SOLAR HEATING & COOLING PROGRAMME
INTERNATIONAL ENERGY AGENCY

SHC
TASK 66
Solar Energy Buildings

IEA SHC Task 66
Solar Energy Buildings

IEA SHC Solar Academy Webinar, September 19, 2023

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Motivation – Why Solar Energy Buildings

Buildings are on global level responsible for

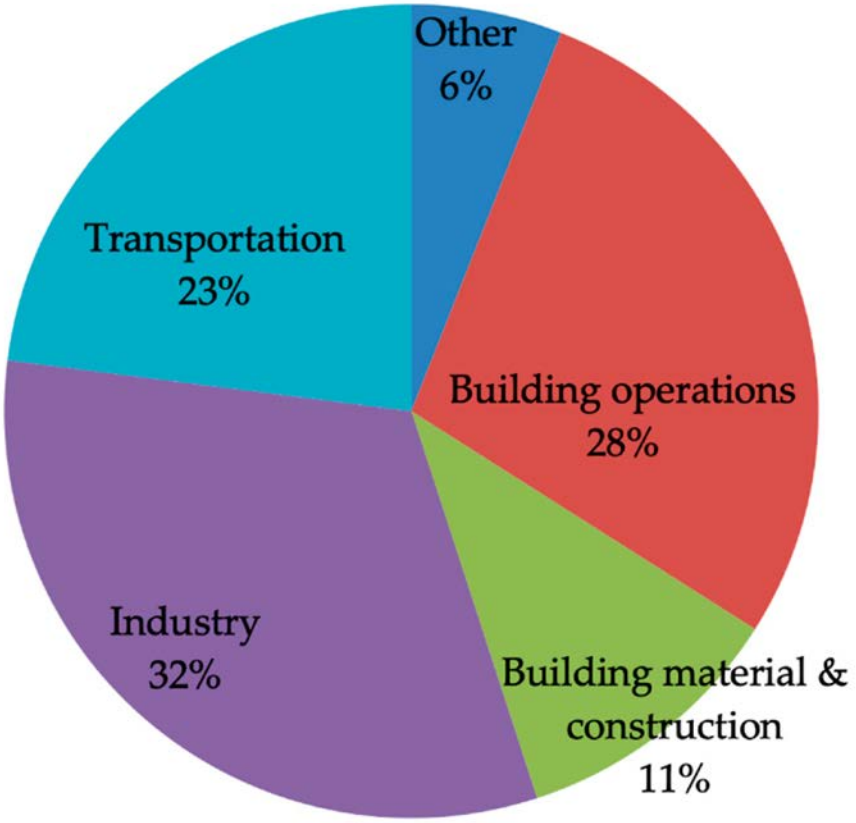
- **around 40 %**
  of the **energy consumption**

  and

- around **40 %** of the
  CO_2-emissions

Predominant part is related to operation!

