2022 HIGHLIGHTS

Task 63 – Solar Neighborhood Planning

THE ISSUE

A large portion of the potential for energy efficiency in buildings and the potential to utilize solar energy remains unused. The combination of making buildings more energy efficient – through refurbishment interventions and new developments – and increasing the use of renewable energy sources is key for moving towards a low carbon energy transition. The increased use of solar energy is one of the important development paths. The urban fabric needs to utilize passive solar gains and daylight to reduce the energy use in buildings, as well as to improve the inhabitants' comfort in indoor and outdoor areas. In addition, active solar energy systems integrated in the urban context contribute to the production of renewable energy as heat and electricity. All these strategies help cities and citizens to reach sustainable development targets.

Participating Countries

Australia
Canada
China
Denmark
France
Norway
Italy
Sweden
Switzerland

OUR WORK

The main objective of SHC Task 63 is to support key players to achieve solar neighborhoods that facilitate long-term solar access for energy production and for daylighting buildings and outdoor environments – resulting in sustainable and healthy environments. Key players include developers, property owners/associations, architects, urban planners, municipalities, and institutions. The Task's scope covers solar energy issues related to new neighborhood development and existing neighborhood renovation and development.

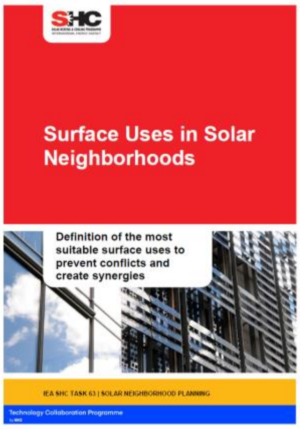
Solar energy aspects include active solar systems (solar thermal and photovoltaics) and passive solar strategies. Passive solar strategies include passive solar heating and cooling, daylighting, and thermal/visual comfort in indoor and outdoor environments.

The types of support being developed include design strategies for new and existing communities with focus on solar energy and methods for securing sunlight access and right to light. Furthermore, the Task is working on economic strategies and business models for improving the use of passive and active solar energy. Apart from economic values, added values or co-benefits of solar energy are considered. Another objective is to study the workflow of tools needed to support decisions in all planning stages (tool chain). All this work will be capped off with case studies from each participating country connecting the close ties to practice and implementation.

Task Period	2019 – 2023
Task Leader	Maria Wall, Lund University, Sweden
Email	maria.wall@ebd.lth.se
Website	task63.iea-shc.org

KEY RESULTS IN 2022

Report on Surface Uses in Solar Neighborhoods

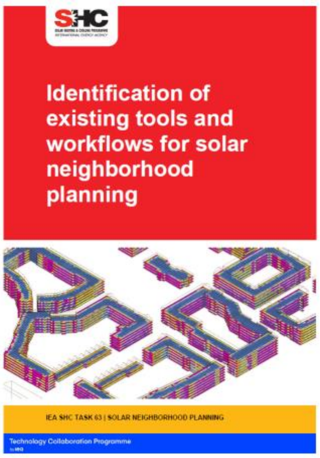


This report, published in September 2022, demonstrates the central role that urban surfaces play in responding to climate change and urbanization issues. Increased surface utilization of solar neighborhoods might offer several opportunities for producing renewable energy and correctly managing passive solar gains and daylight but also for enhancing urban sustainability and climate resilience, and providing environmental, social, and economic benefits.

The main purpose of the report was to collect all the available solutions for using urban surfaces in solar neighborhoods and to shed light on the significant role these might play in enhancing climate resiliency and sustainability. Suitable surface uses were classified into eight major clusters: active solar energy systems, passive solar energy systems, green solutions, water solutions, urban agriculture, cool materials and innovative solutions, smart solutions, and traditional uses/materials. And the most relevant solutions for each cluster were analyzed and the suitability of urban surfaces to integrate these solutions was discussed, together with their contribution to the climate resilience and sustainability objectives. The results were then schematized in tables to provide an overview readily understandable by stakeholders involved in planning decisions, such as urban planners, designers, and municipalities. The report is published online.

Report on Tools and Workflows for Solar Neighborhood Planning

The "Identification of existing tools and workflows for solar neighborhood planning" report was finalized in June 2022. For this report, data was gathered on the current state-of-the-art tools for solar neighborhoods through a literature review, an analysis of National Common Indicators, and Workflow Stories (a model describing a specific design and/or planning project showcasing how tools were used during this process).



It can be concluded from the workflow stories that tools within the visual programming environments are extensively used in the industry and academics and that there are not many examples of GIS tools that can provide the same assessment possibilities. From the workflow stories, CAD & BIM environments seem to be the most common modeling environment when designing new neighborhoods. Combined with the possibilities of a visual programming language like Grasshopper, advanced daylight and solar energy analyses have become closer to the tool workflow of architects. Another clear benefit is that, in most cases, only one model needs to be constructed for multiple types of analyses. However, data handling for larger neighborhoods in those environments can still be challenging. Therefore, GIS is the common tool of choice for existing buildings and larger neighborhoods, but it might be difficult to convert the geometry to a suitable format. Also, data handling processes are more advanced. The field of advanced simulation is evolving quickly and will be influenced by Artificial Intelligence and Machine Learning that will permit faster, more advanced analyses for larger neighborhoods.

For an optimal solar neighborhood design, a district should be planned considering not only the district itself but also how it could complement other districts or the entire city. Whereas GIS enables working at such scale, the resolution (spatial, temporal, LOD) is usually much coarser than that reached by district-scale tools. It would therefore be relevant to identify possibilities to work with high-definition tools.

For more information and results, see the report online.