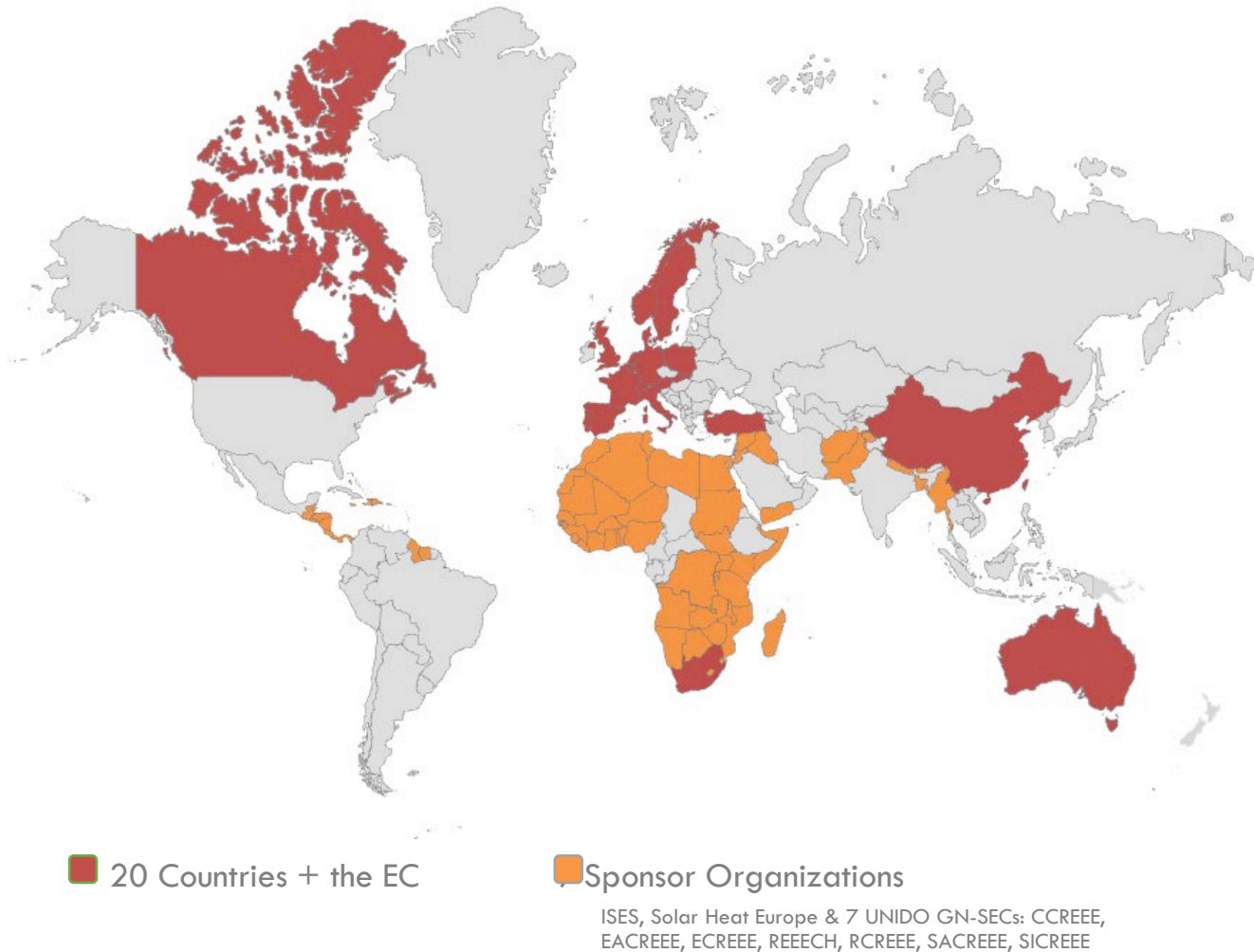


What is the Solar Heating & Cooling (SHC) Programme?



