Newsletter 2016

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.

The first experts meetings took place in **Freiburg, Germany** (21-22 October 2015), in **Florence, Italy** (3-4 May 2016) and in **Stuttgart, Germany** (6-7 October 2016) in close cooperation with the associated Task 54 partners. The events were visited by 25-30 participants from industry and research, providing valuable insights into ongoing cost activities.

Task 54 Workshop on 25 May 2016 in Brussels, Belgium as part of the ESTTP Workshop "Solar Thermal Energy for Europe" (24-25 May 2016). Venue: ESTIF headquarters.

In this newsletter

Levelized cost of solar thermal heat

SHC Task 54's ultimate goal is to reduce costs for installed solar thermal systems up to 40%. To make Task 54's achievements visible, three elements are needed:

1. Technical and process innovations that make cost reductions possible
2. Reference systems as benchmarks
3. A method for calculating costs and making a comparison feasible

Point one is tackled in Subtasks B and C, dedicated to innovations on material, component and system level. Factors two and three are part of Subtask A which focuses on economic aspects. This includes the definition of reference systems for selected regions and the introduction of a procedure to evaluate the cost of heat produced by solar thermal systems;

Whereas in the power sector the cost of produced electricity is systematically used to compare different solutions, there is so far no clear methodology applicable to the heat sector. The FRoNT project [1] laid the foundations for a general method applicable to every heating technology. Based on the concept of *levelized cost of energy*, Task 54 is currently working on a guideline which further details the method for solar thermal applications specifically. In the centre of the work is the definition of necessary input values sensitive to solar thermal systems and the question of the system components relevant for the calculations. The revised LCOH method will be published in a dedicated info sheet and lays the foundations for all further work in Task 54.

[1] Baez, M.J., Larriba Martínez, T., 2015. "Technical Report on the Elaboration of a Cost Estimation Methodology", No. D.3.1. Creara, Madrid, Spain.

By Yoann Louvet, University of Kassel, Stephan Fischer, University of Stuttgart, Germany | fischer@itw.uni-stuttgart.de

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Installer Questionnaire Launched at SHC Task 54 Workshop in Brussels on 25 May 2016

Unlike other projects dedicated to cost reduction of solar thermal systems, Task 54 seeks savings potentials along the entire value chain. This includes cost-efficient innovations on material and component level, design studies, the introduction of standardized components or the reduction of non-technical cost factors such as distribution channels, O&M and installation costs. The latter are investigated by help of an installer survey, which was presented and discussed at the first SHC Task 54 workshop in Brussels on 25 May 2016.

The SHC Task 54 workshop was held in the framework of the ESTTP workshop "Solar Thermal Energy for Europe" (24-25 May 2016) in Brussels, Belgium. Jointly organized with the European Solar Thermal Industry Federation ESTIF, the event attracted solar thermal specialists from industry, research and politics who joined in lively discussions on the challenging goal of Task 54. One of many activities is to gain more transparency on the installation effort and to better understand relevant cost structures. To this end, a questionnaire was designed which is directly dedicated to installers of solar thermal systems in Europe. With their help single working steps in the installation effort will become more transparent to facilitate them and support installers in their daily business.

The survey was launched in September 2016 and will be open till the end of this year. For a successful outcome of the survey, Task 54 is looking for interested solar thermal installers or planners who could contribute with average numbers for their own business. More information can be found on the Task 54 homepage or by contacting us directly.

By Sandrin Saile, Fraunhofer ISE, Germany | sandrin.saile@ise.fraunhofer.de

New business model "Payouse"

To reduce initial acquisition costs, a major problem of renewable energy systems, Sunlumo Technology developed the « pay-per-heat » business model “PAYOUSE”. PAYOUSE removes this barrier by providing users the necessary technology via an accessible renting model. The model allows its customers instant access to the desired energy without having to pay for the complete equipment at once.

Smart device aided system installation © Sunlumo Technology GmbH

Instead, users are paying a daily fee for using the lent technology until the system is paid off. The payment system PAYOUSE is designed in a way that is just as simple and accessible as the solar system: Users can pay their fees by mobile app.
Once a user has sufficient balance on his account, he can activate his micro energy supply system, also with his phone since the complete control of the system is smartly executed with one easily understandable mobile phone app. With the app, users can manage and monitor the hot water system as well as the photovoltaics power source and are also supported with energy supply forecasts based on local weather predictions. The app is directly linked to the PAYOUSE payment system and allows switching between individual accounts on a daily basis for families or local communities to share an energy supply system and to distribute its costs in the simplest manner.

