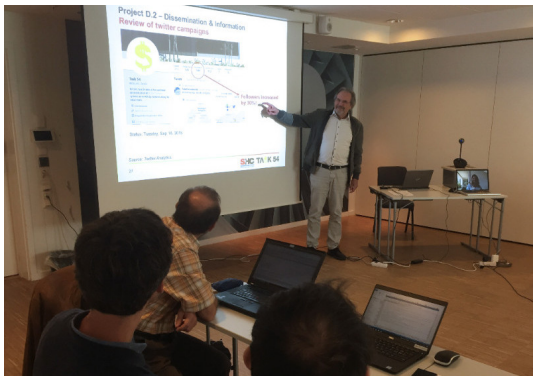
TASK 54

Newsletter 2018

IEA SHC Task 54 is dedicated to the price reduction of solar thermal systems up to 40%. Simplified systems and easy-to-install components are investigated alongside innovative and cost-efficient materials, processing and manufacturing techniques, marketing strategies and distribution channels.

2018 - Final sprint for cost reduction along the value chain. Task 54's final year was packed with cost estimations of optimized systems, the creation of an excel tool for LCoH calculations and their dissemination through meetings, workshops and webinars. This newsletter highlights the technological advances of Task 54 projects and presents Task 54's latest and upcoming publications.

The spring meeting 2018 took place in **Sophia Antipolis, France** in conjunction with a French national dissemination workshop from 24 - 26 April 2018. The events were visited by up to 80 participants from industry and research.



The final Task 54 meeting took place in **Oslo, Norway** from 19-20 September 2018. Discussed were results for final dissemination as well as possibilities to follow up the work started in Task 54. Ideas for for a new working group are presented below. Please contact us in case you are interested.

ISEC
3 – 5 October 2018
Congress Graz / Austria

Don't miss the presentations of our final results at ISEC 2018, Graz, Austria

Final results on cost optimized systems and further measures to make solar thermal systems more attractive will be presented at this year's ISEC 2018 conference in Graz, Austria. Our experts look forward to meeting you on **5 October 2018, 1:30 - 3:00 pm**. The full programme of the Task 54 session can be downloaded here.

March Highlight: Task 54 Webinar

First steps towards cost reduction were presented during a 1,5 hours webinar on 14 March 2018. About 500 participants signed up for a series of presentations now ready for download on our Task homepage. For everyone who has missed the webinar the recording is still available online. Q&As are published in a dedicated section on our homepage.

New Working Group

IEA SHC Task 54 „Price reduction of solar thermal systems" is terminated in October 2018, as planned. The methodology of economical characterisation of selected solar and conventional heating systems (without solar sources) by means of the Levelized Costs of Heat (LCoH) facilitated an assessment of technical improvements in terms of cost efficiency. The calculation tool developed under Task 54 turned out to be easy to handle and close to reality. Therefore, the expert group is going to propose the continuation of the work in the framework of a **Working Group** by updating the economic base and other transient parameters as well as the expansion of the methodology to other (renewable) sources enabling a fair rating of different energy sources combined in the heating and cooling system.

For more information on planned activities, please contact michael.koehl@ise.fraunhofer.de

