2015 HIGHLIGHTS

SHC Task 53
New Generation Solar Cooling & Heating Systems (PV or solar thermally driven systems)

THE ISSUE

A tremendous increase in the market for air-conditioning can be observed worldwide especially in developing countries. The results of the past IEA SHC Tasks and work on solar cooling in SHC Task 38: Solar Air-Conditioning and Refrigeration show the large potential of this technology for building air-conditioning, particularly in sunny regions. However, solar thermal cooling faces barriers to emerge as an economically competitive solution. Thus there is a strong need to stimulate the solar cooling sector for small and medium sized systems.

OUR WORK

This Task, building upon earlier IEA SHC work in this field, is working to find solutions to make solar driven heating and cooling systems cost competitive and to help build a strong and sustainable market for new innovative thermal cooling systems and solar PV. These objectives are being tackled through five activities:

1. Investigation of new small to medium size PV & solar thermal driven cooling and heating systems and development of best suited cooling and heating systems technology with a focus on reliability, adaptability and quality.
2. Proof of cost effectiveness of the above mentioned solar cooling and heating systems.
3. Investigation on life cycle performances on energy and environmental terms (LCA) of different options.
4. Assistance with the market deployment of new solar cooling and heating systems for buildings worldwide.
5. Increasing energy supply safety and influencing the virtuous demand side management behaviors.

The Task’s scope is technologies for the production of cold/hot water or conditioned air by means of solar heat or solar electricity. That is the Task starts with the solar radiation reaching the collectors or the PV modules and ends with the chilled/hot water and/or conditioned air transferring to the application. It is focused on solar driven systems for both cooling (ambient and food conservation) and heating (ambient and domestic hot water).

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Participating Countries:
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Austria
China
France
Germany
Italy
Spain
Sweden
Switzerland
KEY RESULTS OF 2015

SHC Task 53 started in March 2014. The first results have been presented at numerous events, which can be found on the SHC Task 53 webpage.

Solar Cooling Systems 2.0

At OTTI 2015, the IEA SHC Task 53 organized a specific workshop on New Generation Solar Cooling & Heating Systems that focused on the status of solar cooling technology research and market developments. About 40 professionals gathered in Rome for this half-day event.

According to the IEA’s Technology Roadmap on Solar Heating and Cooling, solar cooling should cover at least 17% of the total cooling needs by 2050. In the last 10 years, however, the development has not been as fast and effective as it was expected to be. In only a few specific cases is solar cooling economically competitive and has market appeal. The vast majority of the potential applications offer solutions that still have too long a payback time, and as a result are only installed when there are very high incentives, as happens for instance in research and demo projects. A New Generation of innovative solar cooling systems is now emerging based on PV systems and on solar thermal systems.

Monitoring Procedure for Field Test & Demo Systems with Compression Heat Pumps Driven by Photovoltaic Solar Energy

Monitoring of field test systems and demonstration projects for new generation solar cooling and heating systems is fundamental to analyze their performance and to identify, rate and verify the quality of the proposed solutions.

Ongoing work is to build a monitoring procedure for field tests and demo systems, which is focused on installations with compression heat pumps driven by photovoltaic solar energy. The final Task deliverable planned for mid 2016 will be a monitoring procedure integrating the following aspects:

- Generic schemes of PV driven heat pumps
- Electrical and thermal flows to be measured
- Definition of Performance Ratio Indicators (KPI)
- Measurement methods for air-to-air heat pumps
- Uncertainty analysis

![Compression heat pump driven by PV panels (UMH)](image)