



SOLAR HEATING & COOLING PROGRAMME
INTERNATIONAL ENERGY AGENCY

IEA SHC Task 63

Solar Neighborhood Planning

Maria Wall, Task Manager – funded by the Swedish Energy Agency
November 29, 2023

Solar energy for buildings and urban areas – historical planning perspective

- Urban density ruled by access to daylight and natural ventilation:
 - Solar Access: “the ability to have uninterrupted direct rays of sunlight fall onto one’s property”
 - Right to Light: “a legally enforceable right to a reasonable proportion of the natural unobstructed flow of direct solar radiation”
- Then came electricity (light) and mechanical ventilation
- Simple rules were forgotten/not needed in second half of the 20th century– Densification of cities
- NOW – sustainable cities and renewable energy push for “right to light” for daylight and solar energy production
- BUT increased population growth and environmental gains of walkable and public transport push towards increased density

Solar Contributions today



- **Passive solar energy**: indoors and outdoors to reduce heating demand and improve thermal comfort and health
- **Daylighting** buildings and outdoor areas, to reduce electricity for lighting and improve visual comfort and health
- **Local renewable energy production** using Photovoltaics (electricity) and Solar Thermal Systems, to help create energy/resource self-sufficient environments and not rely on energy imports, and to create resilience to energy price fluctuations
- **Local food production** and use of **green areas** for improved air quality and reducing storm water (roofs, facades, outdoor areas)

Solar Neighbourhoods - Opportunities

- A means to achieve net zero energy districts and low carbon cities
- To address both solar energy production and daylighting/passive solar when planning neighbourhoods, enables to identify synergies and to avoid conflicts between competing uses of solar energy (e.g. daylight versus energy production)
- Don't waste the possibilities to use available surfaces!
- Creating long-term **solar access** for energy production and for daylighting buildings and outdoor environments (right to light)

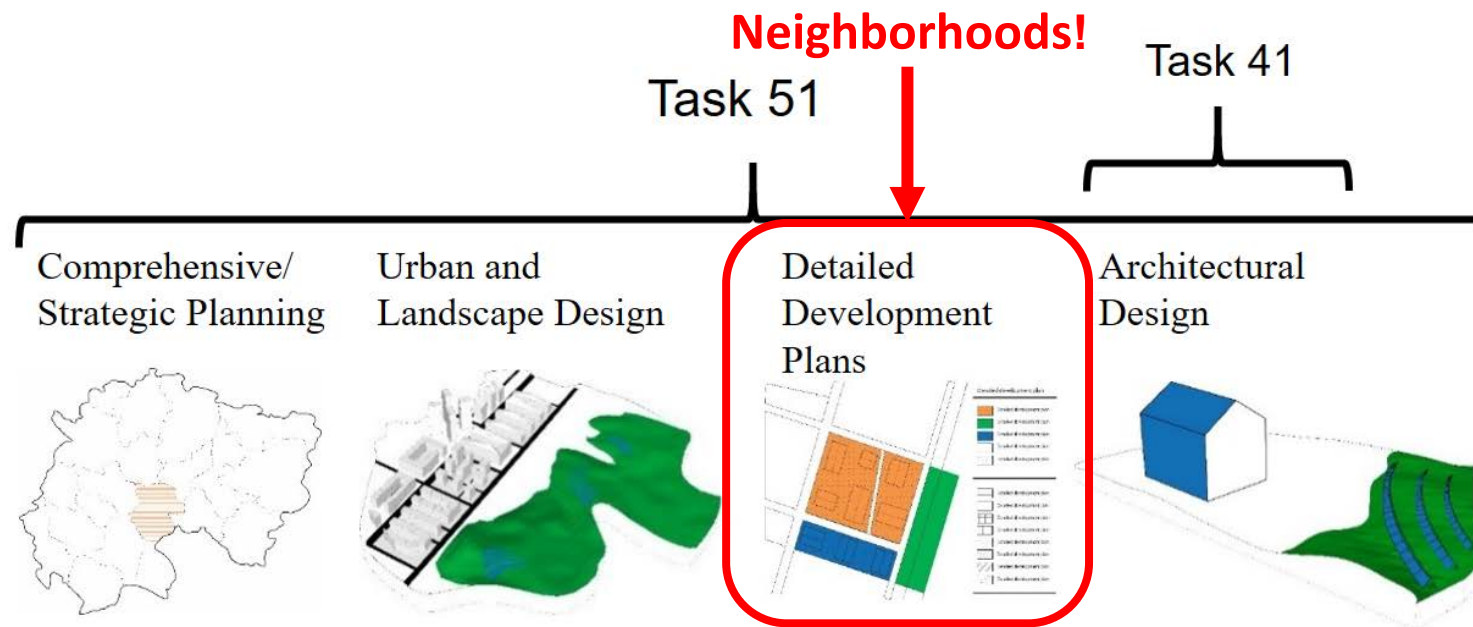


Background

IEA SHC Task 41: Solar Energy and Architecture, 2009-2012

IEA SHC Task 51: Solar Energy in Urban Planning, 2013-2018

Conclusion: More developments on a city district level are needed to improve and develop new strategies and methods/tools – cooperation between research and practice!



