Heat Transition

with Concentrated Solar Thermal

- Experience from the Field -

Joachim Krüger (PhD)
Solarlite
Berlin, 30.3.2025

Solarlite

- Expertise: 20 years of EPC experience with parabolic trough collectors (CSP/CST) for electricity and process heat generation
- Innovations: Direct steam generation, parabolic reflectors made of GRP composite material, particularly lightweight design, expansion through combined heat and power generation
- Product: SL 5770 - a precisely moulded parabolic trough collector for operation up to 550 °C, suitable for mass production
- Benefits: CO^2-free energy generation, low energy generation costs (LCOE/LCOT), modular design, easy maintenance and repair, automated operation
- Research partners: German Aerospace Centre (DLR), Fraunhofer ISE, University of Rostock, Technical University of Berlin, RWTH Aachen University, Jülich Research Centre, CIEMAT Spain

References for breweries
HEINEKEN IN SEVILLA (ESP)

Europe's largest solar thermal plant at the time of commissioning (October 2023)

References for breweries
HEINEKEN IN SEVILLA (ESP)

- Before, the brewery generated 89% of their heat via gas and 11% with biogas
  Now, the brewery covers **≥ 53%** of the heat demand with solar energy (30 of 56 GWh_{th})

- Solar field: **30 MW_{th}** thermal power
  30 GWh supplied heat energy
  43.413 m^2 aperture area (68 HYT-6000 parabolic trough collectors)

- Daily heat storage: **68,8 MWh_{th}** thermal capacity
  210 °C & 35 bar operating parameter
  tanks of pressurized water with a total volume of 814 m^3

	primary circuit (solar field)	secondary circuit (client site)
heat transfer medium:	pressurized water	pressurized water
operating parameter:	120 – 210 °C (ΔT= 90 K) 25 – 30 bar , 267 t/h	110 – 160 °C (ΔT= 50 K) 9,5 bar , 505 t/h

- Possible savings up to 7.000 t CO_2/a (60% saving of gas)

Maximized solar district heating

- As part of a funded study, the use of parabolic trough technology in conjunction with seasonal storage was to be investigated.
- The framework conditions were:
  - Northern Germany
  - Highest possible solar share
  - Achieve necessary temperature range of the heat
  - Temperature stability of the solar technology for the processes

Technical overview:
setup solar district heating

Additional electricity
Wind / PV / other renewable

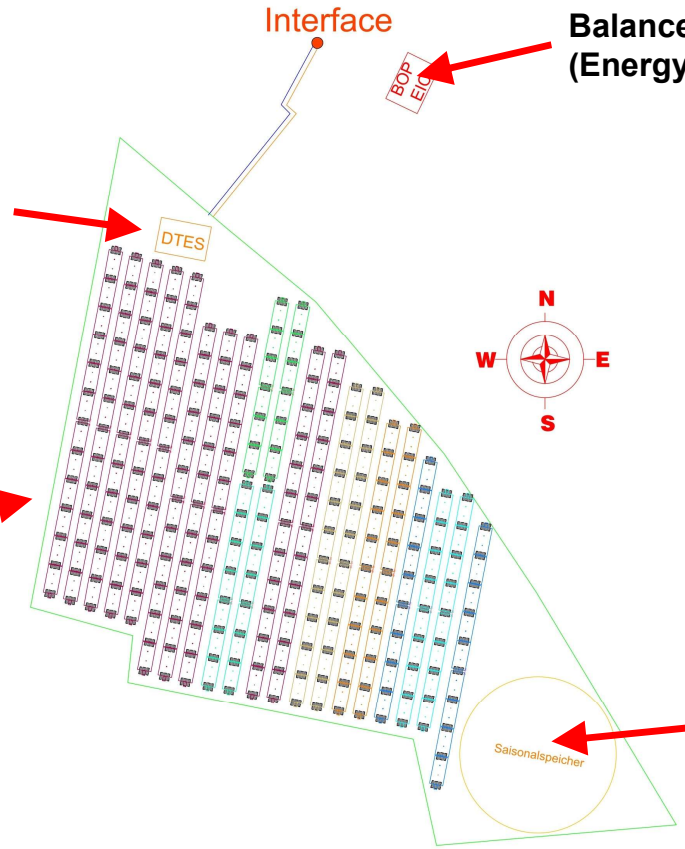
DTES – daily storage

Electrical heatpump

PTES seasonal storage

Quartier or district

Technical overview:
setup solar district heating



Balance of Plant
(Energy transfer station)