In this newsletter

Review: Price Reduction Round Table at Kloster Banz

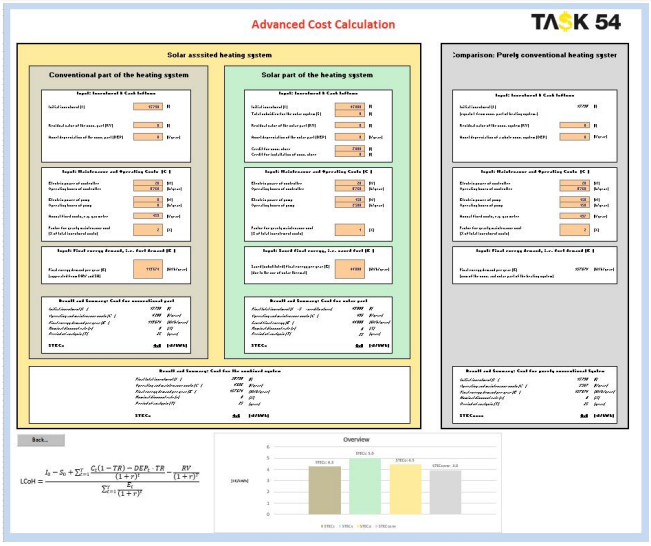
At this year's Solar Thermal Symposium from 13 - 15 June in Bad Staffelstein (Germany), representatives from industry and research discussed the reasons for the currently difficult market situation for solar thermal energy and also ways to reduce costs. Along the value chain, relevant actors and cost drivers were analysed. The discussion was attended by 7 representatives of solar thermal companies and 5 representatives of institutes participating in Task 54.

The representatives from industry stated that installers are an important "bottleneck" in the value chain. In some regions in Germany there are only a few installers who can or want to carry out work on the roof. The same also applies to PV, but there, roof installation is often carried out by supraregional installation teams. Another problem that was mentioned was that some entrepreneurs do not recommend the use of solar thermal energy to end customers, as the margins for bathrooms, for example, are higher and companies are therefore not very interested in selling solar thermal systems.

To overcome the aversion towards roof installation, the participants of the discussion round suggested that installers should be provided with the service of an external installation team for roof installation. The external team could install the solar thermal components, e.g. up to the eaves or outside from the roof to the ground floor. The installers should therefore have the freedom to order the assembly if required. For the installer, this can be interesting because of e.g. lack of time, lack of competence in roof installation, or fear of roof work. The installation team could either be provided by the collector manufacturer, by several collector manufacturers or also act independently.

In Germany and Switzerland, some solar companies already offer the services of such installation teams to installers. Some companies are currently training assembly teams. The fact that the systems must also be technically simple, inexpensive and very easy to install has also been demanded by the participants.

By Daniel Philippen, Institut für Solartechnik SPF, Switzerland | Daniel.Philippen@spf.ch



Screenshot of the result-tab of the Task 54 LCoH-Tool

Within the work of Task 54, an Excel-based tool was created that can be used for calculating the Levelized cost of heat (LCoH) of solar thermal heating systems and other heating systems. The LCoH-Tool will be at free disposal and available at the Task 54 homepage from end of September onwards.

The main purpose of the LCoH-Tool is to calculate the value of the heat produced by solar thermal systems over their lifetime. The cost tool calculates cost indicators for two kinds of systems: a) a solar assisted heating system, where both a conventional and a solar part contribute to the generated heat and b) a purely conventional heating system, where e.g. only a gas burner provides the heat. Thus, the tool can be used to compare different designs and technological solutions among each other.

Various data sets from different solar thermal systems and countries are already implemented in the cost tool. These default data sets are results of market analyses and long-term experience of the Task 54 experts. The default data sets serve as guidance, showing typical values for a specific configuration. All inputs can easily be overwritten by the users to analyse their own data and assumptions.

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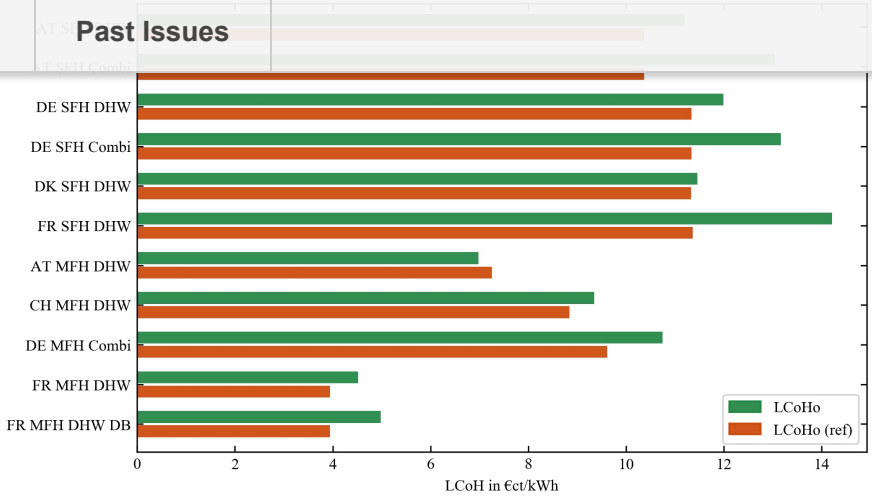
Just Published: Levelized Cost of Heat (LCoH) for Reference Systems