Easy solar system control app © Sunlumo Technology GmbH

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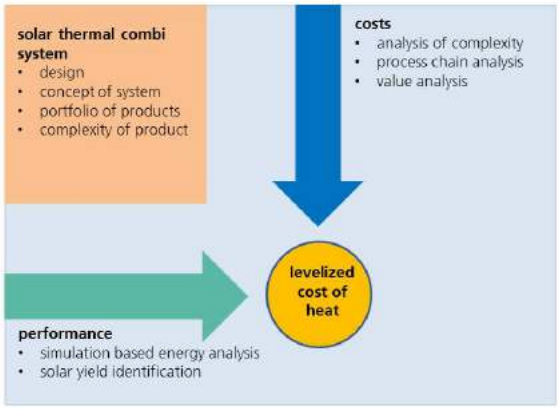
Technological-economical optimization of solar thermal systems (TEWIsol)

The joint research project Technological-economical optimization of solar thermal systems (Short-Title: “TEWIsol”) combines excellence of two scientific partners RWTH Aachen, Werkzeugmaschinenlabor WZL in modern product cost optimization and Fraunhofer Institute of Solar Energy Systems ISE in solar thermal technology. Value analysis, management of complexity and process cost analysis are applied on the cost optimization side. Whereas on the technological side, sophisticated methods of simulation and experimental tests are employed.
The main objective of the project is to establish an integrated technological-economical methodology based on the above mentioned methods in order to provide an even more efficient approach to identify the most promising potentials with regard to an optimum cost-performance ratio. An important aspect of this approach is the consideration of the complete process chain including component suppliers, system manufactures and installers.
The criterion of optimization is to minimize the ratio between full costs and the solar yield of the system. A 20% cost reduction for the end consumer is expected.
Consumer tests by Stiftung Warentest [STW 2009] and Ökotest [ÖKO 2010] show that today’s large variety on system layouts and costs is in contradiction to the relatively small differences in energetic performances. This means that manufacturers can probably reduce product costs by reducing product variety and, therefore, using scaling effects without reducing energy efficiency significantly. Hence, an integrated technological-economical approach for cost reduction sounds very promising.



Tewisol methodology and approach.

By Axel Oliva, Wolfgang Kramer, Fraunhofer ISE, Germany | axel.oliva@ise.fraunhofer.de

Cost effective and reliable solar systems with novel heat pipe collectors

Compared to direct flow collectors, solar collectors with heat pipes offer the advantage of an easier hydraulic connection to the solar loop, a lower pressure drop as well as the possibility to protect the system from overheating during stagnation periods. Their use can therefore lead to simpler and more reliable systems, thus representing a promising approach for cost reduction. The optimization potential of this technology as well as the corresponding technical and economic benefits, however, have not been investigated in detail so far.

Based on the results of previous research activities of the partners, the project HP KOLL aims at the development of new heat pipes solutions for the integration in flat plate and evacuated tubular collectors, both for pumped and thermosiphon systems.
Main goal of the project is to reduce the stagnation temperature in the solar loop to such an extent that vapor formation can be avoided. By selecting appropriate materials and by implementing optimized manufacturing processes and designs, performance and costs of the new collectors should be comparable to those of commercially available products.
The project is funded by the German Federal Ministry of Economy and Energy (reference number 0325550A-C) and carried out by the companies KBB Kollektorbau GmbH and Narva Lichtquellen & Co. KG, in cooperation with the Institut für Solarenergieforschung Hameln (ISFH).

