. This is how we ended up with a total of 389 reference systems providing solar heat for industrial and a few commercial processes, such as car washes. That means that despite the narrow definition, about two times as many plants are on the world map as are recorded in the SHIP database. Of the participating 71 providers, just 29 (41 %) said that they were aware of the SHIP database. Only twelve of these said that they had previously listed projects in the online portal, but some systems were entered into the database by the SHIP organisers themselves.

A reconciliation of the solrico survey with the SHIP database revealed that some solar process heat providers have projects listed as a reference in the database that are not listed on the world map because they do

not fall into the “turnkey” category. If these nine plants are counted as well, the number of systems that the participants of the world map survey have built raises to 398 with a total collector or mirror area of at least 294,531 m². This area presents a bottom threshold, because some system suppliers only delivered the number of plants without collector or mirror area.

There are also plants listed in the SHIP database whose planners did not report any data for the world map of solar process heat. These comprise 127 additional plants with a total area of 121,883 m². Based on this analysis you can assume that at a minimum of 525 plants with an area of at least 416,414 m² exist worldwide for generating solar process heat. This is a surprisingly large figure which indicates that solar process heat is more widespread than is often assumed.

The 127 additional installations from the SHIP database were designed by 62 companies that did not participate in the world map survey and which are also not necessarily turnkey suppliers. Among these are 25 plants that cannot be explicitly attributed to any engineering company. It is therefore safe to assume that the solar process heat industry includes far more companies than the 71 turnkey suppliers listed on the world map.

Diverse offers

The services the survey participants offer are also very diverse. More than half of them manufacture their own collectors. Parabolic trough systems, offered by 18 manufacturers, are the most common type of collector, followed by flat plate collectors (ten manufacturers), vacuum tube and Fresnel collectors (each five manufacturers), and dish collectors (four companies).

Of the participants, 66 % (47 companies) guaranteed a specific solar yield to their customers. That is one aspect in which providers of process heat systems differ significantly from the suppliers of small systems for private use; after all, commercial industrial customers require performance guarantees (see Fig. 1).

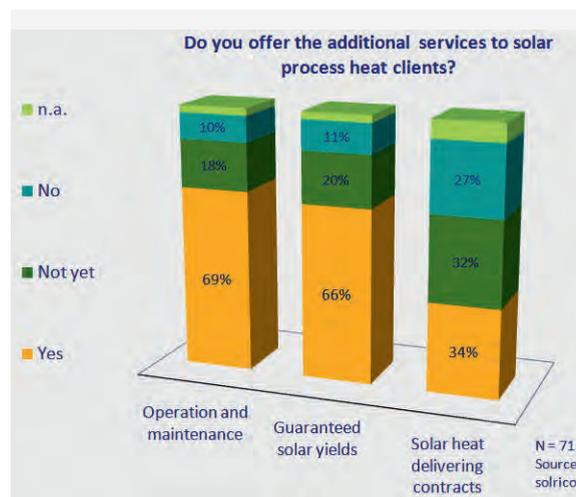


Fig. 1: Service orientation pays – two thirds of the suppliers guarantee a specific solar yield to their customers. A third of the companies either already offer or will offer heat supply contracts.

GRAPHICS (4): SOLRICO

71 suppliers of turnkey solar process heat systems in 22 countries

Publisher: Sun & Wind Energy, www.sunwindenergy.com
Financial support: Solar Payback project by the International Climate Initiative (German Federal Environment Ministry)
Editors: Bärbel Epp, Eva Augsten, www.solrico.com
Design: Eilers-Media, www.eilers-media.de
Date: January 2017
Sources: Data from manufacturers, November/December 2016 survey

Legend

3 (670 m²) Number and total area of supplier's turnkey systems
 n/a Companies with reference projects, but did not deliver figures

Companies without references Companies that are listed without any references are ready to offer turnkey solar process heat systems. Still, they may have experiences with commercial solar installations, e.g., for cooling or power generation.

Several businesses also produce collectors:



Flat plate



Vacuum tube



Concentrating dish



Parabolic trough



Fresnel

Company name*

Prototype collector



Company offers solar heat supply contracts (ESCO)

Examples:

Ritter XL Solar 29 (5,165 m²) Ritter XL Solar manufactures vacuum tube collectors. The company has set up 29 turnkey solar process heat installations totalling 5,165 m² of collector area.