Heat costs of the solar assisted heating system (LCoHo) and their counterparts without solar assistance (LCoHo (ref)) defined within Task 54

The methodology for LCoH calculations developed in the framework of Task 54 was applied to several systems. The heat costs of solar thermal systems for households were calculated in five different European countries. All in all, eleven different systems were assessed, including domestic hot water (DHW) and combi systems as well as single-family house (SFH) and multi-family house (MFH) systems. For each system, a counterpart without solar assistance was also defined.

To define the systems, detailed data were gathered from experts coming from the studied countries. Information regarding typical system sizes, hydraulic configurations, load profiles and investment costs were notably necessary. Numerical simulations were also carried out to estimate the final energy saved by the solar thermal system. All data and simulation results are documented for each system in Infosheets that can be found on the Task 54 website.

The results of the calculations are summarized in the figure. The heat costs of the investigated solar assisted heating systems are in most cases higher than their counterparts. Nevertheless the gap for DHW and MFH systems is relatively small and system improvements proposed within the Task 54 should contribute to bridge it. Selected measures for cost optimization are presented in the next articles.

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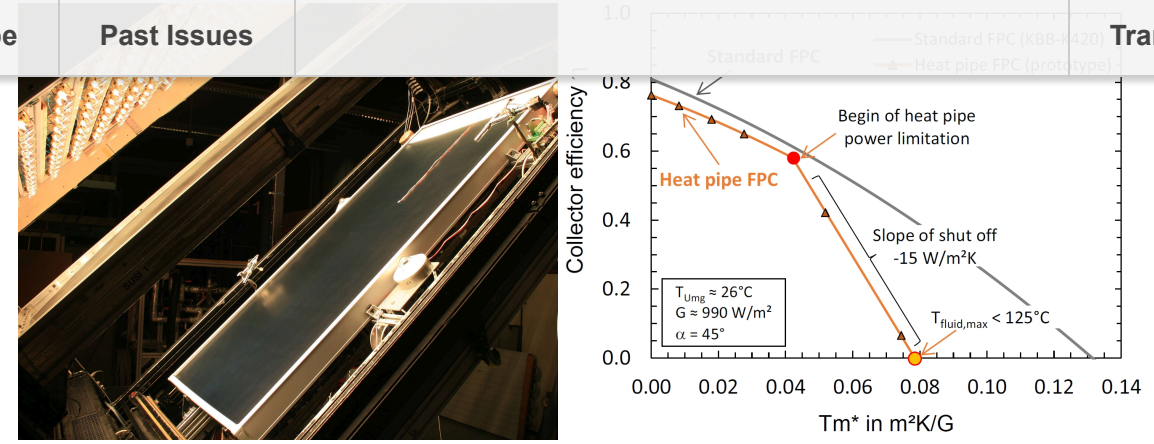
Improved Flat Plate Collector with Heat Pipes for Overheating Prevention



Prototype of improved flat plate collector with heat pipes during the indoor performance measurement (left) and its measured efficiency curve with characteristic power shut-off (maximum fluid temperatures < 125°C) compared to a standard flat plat collector (maximum fluid temperature of about 200°C) (right)

The use of heat pipes to prevent overheating in solar thermal systems during stagnation periods has been investigated in the frame of the German project “HP KOLL” with regards to different collector technologies. Recent tests on a newly developed flat plat collector with heat pipes attest a system performance which is similar to that of standard FPC. The maximum fluid temperature in the loop can be limited to 125 °C and drops quickly below 100 °C close to the collector connections. The higher conversion factor (+ 4%) and the more efficient power shut-off compared to previous prototypes have been achieved by implementing an improved design.