CO_2-Emissions by sector

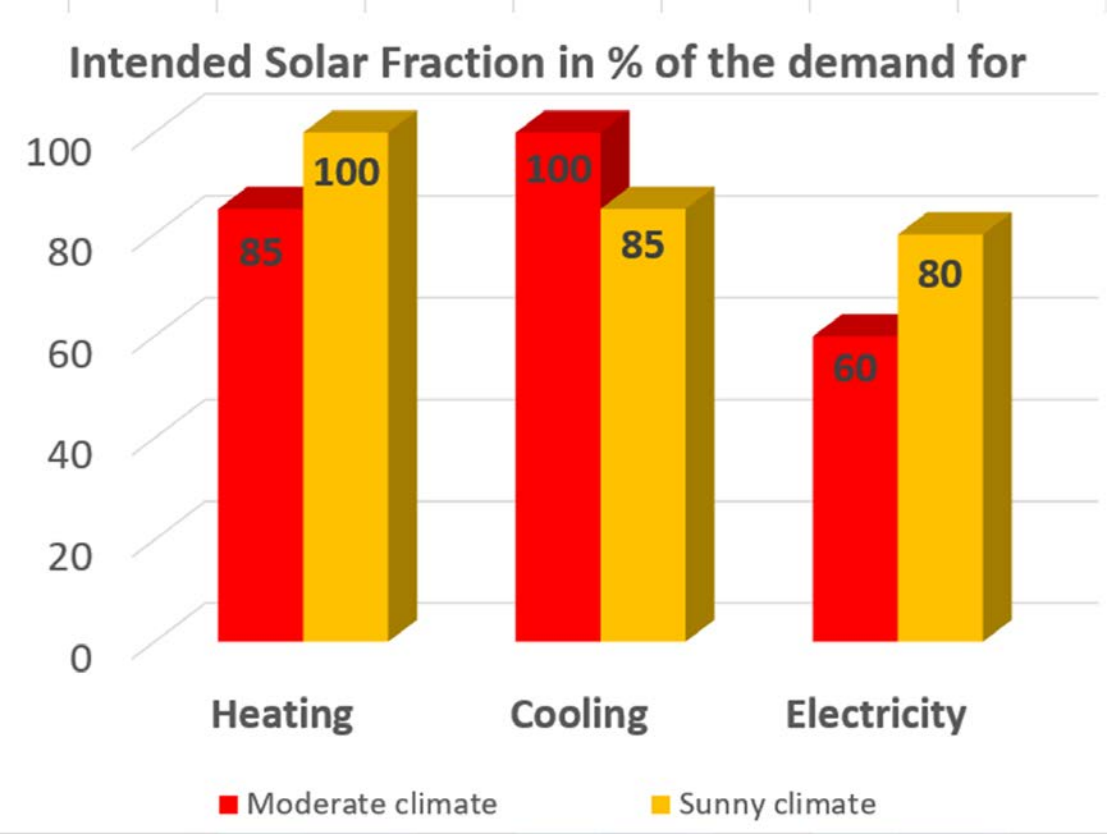


Source: https://www.mdpi.com/2071-1050/12/18/7427

Task 66 - Solar Energy Buildings

Targets

IEA SHC Task 66 focuses on the development of economic and ecologic energy supply concepts for buildings with high solar fractions of
at least 85% of the heat demand,
100% of the cooling demand
and
at least 60% of the electricity requirements
for moderate, e.g. central European climate conditions.



Note: Calculation of solar fraction is based on short (15 min) time intervals

Task 66 - Solar Energy Buildings

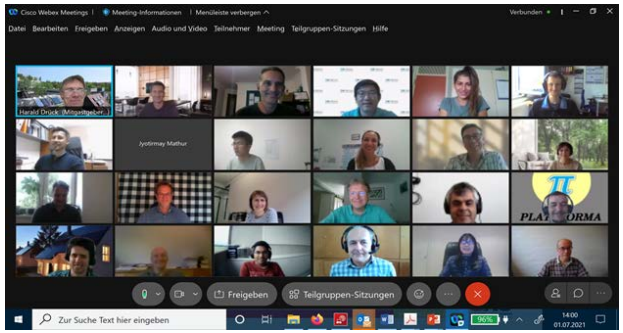
Team

In total around **30 to 40 experts** participate at the meetings

Participating Countries

- Austria
- Germany
- *India*
- *USA*
- Australia
- China
- Belgium
- UK
- *Albania*
- Portugal
- Switzerland
- Poland
- Denmark
- *Mexico*
- Slovakia

*Up to now: **4 virtual** meetings and **1 physical meeting***



Next Task-meeting: Oct 9th, 2023 at Graz, Austria

Task 66 - Solar Energy Buildings

Organisation and Subtasks

Duration: July 2021 – June 2024

Task Manager: **Dr. Harald Drück**, IGTE, University of Stuttgart, Germany

Task Administrator: **Claudia Scholl-Haaf**, IGTE, Uni Stuttgart, Germany

Subtask A: Boundary Conditions, KPIs, Definitions and Dissemination
Lead: **Frank Späte,** OTH-AW, Germany

Subtask BC: New and existing buildings and building blocks / communities
Lead: **Elsabet Nielsen**, DTU, Denmark
Co-Lead: **Xinyu Zhang and Wenbo Cai**, China Academy of Building Research (CABR), Beijing, China

Subtask D: Current and future technologies and components
Lead: **Thomas Ramschak** and **Michael Gumhalter,** AEE INTEC, Austria

Task 66 - Solar Energy Buildings

Deliverables …. *for three target groups*

general public
information about
advantages and benefits
of Solar Energy Buildings

description of
demo cases

decision makers
promotion documents
- for investors
- for politicians

description of
demo cases

experts
design processes and
design tools for solar
energy buildings

description of available
technology portfolio

Subtask A:
Boundary Conditions, KPIs, Definitions and Dissemination

Highlights of the Activities

1. **Final List of KPIs**
2. **Final Definition of Reference Buildings / Cases**
3. **Industry Workshops**
4. **Solar Energy Building promotion guidelines for investors, building owners and politicians**