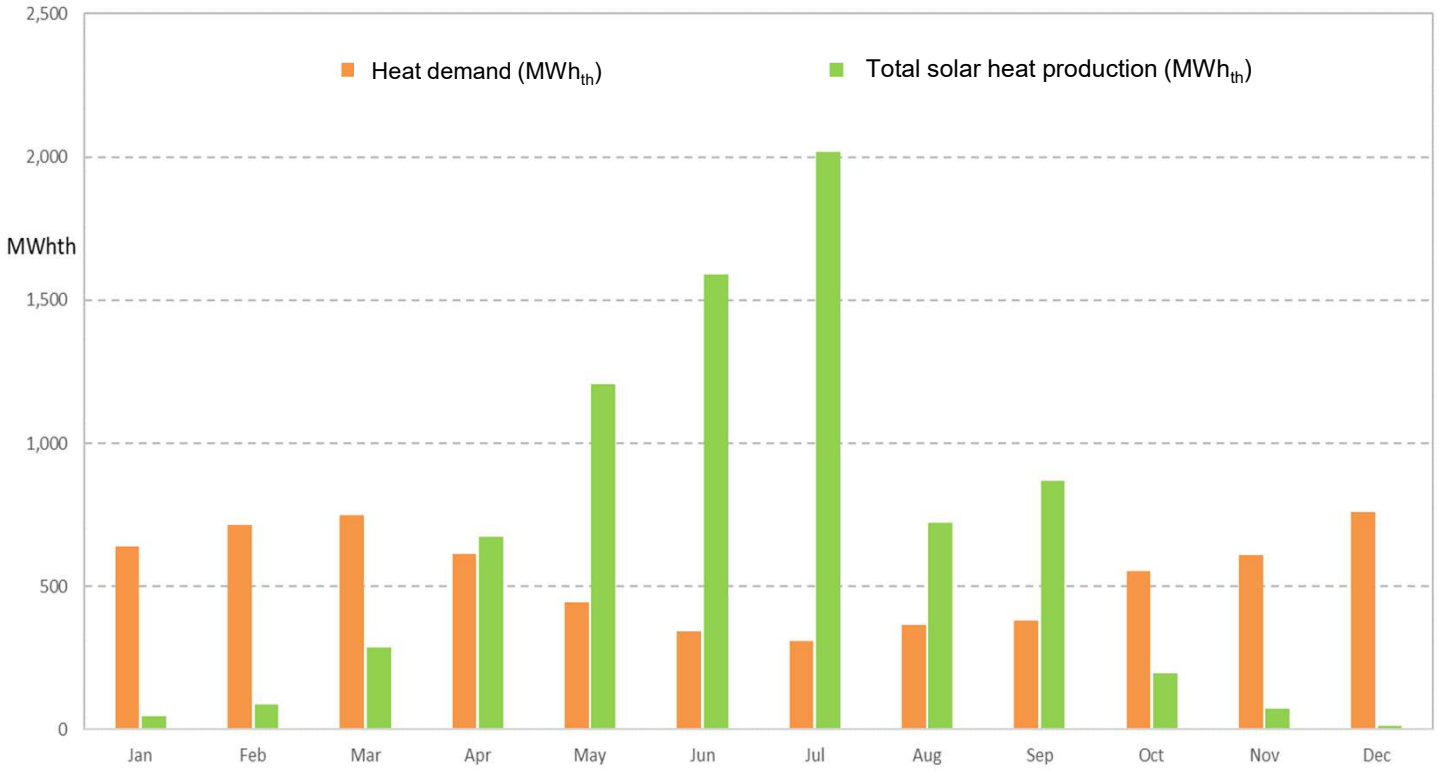
Day storage for solar heat

Solar field,
collectors adopted
in length for fit in
plot shape.