- Project-focused **international R&D collaboration** since 1977
- **20 member countries European Commission**
9 international organizations
- **200+ experts**
- **7 running Tasks**
 1. Solar energy buildings
 2. Compact thermal energy storage
 3. Solar district heating
 4. Low carbon, high comfort integrated lighting
 5. Solar hot water for 2030
 6. Life cycle and cost assessment for heating and cooling technologies
 7. Solar photoreactors for the production of fuels and chemicals

What is the SHC Solar Academy?

The Solar Academy is a **platform the SHC Programme uses to share and apply** our findings and experiences from our Tasks with as many people as possible.

Our Tasks produce not only valuable **scientific results**, but also:

- **training materials**
- **case studies, fact sheets and databases**
- **design, evaluation and assessment tools**



What does the SHC Solar Academy offer?

Webinars – held quarterly and hosted by ISES

- 2025 schedule: Compact Energy Storages in March 2025
- All webinars: 14.00 GMT and rebroadcast with live Q&A at 6:00 GMT

Videos – interviews with solar experts, our Solar Academy webinars & Task videos

👉 www.iea-shc.org/videos or IEA SHC YouTube channel

Onsite Training – solar heating and cooling training workshops by our experts. Available upon request by IEA SHC member countries/organizations.

- Past trainings: CCREEE/Caribbean, China, ECREEE/West Africa, South Africa, United Kingdom



Where to find more information

Visit our website – www.iea-shc.org

Download a free SHC publication – www.iea-shc.org/publications

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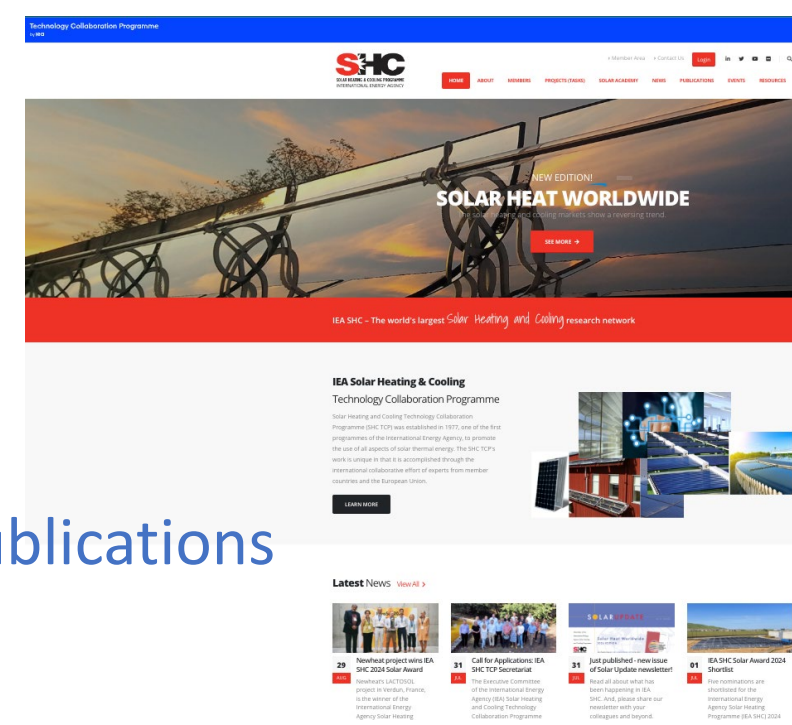


IEA Solar Heating and Cooling Programme (group 4230381)



@ieashc2365

Have questions? Want to be part of an SHC Task? – secretariat@iea-shc.org



Our flagship report

Werner Weiss, Monika Spörk-Dür

Global Market Development and Trends 2022
Detailed Market Figures 2022

SOLAR HEAT WORLDWIDE

Edition 2024

SHC
INTERNATIONAL ENERGY AGENCY
Solar Heating & Cooling Programme

Federal Ministry
Republic of Austria
Climate Action, Environment,
Energy, Mobility,
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Solar Heat Worldwide
Solar Heat Worldwide

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Past Issues

In Brief

Solar Heat Worldwide is published annually. Since 2005, countries, now 72, have provided data to create the most comprehensive assessment of solar heating and cooling markets worldwide.

