

2022 HIGHLIGHTS

Task 65 – Solar Cooling for the Sunbelt Regions

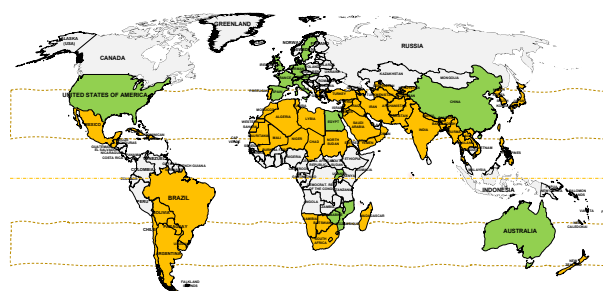
THE ISSUE

In 2016, air-conditioning accounted for nearly 20% of the total electricity demand in buildings worldwide and consumption is growing faster than any other energy source used in buildings. If measures are not taken to counteract this increase, space cooling demand will almost triple by 2050; the demand could reach 6,200 TWh, or 30% of the total electricity used in buildings. The latest studies are primarily directed at existing conventional technology. However, greater attention should be directed at enhancing components and systems.

Solar cooling, either thermal or electrical driven systems, tend to cater mainly to niche markets. To foster affordable, safe and reliable solar cooling systems in the Sunbelt regions a combination of cost reduction, adaptation and system simplification is required. Stimulation of market conditions through policy measures is also necessary. The implementation of revised components and systems that cater to the different boundary conditions should be introduced by cooperation with industry and with support of target countries like India and UAE through the Mission Innovation (MI) Innovation Community, “Affordable Heating and Cooling of Buildings” (IC7).

OUR WORK

SHC Task 65 targets the small to large cooling and air conditioning market (between 2 kW and 5,000 kW). Both solar thermal (ST) and photovoltaic (PV) can be integrated to support a HVAC system. When well designed and boundary conditions are met, these systems are highly competitive when compared with reference systems.



This project focuses on using solar energy across Sunbelt regions where boundary conditions vary (sunny and hot, and humid climates, between 20-40 degrees latitude in the northern and southern hemisphere). Adaptation of existing concepts is key. To utilize solar heat in industry and to support the solar thermal market, the integration of solar thermal systems into existing energy supply structures is paramount.

Participating Countries

Australia

Austria

China

Denmark

Egypt

France

Germany

Italy

Mozambique

Netherlands

Slovakia

Spain

Sweden

Switzerland

Uganda

United Kingdom

United States

Zimbabwe

Task Period

2020 – 2024

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KEY RESULTS IN 2022

Study on Solar Cooling Showcases Systems and Components

The different climates in the Sunbelt regions are characterized by particular boundary climatic conditions that need to be considered during the design process (e.g., temperature, humidity, presence of dust, availability of tap water, etc.). The combination of operating conditions strongly influences the selection and effectiveness of all components and the performance of the solar cooling systems. Therefore, the Task documented adapted components to showcase at the system and component level an up-to-date overview of all necessary devices for the solar cooling systems.



Survey results of 32 projects in 18 countries, representing a range of 10 weather profiles and a total of 17.1 MW of thermal cooling projects, can be summarized as follows:

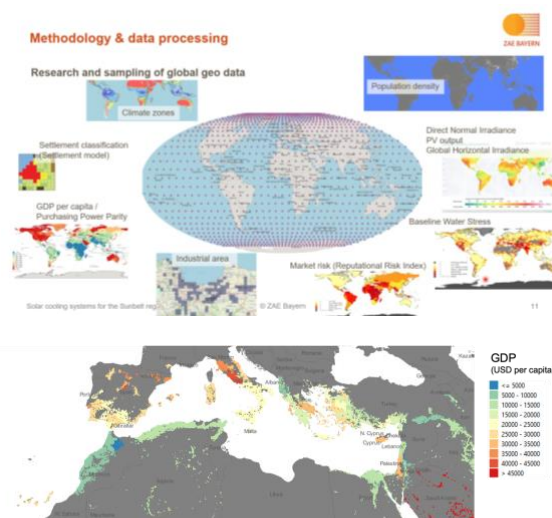
- Most of the projects reported are from BWh (hot desert) (23%) and BSh (hot semi-arid) & Csa (hot summer-Mediterranean) (both 20%) climate regions.
- Solar Thermal (ST) cooling is by far the most applied solar cooling technology over solar electric cooling. Out of which, 30% of cases studied use evacuated tube, flat plate (17%), Fresnel (17%), parabolic trough collectors (10%), and PV panels (10%). These are some of the most preferred options.
- Of the available ST cooling techniques, 71% of them use absorption chillers, whereas 19% use adsorption chillers and other technologies such as ejector cooling, PV assisted cooling (3% each)
- Hot water storage or heat backup by auxiliary heating is used in 72% of the projects, with heat storage being more popular than a heat backup.
- The primary application is on public buildings (34%) with an average working span of 8hr/day, followed by uses in domestic buildings (25%), process industry (9%), and food processing sectors, among others.

SHC Solar Academy Webinar

The SHC Solar Academy held a webinar on Solar Cooling for the Sunbelt Regions on October 25 and 27, 2022. SHC Task 65 experts Daniel Neyer, Tobias Schmetzer, and Uli Jakob presented to 155 and 42 participants, respectively.

Speakers gave an overview of the Task, highlighting the assessment and benchmarking of solar cooling systems work, and reported first insights from the newly developed tool within the German project SunBeltChiller. This new tool can analyze the boundary conditions and potential for solar cooling systems within the Sunbelt regions based on geographical data about irradiation, population density, industrial areas, and water availability.

Link: <https://www.iea-shc.org/solar-academy/webinar/solar-cooling-for-the-sunbelt-regions>



Source: ZAE