PTES seasonal storage

Power solar field:	10 MWtherm
PTES:	80.000 m^3
DTES:	15 m^3

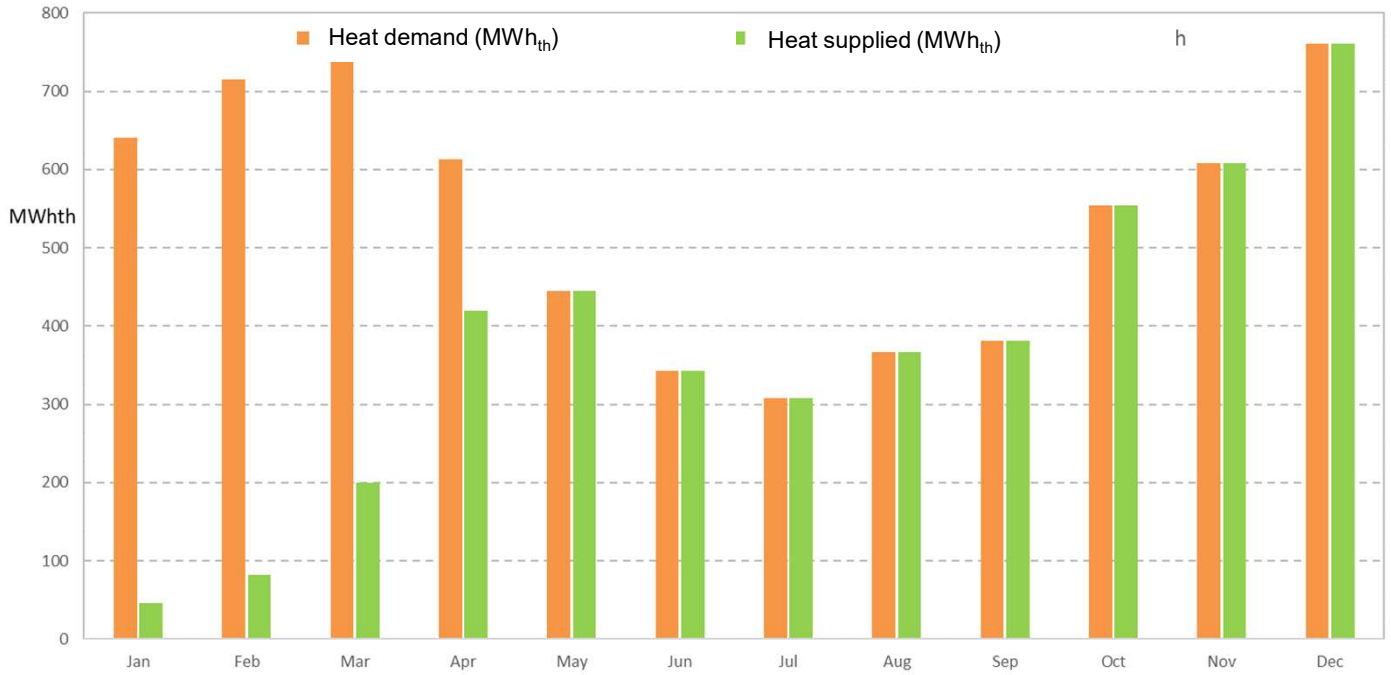
Heat demand and heat production profile



- Comparison of heat demand (industry, municipal utilities, etc.) and solar yield
- From October to March, the heat demand is greater than the amount of solar heat generated
- Storage tanks can be charged with the solar surplus from April to September

