

INTERVIEW

New Generation Solar Cooling & Heating Systems

Interview with Daniel Mugnier

The IEA SHC Programme concluded its work on New Generation Solar Cooling & Heating Systems (Task 53) earlier this year and is now finalizing the last reports. To learn first-hand on how the Task supported the market development of the next generation of solar driven cooling and heating systems, we asked Daniel Mugnier, the Task Operating Agent, to share some of his thoughts on this 3-year project.

Why was this work needed?

Daniel Mugnier (Daniel): This Task on a new generation of solar cooling solutions was needed in 2014 because after the great work on quality insurance for solar air conditioning systems in SHC Task 48 (ending in 2012), this sector had important issues to address to become cost competitive even if the system quality and performance were already present. A new generation of systems had to emerge, and above all, we had to finally integrate solar photovoltaic driven solutions into the scope of work.

What were the benefits of running it as an IEA SHC Task?

Daniel: Solar Cooling is a hot topic (!) and cannot really be managed if just considered at a regional level (Europe for instance). As indicated in the recent report from the IEA called "Future of Cooling", air conditioning is one of the major challenges in terms of energy consumption increases by 2050 worldwide

What, if any, results surprised you?

Daniel: In Task 53, we had the chance and the opportunity to list, study, model and measure innovative and commercially available systems based on this new generation. According to our cross analysis based on real measured values, it showed that solar thermally driven systems can be cost competitive with solar PV powered systems. Of course, economic efficiency depends a lot on the different criteria, but the game is still open between the different technological approaches.

If someone wanted to learn more, which reports should they read first, and why?

Daniel: The most important deliverables are:

- Those dealing with the state-of-the-art of this new generation of solar cooling systems in Subtask A, which is linked to the LCA (Life Cycle Analysis) approach thanks to a dedicated tool called ELISA to size the environmental impact of a system.
- In Subtask B, a very interesting report is the one on the results of simulations and system intercomparisons.
- But the most important report is from the work in Subtask C that is delivering real-life monitored results from nearly 15 installations of different sizes and types. The report "Monitoring Data Analysis on Technical Issues & on Performances" presents a comprehensive cross analysis both in technical and economic terms.

Do you have a Task success story from end-user or industry?

Daniel: One of the most exciting tools to be used by industry will be the ELISA tool that helps to calculate the different environmental indicators in terms of the life cycle analysis of commercialized systems. Designed by the University of Palermo, this tool is powerful even if needing detailed information to be provided by the industry actors themselves.

Another very interesting deliverable for end users, and above all, policymakers will be the Task 53 Position Paper which summarizes the main outputs from the Tasks, especially concerning cost competitiveness and level of maturity.



Has the Task's work supported capacity and skill building?

Daniel: Yes, definitely, we have informed several hundred people from different groups (installers in Italy, engineers in Spain, IEA SHC Solar Academy Webinar participants (more than 200 participants), policymakers in Cairo under the umbrella of League Arab States workshop, etc..) during workshops and special dedicated events on solar cooling (<http://task53.iea-shc.org/meetings>)

What is the current status of the technology?

Daniel: The technology is still under development and is profiting from the intensive stimulation work coming from the rapid cost decrease on the PV side. However, solar thermally driven solutions show interesting cost decreases as well, especially for large systems, as well as promising efficiency gains. Finally, there is nearly no significant market yet in term of volume (a few hundred new installations per year), but there are still numerous SMEs motivated and developing solutions based on solar thermal or solar PV approaches. The offer ranges from a few kWcooling to a few MWcooling.

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What is the future of the technology – new developments, market and policies needed?

Daniel: The main evolution in the sector will be the critical need for emerging and sunny/hot countries to adopt technical solutions for cooling (air conditioning and refrigeration). Therefore, an important driver for future developments will be the work of adaptation of several parts of the solar cooling systems: heat rejection, control, solar collection as well as exploitation and maintenance. A very strategic technology transfer from traditionally experienced countries (mainly OECD ones) to emerging sunny countries

is needed because the main markets are not where the know-how is at the moment. A re-orientation of the market and the subsequent innovations will profit as well to traditional countries because of the general global warming trend.

Will we see more work in this area in IEA SHC?

Daniel: Certainly, we are working hard on developing a new SHC Task called “Solar Cooling in the Sunbelt Regions” which means focusing on creating innovative and adapted systems for intertropical countries with sunny and hot conditions. The focus would be on

the range of 10 to several hundreds of kWcooling so as to be differentiated from other ongoing work and tasks² on small green air conditioners. We hope to foster collaboration between IEA SHC members and Mission Innovations Challenge 7³ market players on this challenging work and kick-off the work in 2019.

¹ <https://www.iea.org/cooling/>

² <https://globalcoolingprize.org/>

³ <http://mission-innovation.net/our-work/innovation-challenges/heating-cooling-challenge/>