As a result of the suppression of vapour formation and the reduction of thermomechanical stress in the solar circuit, system components such as the expansion vessel or the solar piping can be resized or made by cheaper polymeric materials. Beside the simplification of the installation process, further benefits are expected from the significantly lower maintenance effort. Considering the measured collector data and with reference to a typical domestic hot water system according to the IEA TASK 54 definition, the levelized cost of heat (LCoH) can be reduced by 25 – 35 % compared to a similar system with standard FPC.

The project was funded by the German Federal Ministry of Economy and Energy (reference number 0325550 A-C) and carried out by the companies KBB Kollektorbau GmbH and Narva Lichtquellen & Co. KG, in cooperation with the Institute for Solar Energy Research Hamelin (ISFH).

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Cost-Optimized: Conico Glycol-Free Solar System in First Residential Demonstration

Following extensive prototype testing in the last 12 months, the Conico Direct Solar

System has now been installed in the first single-family-home demo-system in Eindhoven (NL), in combination with an air-source heat pump. The Conico Direct Solar System uses water from the heating circuit as the heat transfer medium in combination with vacuum tube collectors, which are protected from freezing through night circulation, for which a very reliable system has been developed that uses thermosiphon circulation as a back-up for pumped circulation. The Conico Direct Solar System uses the patented self-actuating Thermo-Differential Valve (TDV) to bypass the storage tank in the solar circuit, only opening the solar circuit to the storage tank when the temperature of the solar supply flow exceeds the temperature in the storage tank. This allows all the sensors of the solar system to be integrated into the pumping station (with regular 'sampling' circulation to determine the collector temperature) and allows heat for frost protection to be carefully dosed, so that the amount of heat lost for frost protection is kept to a minimum. Since the TDV reacts rapidly and switches very quickly (in less than 1 second), it also allows innovative control strategies to be implemented, such as the 'collector-multi-pass strategy', which allows the system to efficiently achieve the necessary temperature increase for DHW preparation in one pass through the tank (but with multiple passes through the collector), even in relatively low intensity conditions.

Conico Direct Solar System combined with air-source heat pump

An LCoH analysis of the Conico Direct Solar System in a combi-system with a gas-heater as auxiliary heat-source, performed within IEA-SHC Task 54, shows that the LCoHs of the Conico Direct Solar Combi-System is €0.096/kWh, 46% lower than the LCoHs of the reference combi-system for Germany used in Task 54.

Since the Conico Direct Solar System can very efficiently focus on generating high temperatures, it is expected to be particularly useful in combination with air-source heat pumps, since the solar system generates high temperatures for DHW preparation in a single pass through the storage tank, so there is no risk of the solar system acting as a pre-heater for the heat pump (which would lead to a lowering of the COP of the heat pump). The demo-system will be carefully monitored to not only measure the amount of

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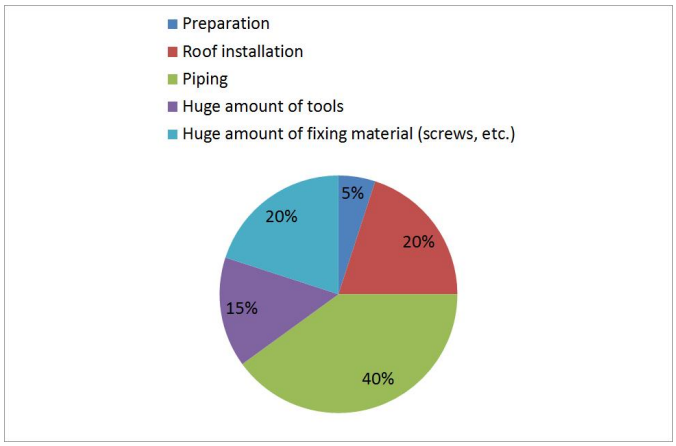
Recommended: Installers Point the Direction



Percentage distribution of time consuming factors for installation

Installation cost is often considered among the solar thermal entire value chain as a weak point where abnormal overcosts are observed. This fact is probably partially real and checkable in isolated cases but there was a strong need to address it more widely by asking numerous installers among EU countries directly.