Definition - neighborhood

A neighborhood is defined as a group of buildings, a district/precinct. It is a spatially defined specific geographic area, often including different types of buildings and functions, open space and infrastructure.

A neighborhood can be part of a larger city or a smaller village. It can be part of an urban area, a rural development or represent an isolated community.

- Connected to a district heating/cooling network or outside, given different boundary conditions

Task 63: Solar Neighborhood Planning: 2019- 2024

Objective

The main objective 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.

Scope

The scope of the Task includes solar energy aspects related to

1. New neighborhood development
2. Existing neighborhood renovation and development

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



The role of solar aspects related to energy, environment, economy and inhabitants' comfort and health is in focus

Subtasks and leaderships

A. Solar Planning Strategies and Concepts

Leader: Caroline Hachem-Vermette, University of Calgary, & Kuljeet Singh Grewal, University of Prince Edward Island, Canada

B. Economic Strategies and Stakeholder Engagement

Leader: Silvia Croce & Daniele Vettorato, EURAC Research, Italy

C. Solar Planning Tools

Leader: Jouri Kanters, Lund University, Sweden & Martin Thebault, University Savoie Mont-Blanc – INES, France

D. Case Studies

Leader: Gabriele Lobaccaro & Mattia Manni, Norwegian University of Science and Technology NTNU, Norway, jointly with all leaders

Project leader (Task Manager): Maria Wall, Lund University, Sweden

Participating countries

- Australia
- Canada
- China
- Denmark
- France
- Italy
- Norway
- Slovakia
- Sweden
- Switzerland



Deliverables

- A1: Strategies for the design of new and existing high energy performance solar neighborhoods
- A2: A tool to select solar strategies for neighborhoods: A user guide for preliminary decision-making (MS Excel tool + user guide)
- B1:** Surface uses in solar neighborhoods. Definition of the most suitable surface uses to prevent conflicts and create synergies
- B2: Solar Neighborhood Financing Mechanisms and Business Models
- B3: Strategies for stakeholder engagement and citizen involvement
- C1:** Identification of existing tools and workflows for solar neighborhood planning
- C2: Opportunities for improved workflows and development needs of solar planning tools
- D: Case study collection

Some key points (1)

- Enhanced solutions for **architectural integration** of solar systems, to enable greater flexibility in the design – to increase acceptance
- Utveckling – arkitektonisk integrering av solel/solvärmesystem (flexibilitet)
- Efficient **use of urban surfaces** – for solar energy production, green areas, local food production – to achieve healthy environments and sustainable cities not dependent on energy and food imports
- Vi behöver använda ytor bättre och mer effektivt, t.ex. för solenergiproduktion, odling...
- Develop **tools** handling the neighborhood scale, and improve tool interoperability, develop **Key Performance Indicators and target values** for solar related indicators.
- Utveckling av verktyg, kriterier och definiera mål/kravnivåer relaterat till sol i tidig planering

Some key points (2)

- Define **business models** for solar neighborhoods to ensure long-term viability *and* include and **elucidate added values** (human health and well-being, resilience, energy security, biodiversity etc)
- Utveckling av affärsmodeller – inkludera mervärden (hälsa, trygg energiförsörjning etc)
- Need of **legal reforms as to solar access protection** to secure investments in renewable energy and sustainable developments. (“Right to Light” – and “Right to Shade”)
- Behov av lagar/regler och principer, för att planera för och skydda rätten till sol/skugga
- Improve **planning approval processes** where informed decisions can be made
- Bättre beslutsprocesser för solintegrering (t.ex. solpaneler)
- Improve **knowledge transfer**, involving stakeholders and citizens in the planning and developments
- Kunskapsspridning! Engagera olika målgrupper i planering och genomförande!

Thank you!

For more information about IEA SHC projects, see e.g.

Task 63: Solar Neighborhood Planning (2019-2024): <https://task63.iea-shc.org/>

Task 51: Solar Energy in Urban Planning (2013-2018): <https://task51.iea-shc.org/>

Task 41: Solar Energy and Architecture (2009-2012): <https://task41.iea-shc.org/>

Ten questions concerning planning and design strategies for solar neighborhoods in the Journal Building and Environment, Elsevier



LUND
UNIVERSITY