Our semiannual newsletter

SOLARUPDATE

VOL. 78 DECEMBER 2022

Newsletter of the
International Energy
Agency Solar Heating
and Cooling Programme

SHC
INTERNATIONAL ENERGY AGENCY
Solar Heating & Cooling Programme

#SolarHeat
#SolarThermal
#SolarProcessHeat
#SolarCooling
#SolarDistrictHeating

Solar Energy Buildings Around the World

The analysis of 20 Solar Energy Buildings demonstration cases is wrapping up in IEA SHC Task 66 on Solar Energy Buildings. In this article, you will preview some of the high-solar fraction buildings in this collection.

The case studies include single- and multi-family homes and commercial buildings in different climate zones and inside and outside district heating areas. All the buildings, except one in India, are connected to the electric grid. The selected buildings aim for high self-sufficiency in heating, cooling, and electricity. The degree of self-sufficiency is defined as renewable energy consumption divided by total energy consumption. The Solar Energy Building demonstration cases are distributed across Europe (13), Asia (6), and Australia (1). The European demonstration cases are in Austria (4), Germany (6), Poland (1), Portugal (1), and Denmark (1), and the Asian cases are in China (1) and India (5).

The technologies used in the IEA SHC Task 66 Solar Energy Building cases in Europe and Asia are shown in Figure 1.

It is noticeable that the variability of technologies is more significant in Europe than in Asia. On average, the 13 European cases use five different technologies to reach a high degree of self-sufficiency, while the Australian case uses six different technologies. In contrast, the Asian average is

4 Single-family houses in Freiberg, Germany, in continental climate. Photo: Lukas Oppelt, TU Bergakademie Freiberg.

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European Solar Energy Buildings

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Asian Solar Energy Buildings

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4 Figure 1. Technologies used in the IEA SHC Task 66 demonstration cases in Europe and Asia.

continued on page 2

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Free to download

<https://www.iea-shc.org/solar-heat-worldwide>



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Welcome to the SHC Solar Academy webinar

Boosting the Efficiency of Solar Thermal District Heating with Digitalization, Advanced Control and Open Data

19 November 2024



SOLAR HEATING & COOLING PROGRAMME
INTERNATIONAL ENERGY AGENCY

Current market figures and trends in solar district heating

Bärbel Epp. Solrico, <https://solarthermalworld.org/>

Task 68 considers higher temperatures and digitalization measures



TASK 68

Efficient Solar District Heating Systems

April 2022 to March 2025
Task Manager:
Dr. Klaus Lichtenegger
klaus.lichtenegger@best-research.eu