Final list of Key Performance Indicators

The KPIs collected/defined in this Task can be used to

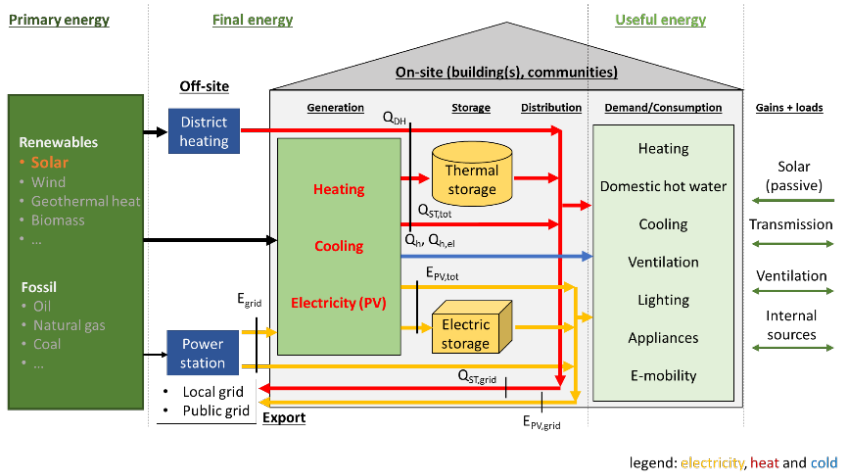
- **evaluate and compare different buildings/blocks/communities**
- **evaluate and compare different concepts in one building/block/community**
- **optimize components of the building in terms of energy use/flows, economics, ecological etc.**

They cover the following aspects:

- **Energetic and technical**
- **Ecological**
- **Economic**
- **Sociological**

17 KPIs

Example: total solar fraction

Total solar fraction = LCF – Solar Load Cover Factor [%]	$$f_{sol} = \frac{E_{PV,tot} - E_{PV,grid} + Q_{ST,tot} - Q_{ST,grid}}{E_{PV,tot} - E_{PV,grid} + E_{grid} + Q_{ST,tot} - Q_{ST,grid} + Q_{grid} + Q_h - Q_{h,el}}$$ Fraction of self-generated and self-used PV electricity and solar thermal useful heat referred to the total energy used for household and technical purposes in the form of heat and electricity. Energy supplied by solar part (PV or ST) of a system divided by the total system load (electrical and thermal).
	

A Draft of the „Final List of KPIs“ is available

Authors: Franziska Bockelmann, Tillman Gauer, Frank Späte

Definition of reference buildings, building blocks and/or communities

Why reference buildings, building blocks and/or communities?

1. **Comparing different energy supply concepts on the basis of clear and comprehensible boundary conditions.**
2. **Elaboration of reasonable energy supply concepts for typical buildings, building blocks and/or communities in the participating countries based on representative samples.**
3. **Validation and calibration of simulation models based on representative samples.**

Method:

Definition of one or more country-specific reference building(s) for each of the country-relevant building types (single family, multi family, block, community) and related heating system(s) by each of the Task 66 participants.

Main advantages of country-specific reference building(s), building blocks and/or communities

- **Every country/participant can define reference buildings and relevant heating, cooling and HVAC systems that take into account the specificities in the country.**
- **Consideration of country-specific building characteristics and traditions (e. g. accounting for specific climate conditions) as well as standards and regulations.**
- **Enhanced usability of the results within the respective countries.**
- **Reflecting local conditions, country-specific buildings possibly boost the local market more than findings and/or statements derived from joint reference building(s) valid for all participating countries.**

Authors: Markus Peter, Dominik Bestenlehner

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IEA SHC Task 66
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Integrated solar energy supply concepts for climate-neutral buildings and communities for the "City of the Future"

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Industry Workshop No 4

"Solar energy supply concepts for buildings and districts in an international context"

9th October 2023, Graz, Austria

13:30 – 17:00 h, Franziskaner Kloster Franziskanerplatz 4, 8010 Graz, Austria

Next Task-meeting: Oct 9th, 2023 at Graz, Austria

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Thank you for your attention

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https://task66.iea-shc.org/

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