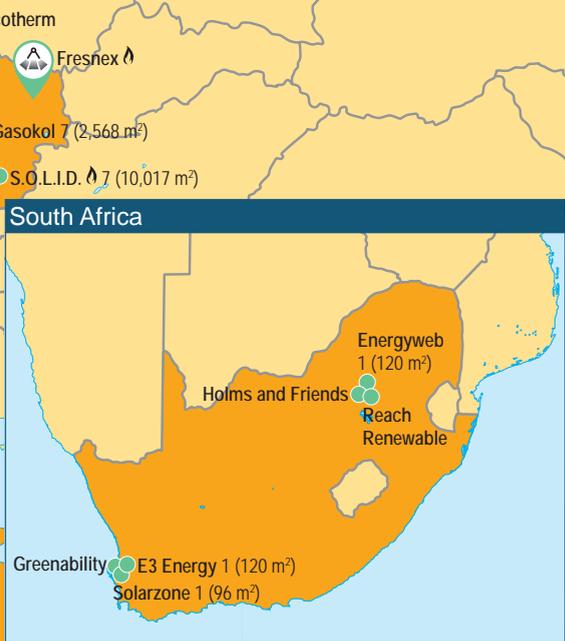
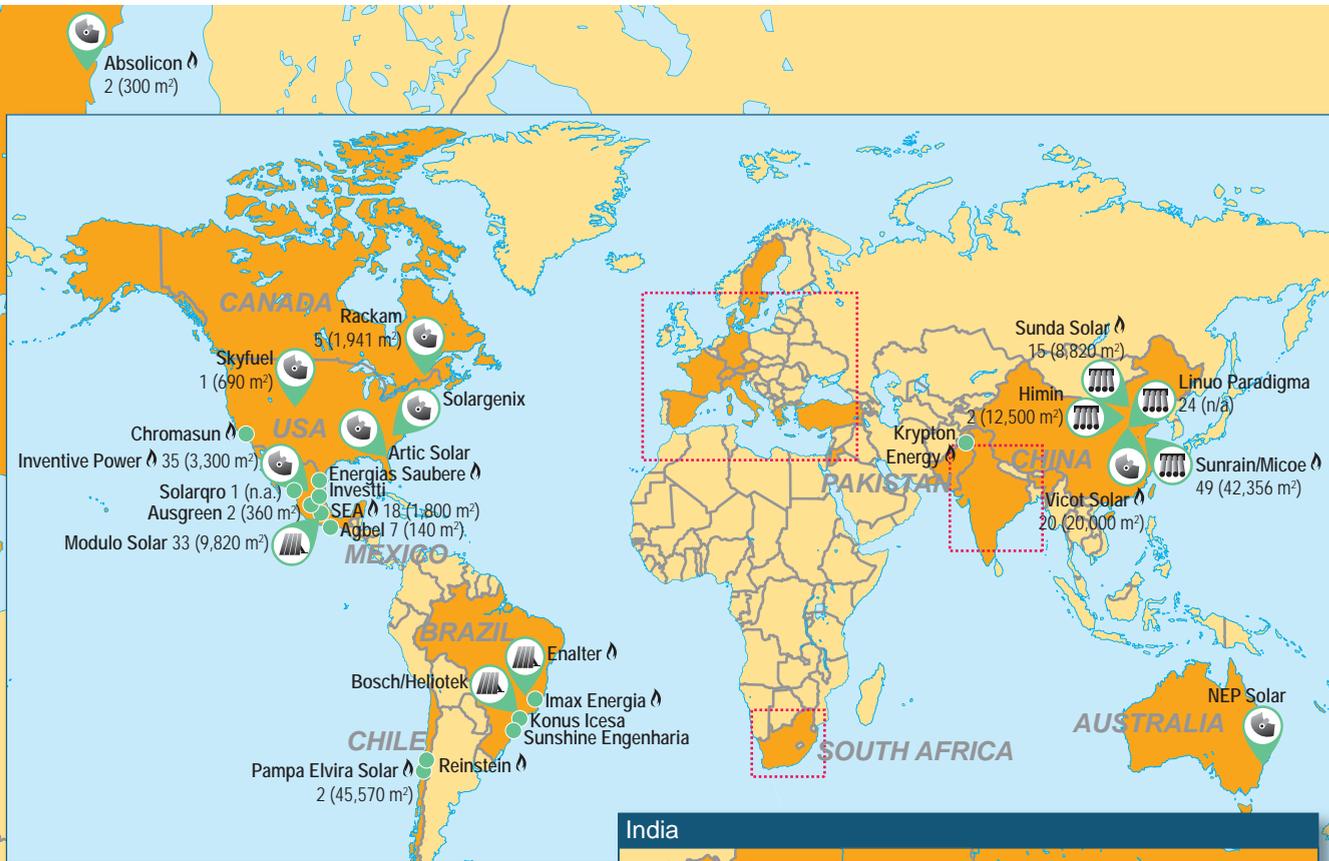


Chromasun Chromasun does not produce collectors and has not yet carried out any projects matching the definition of solar process heat below. It is ready to offer solar heat supply contracts.