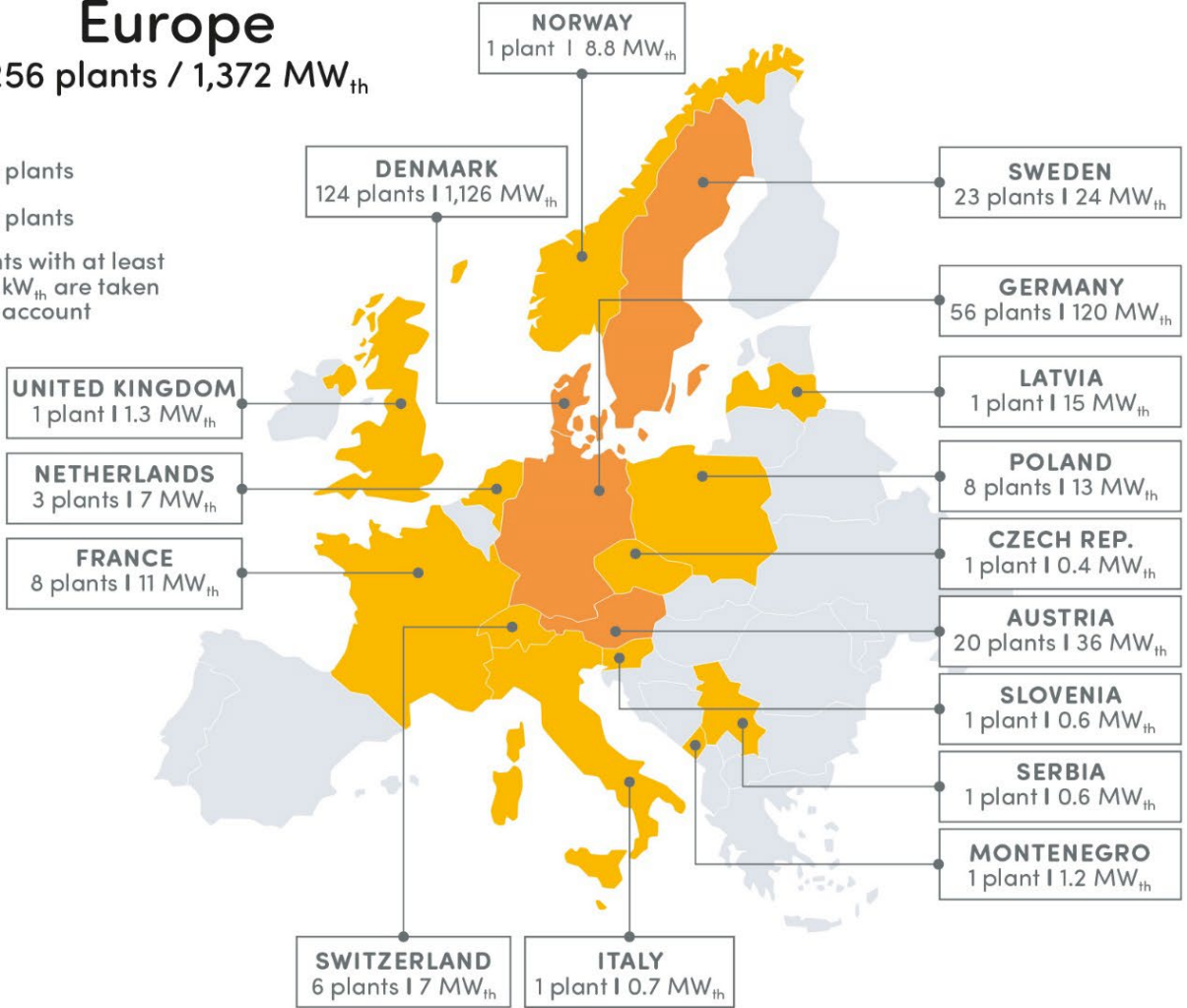
336 towns and cities use solar district heating

(Status: End of year 2023)

Europe

256 plants / 1,372 MW_{th}

■ > 10 plants
■ < 10 plants
 Plants with at least 350 kW_{th} are taken into account



