

Description:	One-World-Solar-System Sunlumo Technology GmbH
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Authors:	Max Wesle, Robert Buchinger (Sunlumo)
Download possible at:	http://task54.iea-shc.org/

Background

Sunlumo Technology is researching and developing future-oriented products and solutions in the field of solar heating. Mission and creed is to make a One-World-Solar-System available; to provide solar heating for literally everyone on earth. To realise this vision, Sunlumo developed a novel solar collector and the associated system components like pump group and piping to be mass-produced fully automatically.

All components of this novel solar system are made completely from polymer materials. At the moment, comparable solar collectors, pump group and piping are mostly made from cost-intensive metals such as copper, aluminium, brass and steel. Many people, especially in emerging and developing countries, cannot afford such solar products and must rely on conventional domestic water heating with fossil fuels or electricity.

Innovation

Here, for the first time, all components of a solar system are made completely from polymer materials and producible on a large scale. A unique and holistic product design made it possible to manufacture these products at up to 50 percent lower economical as well as environmental costs compared to customary solar system components. This innovative solar system allows solar heating to become more affordable, accessible and sustainable than ever before.

One-World-Solar-Collector

The polymer-based solar collector is the cornerstone and key component of the One-World-Solar-System.

One-World-Solar-System

The One-World-Solar-System is the logical completion of the One-World-Solar-Collector by a compact, standardized pumping group, which already includes all necessary interfaces, valves and sensors, and the accompanying piping and fittings. For the first time, all components of the solar circuit are made by 100% from polymer materials and are producible economically at large scale.

The One-World-Solar-System is designed for domestic hot water preparation and room heating support and is compatible to customary storage systems. By its standardized components and a push-fit technology, the novel solar system is plug-and-play ready.

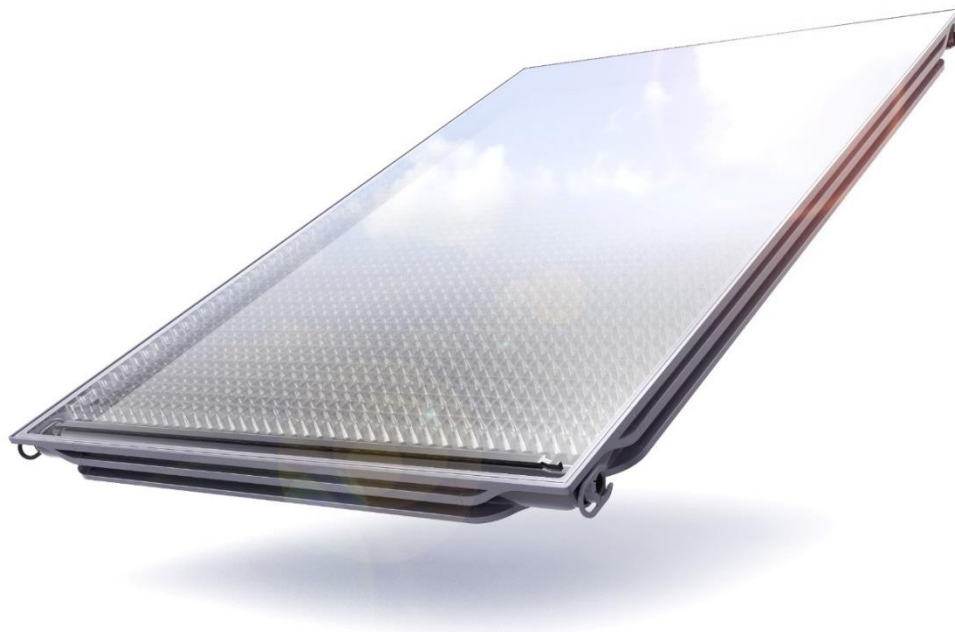


Fig1. One-World-Solar-Collector © Sunlumo Technology GmbH



Fig2. Polymer-made solar pumping group with push-fit connectors and piping
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System accessibility

The whole system is designed for low complexity and easy usability which is very important because of the diverse cultural and educational background of users worldwide. The setup and installation of the system is assisted by an illustrated operator's guide accessible through mobile phones. Near field communication chips inside the solar system components are used to register and setup the solar system components correctly. Essentially the mobile phone is the connecting element between the users and the One-World-Solar-System.

This solution is in agreement with the fact that even in developing countries more smartphones than conventional mobile phones are sold these days. Additionally, an appreciable price reduction can be achieved by using the people's own hardware devices like smartphones as substitute for the hardware control.



*Fig3. Smartphone control of One-World-Solar-System
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Integral storage solution

The One-World-Solar-System is also usable with a stand-alone hot water storage with electrical backup heating – making it a holistic domestic hot water solution. Here, the pumping group, parts of the piping and interfaces are integrated in the storage corpus.

Polymer made hot water storage

The system parameters, set by using a polymer made solar collector and solar system components, logically allow the use of polymer materials for the hot water storage as well. For its integral storage solution, Sunlumo Technology therefore is actually developing a straightforward, small to medium sized hot water storage whose tank wall, coiled heat exchanger and internal piping are consequently made from polymeric

materials too. This one-stop solar domestic hot water solution with electrical backup heating is especially designed for emerging and developing countries.



