

# Solar Cooling for the Sunbelt Regions

## First results of Task 65 Activity A1

### Climatic conditions and applications

### About the project

The energy demand for air-conditioning is growing faster than any other energy consumption in buildings. The main share of the projected growth for space cooling comes from emerging economies and will more than triple by 2050 to 6,000 TWh/a globally.

Therefore, the IEA SHC Task 65 “Solar Cooling for the Sunbelt Regions”, started in July 2020, is focusing on innovations for affordable, safe and reliable Solar Cooling systems for the Sunbelt regions. The innovation is the adaptation of existing concepts/technologies to the Sunbelt regions using solar energy, either solar thermal or solar PV.

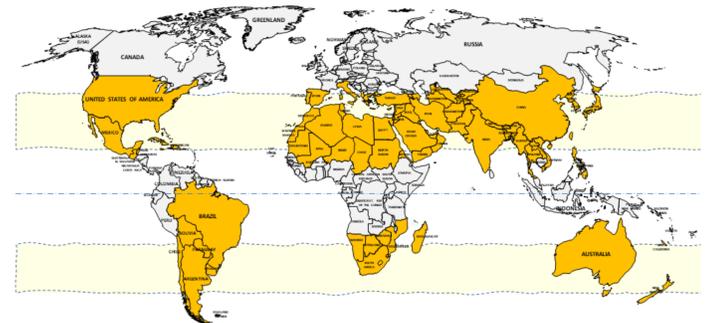
### Results of Activity A1

In general, climatic conditions and typical applications for (solar) cooling heavily depend on the location. In order to be able to deduce regionally specific requirements for Solar Cooling systems, it's therefore obvious to use geographical data. To process such data a Geographic information system (GIS) is needed. GIS are able to capture, store, check, and display data related to positions on Earth's surface. Most geographical data relevant for this application are already available from various sources, such as solar radiation data, climatic data, population data etc.

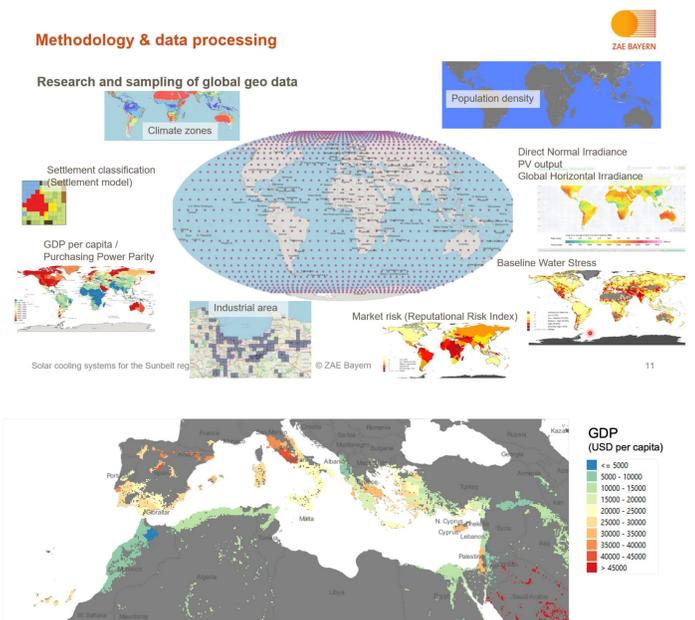
A GIS software was used to combine geographic data in a way that local reference boundary conditions for solar cooling systems in the Sunbelt regions can be determined and used for evaluation. The developed method can also be used to create information about possible locations and potentials of specific solar cooling systems. By additionally using for example population density and purchasing power data a base for future market potential studies on certain products / technologies is provided. As a result, potential sites can be identified as well as economic factors can be considered to identify (future) markets.

Therefore, the newly developed tool within the German research project SunBeltChiller led by ZAE Bayern (funded by the German Federal Ministry for Economic Affairs and Climate Action - BMWK under the project number 03ETW026) allows the assessment of solar cooling potentials based on specific geographic data considering the following conditions and sources:

- Geographic areas requiring cooling include latitudes between 48°N and 44°S
- Various solar irradiances (DNI, GHI, DIF) and photovoltaic power potential (PVOUT)
- Population density / settlement levels
- Industrial areas
- Climate zones (Köppen–Geiger climate classification system)
- Water availability
- Market risk covered by Environmental Social Governance (ESG)
- Purchasing Power Parity / Gross domestic product (GDP)



**Sunbelt regions (sunny and hot, and humid climates) between 20-40 degrees latitude in the northern and southern hemisphere.**  
(Source: NB)



**Developed GIS-Tool to identify potential Solar Cooling markets based on specific geographic data about irradiation, population density, industrial areas or water availability.**  
(Source: ZAE Bayern)

### Participating Countries

- |                   |                    |
|-------------------|--------------------|
| <i>Australia</i>  | <i>Netherlands</i> |
| <i>Austria</i>    | <i>Slovakia</i>    |
| <i>China</i>      | <i>Spain</i>       |
| <i>Denmark</i>    | <i>Sweden</i>      |
| <i>Egypt</i>      | <i>Switzerland</i> |
| <i>France</i>     | <i>Uganda</i>      |
| <i>Germany</i>    | <i>UK</i>          |
| <i>Italy</i>      | <i>USA</i>         |
| <i>Mozambique</i> | <i>Zimbabwe</i>    |

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