Outside Europe

80 plants / 537 MW_{th}

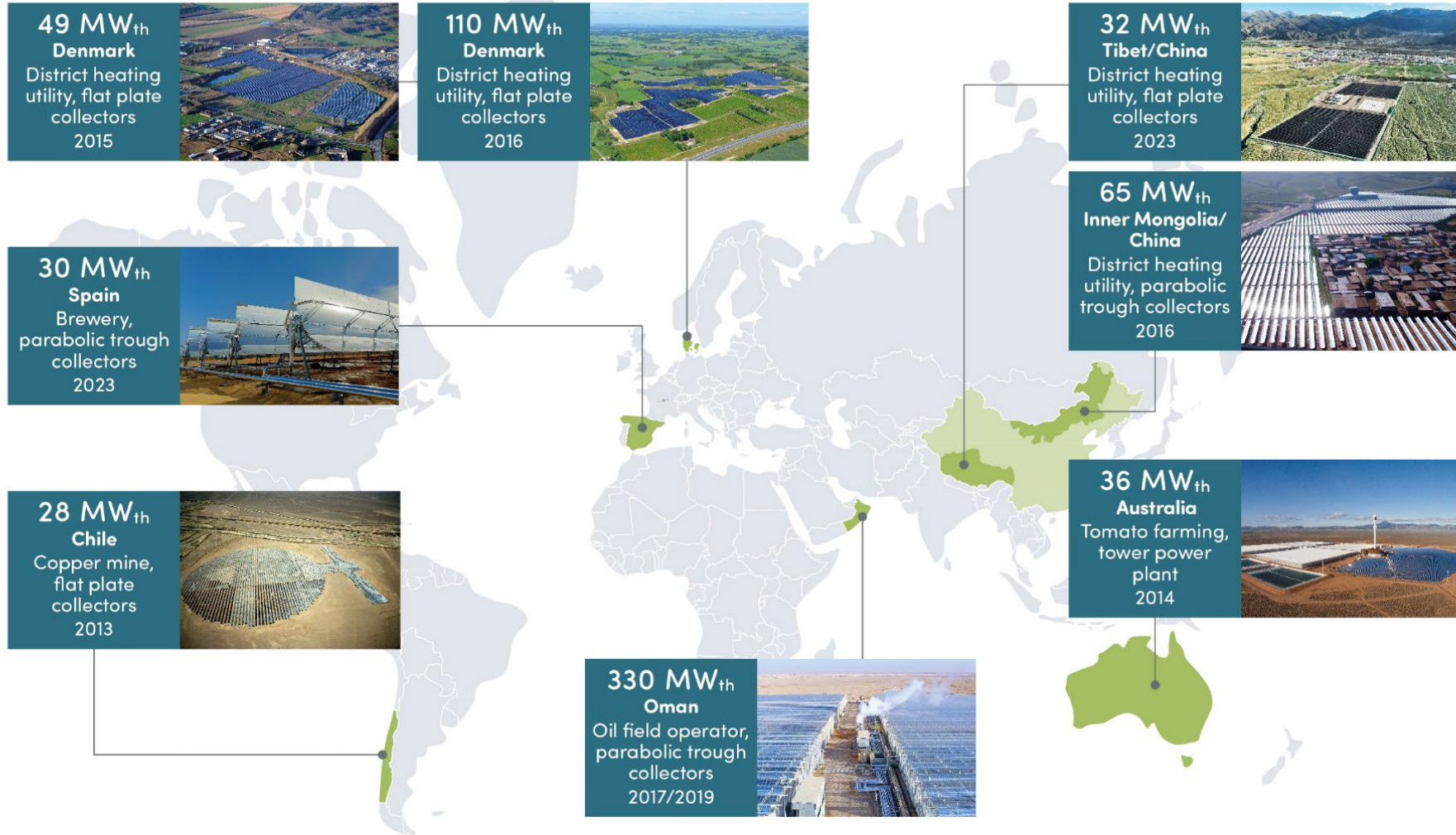
CHINA	72 plants	503 MW _{th}
SAUDI ARABIA	1 plant	25.4 MW _{th}
SOUTH AFRICA	2 plants	0.8 MW _{th}
CANADA	1 plant	1.5 MW _{th}
JAPAN	1 plant	0.9 MW _{th}
USA	1 plant	1.3 MW _{th}
RUSSIA	1 plant	3.1 MW _{th}
KYRGYZSTAN	1 plant	0.5 MW _{th}



<https://www.iea-shc.org/solar-heat-worldwide>



World's largest solar heat plants







Photos: Aalborg CSP, Arcon Sunmark, China Solar Thermal Alliance, AEE INTEC/Wolfgang Gruber-Glatzl, GlassPoint, Sunmark, SolarEast Group

5 top markets

(In terms of new installations)

End of 2023

		1	2	3	4	5
Solar water and space heating		China	India	Brazil	Turkey	United States
Solar district heating		China	Germany	Austria	Denmark	Italy
Solar industrial heat		Spain	France	China	Netherlands	Belgium
Solar hybrid solutions (PVT)		China	Netherlands	Germany	France	Spain