*Fig4. One-World-Solar-System with polymer-made hot water storage
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*Fig5. Polymer-made domestic hot water storage with integrated One-World-Solar-System components
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Life cycle assessment

For an all-polymeric “One-World-Collector” system with 4 m² collector area (i.e. 4 collectors) and 150 l heat store the energy consumption and the CO₂ footprint data are depicted below. For all components the eco-impact is governed primarily by material production compared to component manufacturing. In terms of aggregated data for the entire system, the energy demand amounts to about 5000 MJ with a corresponding CO₂ footprint of 250 kg. Depending on the installation site or world region energy pay back times (EPBT) ranging from 0.5 to 1.3 years were deduced. Compared to a collector service life of 20 years, this leads to energy amortisation factors of more than 15 (!) for all world regions.

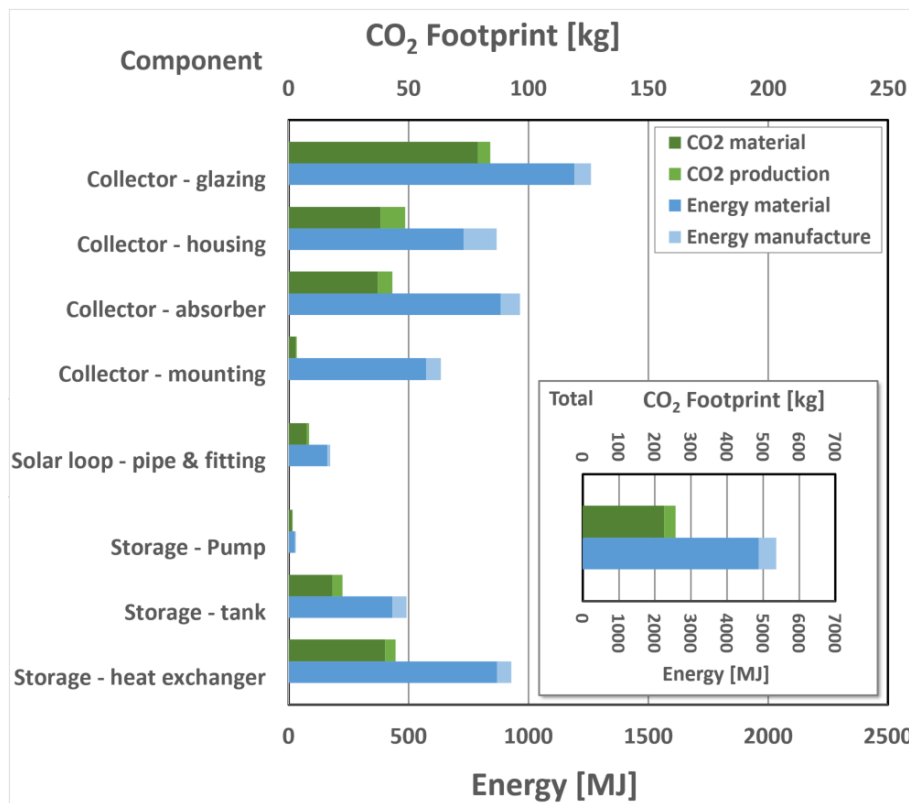


Fig6. CO₂ footprint data for manufacturing the all-polymeric collector system (collector area 4 m², heat store volume 150 l, all in-house solar system components, excluding bought-in parts like motors etc.)

© Sunlumo Technology GmbH, Source: SolPol-4/5 report

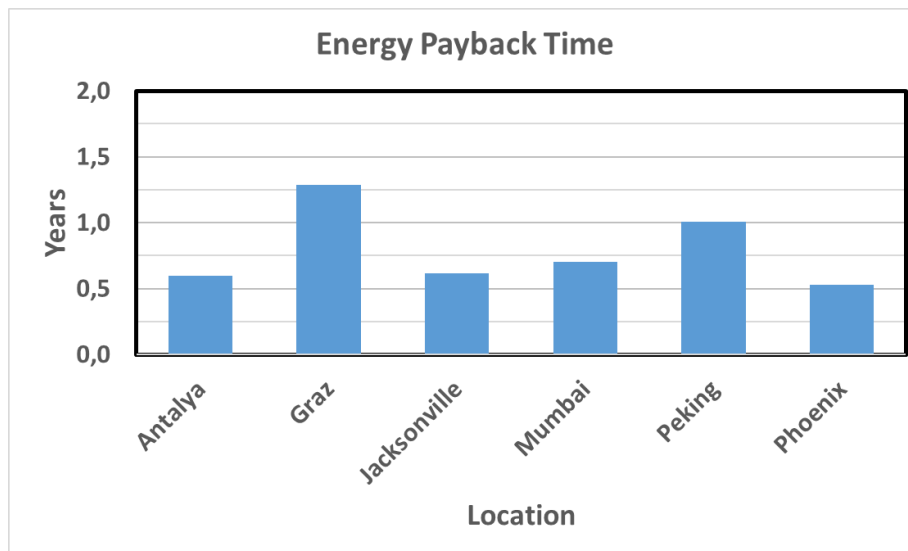


Fig7. Energy consumption for manufacturing the all-polymeric collector system (collector area 4 m², heat store volume 150 l, all in-house solar system components, excluding bought-in parts like motors etc.) © Sunlumo Technology GmbH, Source: SolPol-4/5 report

Conclusion

Sunlumo Technology has developed an utmost affordable solar hot water system. Such a solar hot water system consists of one or more solar collectors, a pumping group, the connecting pipes and a software control. The system can be used with customary domestic hot water storages, otherwise, an integral storage solution is also feasible. The complete system was designed using polymer materials which are the key technology as to maximize benefits and at the same time reduce economical as well as environmental costs by up to 50 per cent. Furthermore, the combination of different technologies including push-fit connections and personal mobile devices leads to a new approach to further reduce costs and boost system practicability.