Solar share in year 1

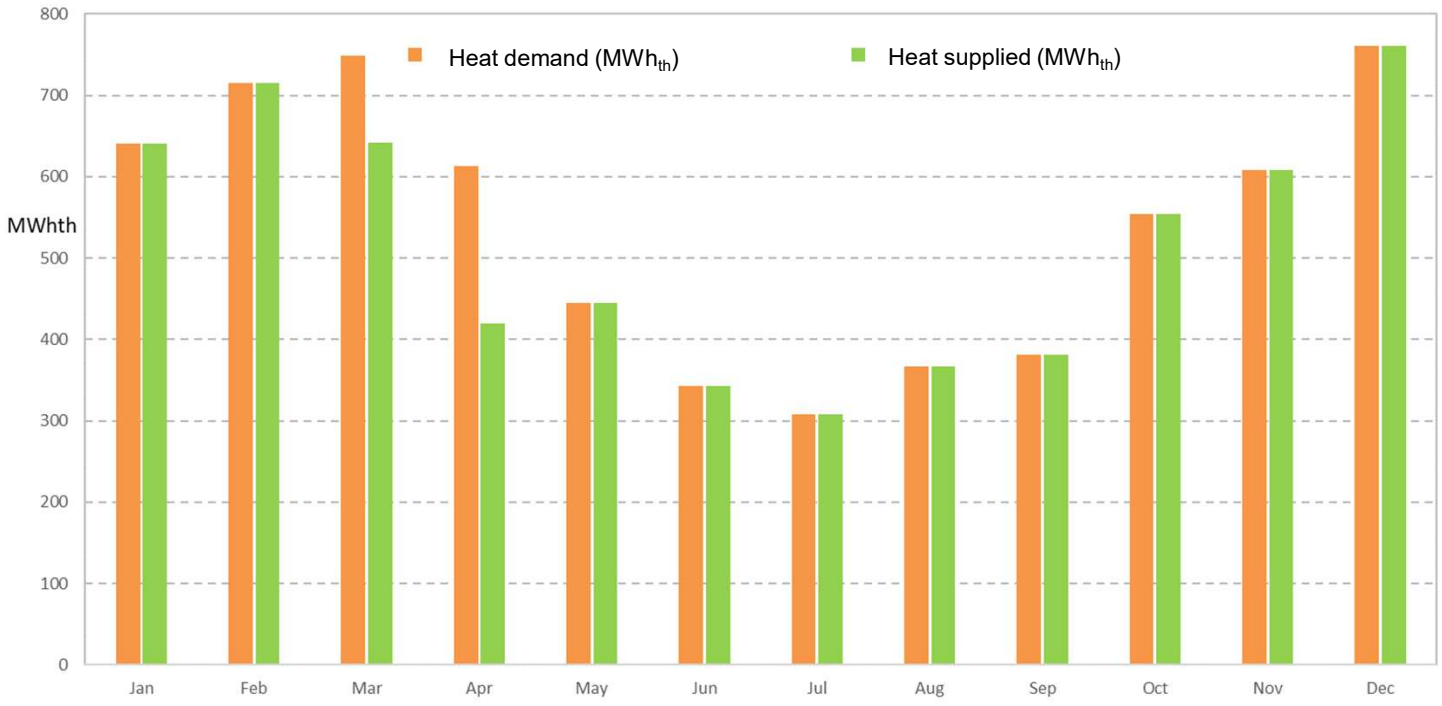
Year 1 : solar share 70%



- January to April, the heat demand is greater than the amount of heat generated
- From April to December, 100% of the demand is covered by solar heat
- Heat supplied by solar field + daily and seasonal storage

Solar share in year 2 and onwards

Year 2 : solar share 95%, remaining 5% by other renewable sources



- In March and April, the heat demand is greater than the amount of heat generated
  - Discharge PTES
  - Heat supplied by solar field + DTES
- January to February and May to December, 100% of the demand is covered by solar heat
  - Heat supplied by solar field plus daily and seasonal storage tank

Summary

- Concentrating solar thermal energy can make an important contribution to heat supply in Central Europe, both in industry and in district heating
- Until now, utilisation has concentrated on electricity production in sunny regions, but recently an economic potential for heat production has also opened up in Germany.
- Heat demand and resilience reveal the advantages of concentrating solar thermal energy.
- Decarbonisation and climate protection requirements are key features of concentrating solar thermal energy:
  - Technology has been in use for decades with a service life of over 30 years
  - Direct heat generation in combination with low-cost thermal storage systems
  - Independent local energy generation with high solar coverage and therefore low operating costs
  - High area efficiency
  - High supply and price security thanks to the predictability of the technology
  - Ability to hybridise with other heat generators and thus reduce geopolitical dependencies
  - High local added value

Contact

Joachim Krüger
CEO Solarlite Beteiligungs UG
joachim.krueger@solarlite.de
Hansestraße 21
18182 Bentwisch

Phone +49 (0) 381 260550 - 10
Fax +49 (0) 381 260550 - 04
Mail info@solarlite.de
Web www.solarlite.de

https://www.solarlite.de/