Definition: Solar process heat plants supply heat to manufacturing companies for production processes, cleaning or sterilising. This definition does not include installations for solar cooling, electricity generation or energy use in service sector applications, e.g., for laundries and catering.

World Map of Solar Process Heat Specialists 2017



Tigi 6 (1,000 m²)

JORDAN

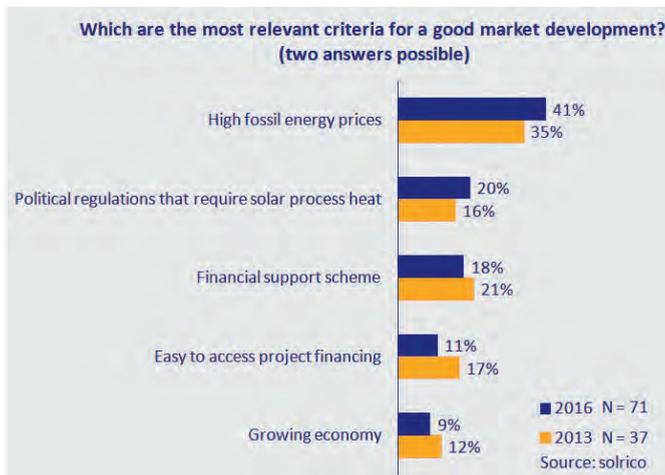


Fig. 2: High fossil fuel prices are still the most important argument for solar process heat. The order of the other criteria has changed in comparison to the 2013 survey. An obligation to use solar process heat has gained in importance, probably because Renewable Heating Obligations for the industry are discussed in India and China.

Approximately the same number of companies also offer to operate and maintain the systems. A third of the participants (24 companies) operate as well as Energy Service Companies (ESCOs) offering their customers heat supply contracts. It is fitting that 79 % of respondents agree or strongly agree with the statement that heat supply contracts are an important business model for increasing the use of solar process heat. No other statement about the market was met with such a high level of agreement.

Markets and views

As usual, the companies were also asked how satisfied they were with their business over the past year. Because the survey took place at the end of 2016, the question was in reference to the year 2015. Worldwide, just over half (55 %) of the participants were (extremely/very) satisfied with their current sales. In contrast, 40 % were dissatisfied or fairly dissatisfied. It is striking that the companies in the four partner countries of the Solar Payback project are much more optimistic. In those countries, 77 % of participants were (extremely/very) satisfied with their current revenue. In contrast, 23 % were dissatisfied or fairly dissatisfied.

When asked about market barriers, low fossil fuel prices is a response that shows up conspicuously often. Other frequently cited issues are the high cost of systems, excessively long payback periods, scant financial incentives – all of which fall under the heading of the “economy” argument. The CEO of one provider says: “Most decision-makers in the industry are not open to investments that don’t pay for themselves within four years or less.”

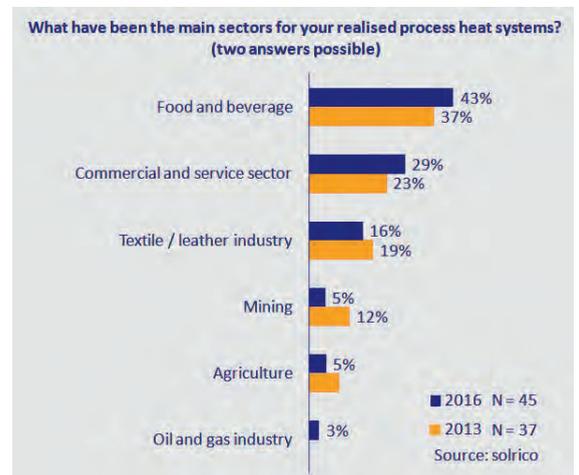


Fig. 3: The food and beverage industries are still the most important target industries for process heat. The commercial and service sectors have increased, but this can also be explained to a large extent by the different pool of participants of the survey.

