IEA SHC Task 66

SOLAR ENERGY BUILDINGS

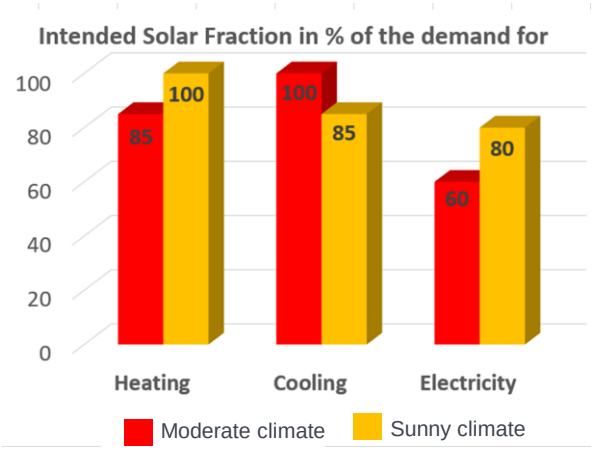
INFORMATION FOR INVESTORS

SOLAR ENERGY BUILDINGS = MONEY SAVINGS

What is a Solar Energy Building?

A Solar Energy Building is a building with a relatively high solar fraction, based on the definition of IEA SHC Task 66.

The solar fraction is the share of the solar energy used for heating, cooling and electricity related to the solar energy demand of a building. As shown in the graph on the right sight, the solar fraction depends on the climatic region.



Moderate climate: e.g. central Europe, northern China and northern USA

Sunny climate: e.g. southern Europe, southern China and s. USA, Australia, Mexico

Source: Jenni Energietechnik

Solar energy can be used to produce any kind of energy needed in buildings, such as

- electricity
- heat
- cold

for any building type such as

- single-family buildings
- multi-story residential buildings
- building blocks and communities
- new and existing buildings

Possibilities for the Use of Solar Energy in Buildings

ACTIVE USE

Conversion of solar energy to heat, cold, electricity with technical devices

Technical devices	Applications	Scope of design	Example
• ST[1] collectors (producing heat) • PV[2] modules (producing electricity) • PVT[3] collectors (producing heat and electricity)	domestic hot water and space heating heating and cooling electricity for all purposes	• roofs • facades • balconies • terraces • on the ground • carports / garages	 Solar house, Austria Photo: Andreas Schindl

[1] ST = Solar Thermal; [2] PV = Photovoltaics; [3] PVT = Combination of ST+PV

PASSIVE USE

Use of solar energy to decrease energy consumption + increase comfort

Measures	Applications	Scope of design	Example
• windows etc. • Building design • Smart use of plants • shading elements • etc.	heating cooling natural ventilation day lighting	• light painting → reflection of solar radiation • insulation → saves energy • shading with movable or fixed fins and overhangs → keeps the sun out of the building • etc.	 Aarhus City Tower, Denmark, Yakov Safir

Involve an energy expert for appropriate design and implementation

You can find them in any country! In some, for example in Germany, the „German Energy Agency“ provides lists or you ask at research institutes working on Solar Energy Buildings, Net-Zero-Buildings or similar. On the IEA SHC Task66 website, https://task66.iea-shc.org/ you find more information such as examples of buildings, fact sheets about possible measures etc.

Solar Energy Buildings suits every climatic zone !

Example for moderate climate: Germany

Single Family House[1]

Average ambient temperature: 9ºC

Key designs

- thermal collectors on facade
- PV on roof
- central ventilation system
- thermal storage unit

Energy consumption and costs

- annual energy consumption[3] = 6 kWh/m²/yr
  → primary energy consumption, European Energy Class A+
- additional investment for the energy design (including subsidies) = 50,000 €
- annual savings heating = 950 €/yr
- annual savings electricity = 1,300 €/yr
- annual savings mobility = 1,850 €/yr (considering 20.000 km/yr electric vehicle)

Total annual savings = 4,100 €/yr
Pay back period: 12-13 years

Example for tropical climate: Chennai, India

Bhawar Residence[2]

Average ambient temperature: 28ºC

Key designs

- curved corners for smooth ventilation
- building facades with lots of plants for a comfortable micro climate
- facade with zinc panels for reflecting solar energy
- energy efficient lighting with occupancy sensors
- solar PV modules