Photos: Chromagen, TVP Solar, Inventive Power, Abora Solar



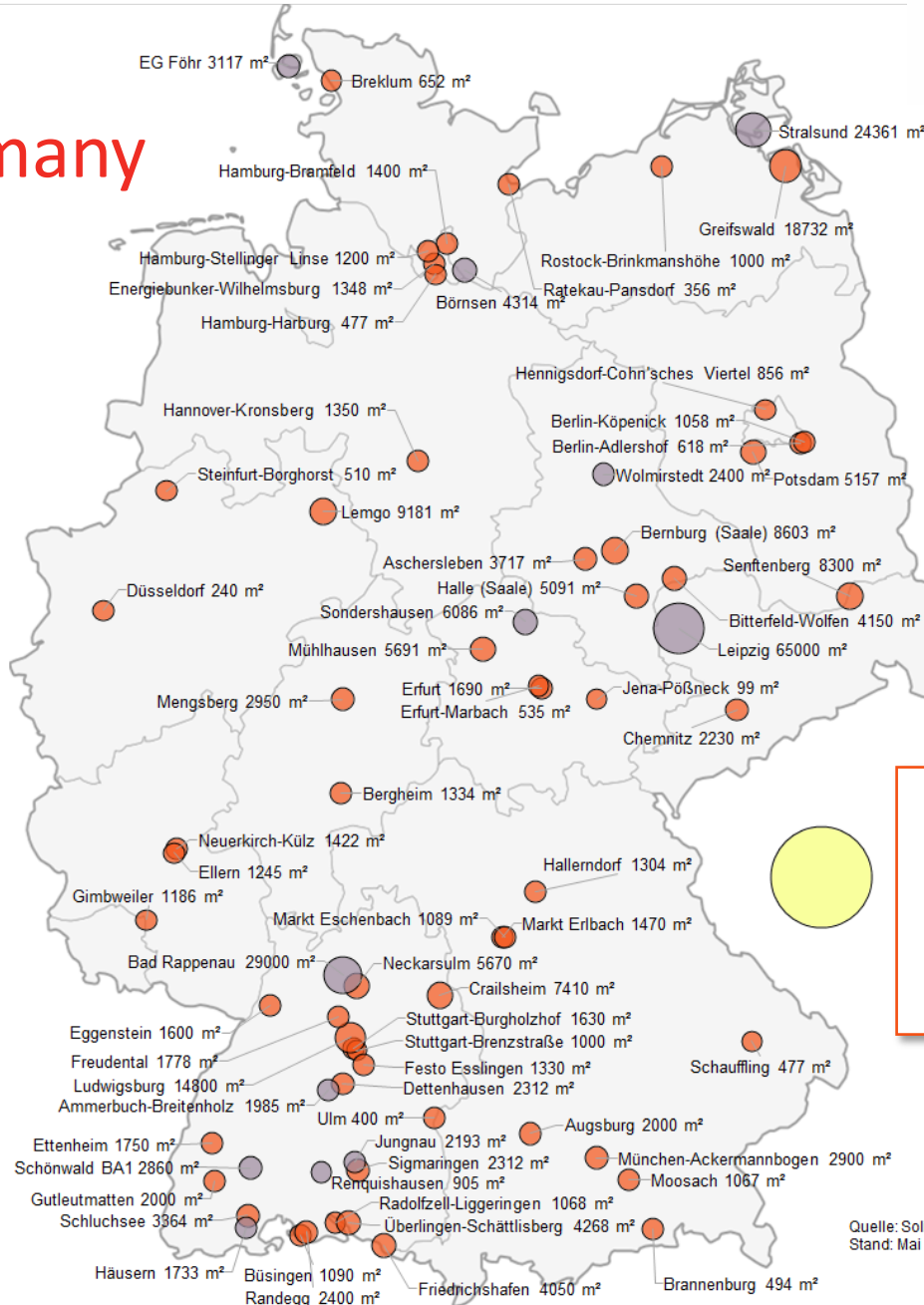
IEA Solar Heating & Cooling Programme | www.iea-shc.org/solar-heat-worldwide



District heating in Germany

Systems in operation:
58 systems
163,411 m² / 114 MW

Realization ongoing:
12 systems
144,000 m² / 100 MW



In development:
about 400,000 m²
/ 280 MW

Quelle: Solites
Stand: Mai 2024

Largest SDH plant in Germany under construction



Site	Leipzig, Germany
District heat consumers	588,000 (2019)
Annual solar share	1.6 %
Capacity of solar field	41 MW
Solar feed-in temperature	Up to 108 °C
Estimate commissioning	Ende 2025
Land area	Around 140,000 m ² for 65,000 m ² of collector field

Multi-MW solar district heating plants on the rise across Europe

- ✓ **37 MW** collector field commissioned in August 2024 in Groningen, Netherlands.
- ✓ 30 years solar heat delivery contract between Special Purpose Vehicle and utility company Warmtestad.
- ✓ Evacuated flat plate collectors deliver the required temperature of the district heating grid between 69 and 93 °C