High energy prices and solar regulations strengthen the industry

The single most important criterion for good market development is high fossil fuel prices. That not only follows as a reverse corollary to the fact that low energy prices act as a market obstacle, but also because fully 41 % of the respondents explicitly said so (see Fig. 2). This result also sits well with the fact that the companies in the top market of India, more often than in other countries, cited the good return on investment of comparably inexpensive systems as an argument in their favour.

Nevertheless, policy conditions also play a major role. One in five respondents said that an obligation to use solar process heat was a good basis for positive market development, even more so than financial incentives (18 %).

Another aspect often cited as an obstacle is the lack of knowledge about solar process heat. Here, the choice of words used in reference to customers ranged from “scepticism” to “lack of awareness” and “ignorance”. But respondents also complained of a lack of knowledge and education on the part of planners. Two explicitly cite poor performance of existing plants as a market barrier.

Just how important the issue of “awareness” is for the solar process heat market is indicated by the fact that 70 % of companies agreed with the statement that solar heat in many market segments is already competitive, but that customers were not sufficiently aware of the fact.

It is hard to assess the impact of financing difficulties on the market. This also crops up in the question of market barriers quite often. However, it is not always clear from the free-text responses with their bullet-points whether participants are complaining of the banks’ reluctance to extend credit or an absence of government funding. To the statement, “Difficulties with obtaining financing are one of the main limiting factors” 54 % of the participants

expressed strong agreement, a further 23 % tend to agreed, and 23 % disagreed.

The larger target group of the current survey means that not all of the statements in the survey for the latest world map of solar process heat in 2017 are comparable with the survey three years ago. In particular, among the 36 listed collector manufacturers from 2013, eight were manufacturers of dish collectors from India. For this group, in contrast to manufacturers of linear collectors, the textile industry was almost as important as the food industry. In the 2016 survey, there were also eight Indian companies among the 71 firms, but only four of them were manufacturers of dish collectors. It also stands to reason that by including installations with flat plate and vacuum tube collectors in the recent survey, the importance of low-temperature processes has increased.

The figures show that the food and beverage segment is still the most important target industry (see Fig. 3). Commercial and service industries have moved to second place. (This segment was queried for the sake of comparability with 2013, although the plants are not shown on the current world map). The textile industry, however, has slipped slightly and is marked by only 16 % of the participating companies.

Also, with regard to market factors, the key factor – fossil fuel prices – is still in first place, despite the change in methodology. There were some changes in the rankings of other factors: Financial incentives slid slightly, landing in third place, while political regulation moved from fourth to second place (see Fig. 2).

As in 2013, we wanted to know from providers, whether they consider photovoltaics competition with their technology. This is a particularly interesting question because in the retail market, the combination of photovoltaics and solar thermal heat pumps has become even more popular in recent years than it was in 2013. Even solar process heat providers seem to be feeling the competition more keenly. While in 2013, only 13 % agreed with the statement that photovoltaic heat was competition for solar energy, the figure was 32 % in 2016. This development still holds, even discounting the responses of all but the manufacturers in the latest survey. Even among these, 30 % see PV as the competition. **Eva Augsten, Bärbel Epp**

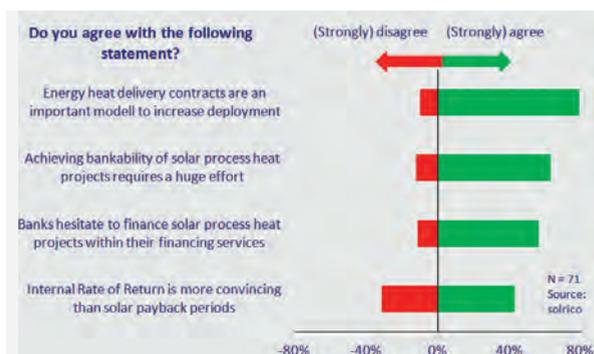


Fig. 4: Funding and ROI models are key factors for solar process heat. Heat supply contracts can help. But many customers do not base their decisions on the internal rate of return (IRR), but rather on the payback period, a calculation that usually works out to the disadvantage of solar thermal.



Your solar Partner

aluminium
and copper surfaces
for all environments



TINOX[®]
energy

The first
absorber.
The lowest
emissivity

TINOX[®]
nano

Extreme resistance
to high levels of
solar radiation



TINOX[®]
artline

Combining
aesthetic and
efficiency

vega
energy[®]

High reflection,
durability
and lightness.



www.almecogroup.com

Almeco GmbH
Claude Breda Strasse, 3
D-06406 Bernburg - Deutschland
T: +49 3471 3465500 F: +49 3471 3465509
E: info.solar@almecogroup.com