Task 54 has investigated obstacles in installation of solar thermal systems and developed recommendations for improvement of the installation process by evaluating respective questionnaires in Austria, Switzerland, France, Romania, Denmark, the Netherlands and Germany. From feedback by 23 installers from 7 countries, recommendations and wishes for working with solar thermal systems could be deduced. The investigation has shown that a high majority of installers prefers solar thermal sets that are easy to install with convenient installation sets. In general, one can say that achieving a maximum margin with least risk is on the bottom of any decision for or against a certain system type and manufacturer.

Secondly, the problematic on how decisive installation time is, has been shown by the question on the most time consuming parts in installation. Big agreement amongst the countries appears to be on the fact that major time losses occur in connection to piping as well as to roof installation in general (see Figure). The main recommendations for Improvements listed have been: standardized mounting for all kinds of systems, suggestions for useful collector fixing kits or detailed mounting videos explaining crucial steps in the installation process. An increased and open communication amongst all stakeholders, better cooperation and sharing schemes of “lessons learnt” are also highlighted by the respondents. These could also be acquired from the installation of large area collectors with specialized and efficient plumbing and heating installers. Wireless

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Best Practice:
How the Heat Changers Breathe New Life into Solar Thermal Marketing

Reviving solar thermal is not only a matter of cost reduction but also one of visibility. New marketing strategies and ways to inform about the technology are crucial elements for strengthening the market for solar water heating. Heat Changers is a recently launched campaign with the mission to educate, inspire and motivate people to use solar energy to heat water, contaminate less and build a greener future.

Image creation and branding via Instagram: The Heat Changers Campaign plays on emotions of well-being and ecological awareness

Through an international communication campaign and use of social media, the Heat Changers community reaches out to people from different countries and different backgrounds. As 'brand ambassadors' for solar heat, Heat Changers act as multipliers and introduce others (families and friends) into the solar heat world since they either have a solar heating system, work in the solar heating sector, or both. In doing so they create a bridge for others to learn and enjoy the benefits of solar heat which is one important element in improving the image of solar thermal in general. The goals of founders Marisol Oropeza and Stefan Abrecht are quite clear:

- To draw consumers' attention to heat and solar heat.
- To show that solar heat is able to compete with other energy sources.
- To provide evidence that solar heating is worth it, financially and ecologically.
- To make solar thermal appealing to consumers by creating an innovative and consistent image.
- To reduce uncertainty and awaken interest by providing useful and easy-to-understand technical facts.

With their approach to promoting solar thermal through a fundamentally new and inspiring bottom-up movement, Oropeza and Abrecht set an example that should be followed by more players in the solar thermal sector. In their opinion, “the solar (and particularly solar thermal) industry associations are important multipliers regarding communication within and outside the branch. They represent the interests of their members who are not only manufacturers, but also suppliers of components, who are all Heat Changers.” Improving the positioning and branding of solar thermal is crucial for the whole sector, and the industry has more significant changes to do so presenting itself as a strong and united community. They are the first step towards improving the image of solar thermal and set the basis for revived marketing measures that (finally) reflect the spirit of our time.

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For more information please see our:

Info Sheets

Publications

Webinar

Upcoming Events

International Sustainable Energy Conference - ISEC, 3-5 October 2018
Meet Task 54 at ISEC 2018 in Graz, Austria

More information:
http://task54.iea-shc.org/

Upcoming Publications

Task 54 Position Paper

LCoH Calculation Tool

All publications will be made available via the Task 54 Homepage.

SHC
SOLAR HEATING & COOLING PROGRAMME
INTERNATIONAL ENERGY AGENCY

Price reduction of solar thermal systems up to 40% by research along the value chain.

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