Energy consumption and costs

- annual energy consumption[3] = 37 MWh; EPI4 = 0.77 kWh/m²/yr
  → almost zero energy building = almost no energy costs
- annual solar electricity generation = 39 MWh = 363 €/yr

[1] Michael Hövel; Design, construction and operation of a solar thermal family home; https://task66.iea-shc.org/Data/Sites/66/media/meetings/industry-workshop-no5/task66_indws5_hoevel1.pdf

[2] Net zero energy buildings; https://nzeb.in/case-studies/nzebs-in-india/nzebs-in-india-case-studies-list/bhawar-residence/

[3] total consumption for heating / cooling /electricity

[4] EPI = Energy Performance Index; benchmark in India is 180 kWh/m²/yr

Governments, cities and communities worldwide supports the use of Solar Energy by

- Simplification of application and execution procedures specifically for SEBs
- Providing subsidies

YOUR ADVANTAGE → an easy and affordable way to Solar Energy Buildings

Design properly and save money

Your benefits by Investing in Solar Energy Buildings

VALUE INCREASE of the property through small, economic feasible additional investments

- → Excellent resaleability
- → Revenue increase on sale

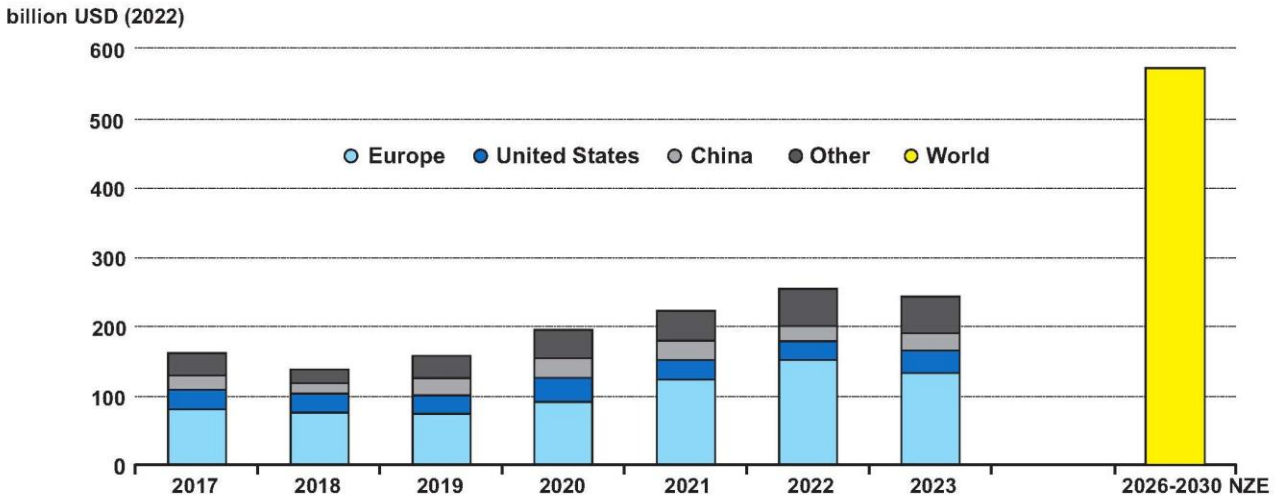
SALES BENEFITS

- → On site energy production based on a source free of charge
- → Almost zero energy price increase over many years
- → Very low environmental impact → up to zero-energy- or climate-neutral-buildings

FINANCIAL SUPPORT in many countries in the world

- → Grants for Solar Energy Buildings and particularly for the active solar systems
- → Long term feed-in tariffs for solar electricity

The global Solar Energy Building / Zero-Energy-Building market is moving **towards a trillion $ market**



Source: IEA (International Energy Agency): World Energy Investment 2023, https://www.iea.org/reports/world-energy-investment-2023, Chart "Annual investment in energy efficiency in the building sector in the Net Zero Scenario 2017-2030", IEA-licence: CC BY 4.0

NZE = Net Zero Emissions by 2050 Scenario

Invest in Solar Energy Buildings and be ready for the FUTURE

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SHC TASK 66 Solar Energy Buildings