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WISYS – developing a drain back system concept for large solar thermal systems

The project "*WISYS - developing a drain back system concept for large solar thermal systems"* funded by the Hessian Ministry of the Environment, Climate Protection, Agriculture and Consumer Protection and the HA Hessen Agentur GmbH was carried out by the University of Kassel, Enersolve GmbH, the Institute decentralised Energy Technologies and Enertracting GmbH.
Its aim was to develop technical solutions in order to achieve cost reductions for large scale solar thermal systems. This was to be achieved by proposing new solutions for the

configuration. Here, the focus was on drain back systems, a specific system design which presents a good potential for system simplification and thus cost reductions. In addition to that, new financial incentives in form of contracting solutions were considered to eliminate technical risks and the capital commitment for the customer.
The main outcomes of the project are the following:

- The drain back design with direct connection (without heat exchanger) of the collector field to the heat storage is the most promising in order to reduce system complexity and to improve the overall thermal performance.
- A modular pressure less polypropylene heat storage was patented (see illustration below) and is now marketed by Enersolve GmbH.
- A solar collector for large applications with good ability to drain was developed.
- A contracting model for multi-family houses and industries was elaborated. Several projects have already been implemented following this innovative financing scheme.

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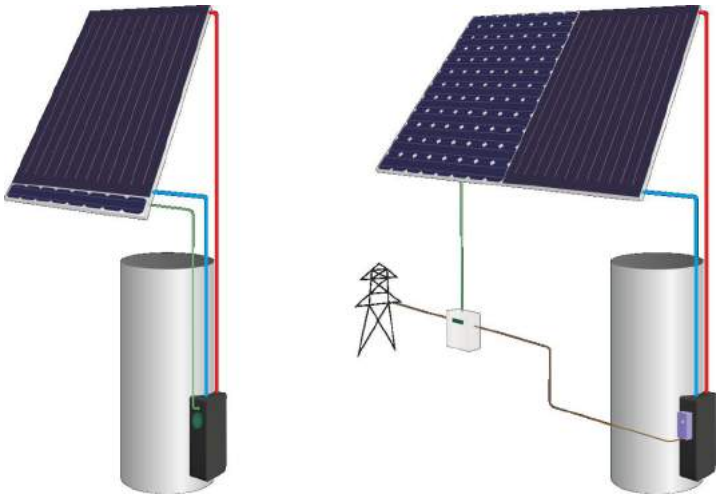
Solar thermal without a differential controller or sensors, but with the highest efficiency, using the breakthrough Thermo-Differential Bypass Valve (TDBV)

Is it possible to create a pumped solar thermal system without a differential controller and temperature sensors, which also has an improved efficiency? Yes it is!

Conico Valves bv from the Netherlands has created a completely new solar thermal concept based on the breakthrough Thermo-Differential Bypass Valve (TDBV), in which a differential controller is no longer required. Instead, the pump can just run whenever the sun shines, for example by using a DC pump, powered by a small PV strip on the collector (as pictured).
The TDBV is installed on the heat exchanger of the storage tank (integrated into a solar station attached to the tank), and acts as a one-way valve for heat flow, so that the solar flow bypasses the heat exchanger when it cannot add any heat. This way heat can never

for a differential controller and temperature sensors, the pump runs whenever the sun shines, except when a bi-metal switch cuts the power to the pump, to prevent overheating of the tank.



This new concept not only offers benefits in terms of simplicity, maintenance and cost, but also significantly improves the efficiency of solar thermal systems, particularly those with long pipes (>10 meters) between the collector and the storage tank. The TDBV prevents net heat loss from the tank at start-up, since the cold fluid in the pipes bypasses the heat exchanger, and also allows the solar system to operate at lower temperatures (and at higher flow rates), since it already collects heat when the solar circuit is only 1 degree warmer than the tank. The lower operating temperature of the system increases the collector efficiency in all conditions, but particularly in low intensity conditions, when the collector efficiency is particularly sensitive to the collector temperature.
The TDBV thus heralds a new generation of solar thermal systems, which are not just simpler and more reliable, but also more efficient!

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For more information please see our:

Info Sheets

Publications

Upcoming Events

ISH 2017, 14-18 March 2017
Meet Task 54 at ISH 2017 in Frankfurt, Germany

27th Symposium Thermische Solarenergie, 10-12 May 2017
Bad Staffelstein, Germany

4th Experts Meeting, 3-4 May 2017
HSR - SPF, Rapperswil, Switzerland

Task 54 Workshop, 4-6 October 2017
National dissemination workshop in Austria

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

SOLAR HEATING & COOLING PROGRAMME
INTERNATIONAL ENERGY AGENCY

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

For more information please visit our homepage:
http://task54.iea-shc.org/

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