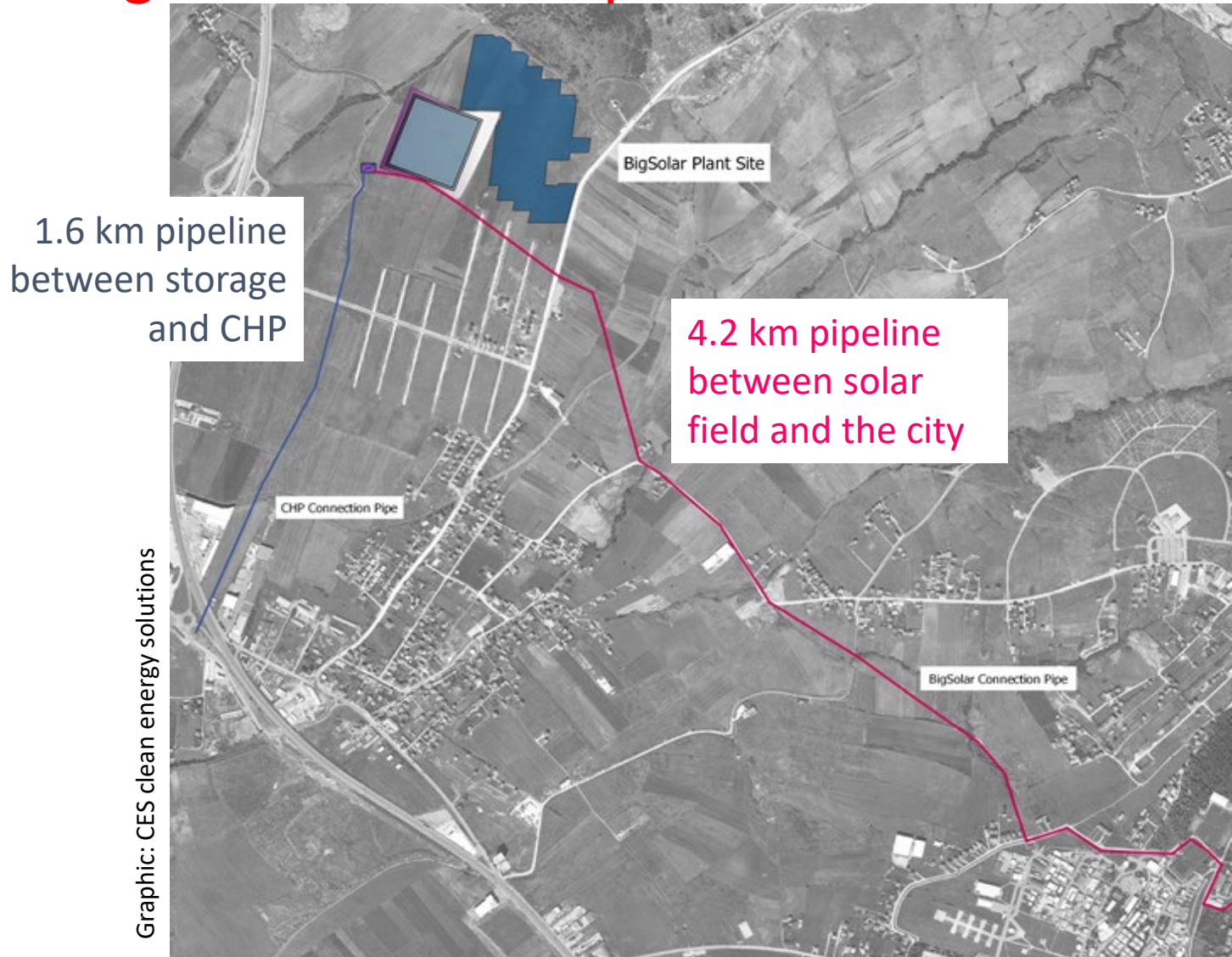


Photo: TVP Solar from Video of the construction site:
<https://www.youtube.com/watch?v=WfwXdOkpHkY&t=4s>



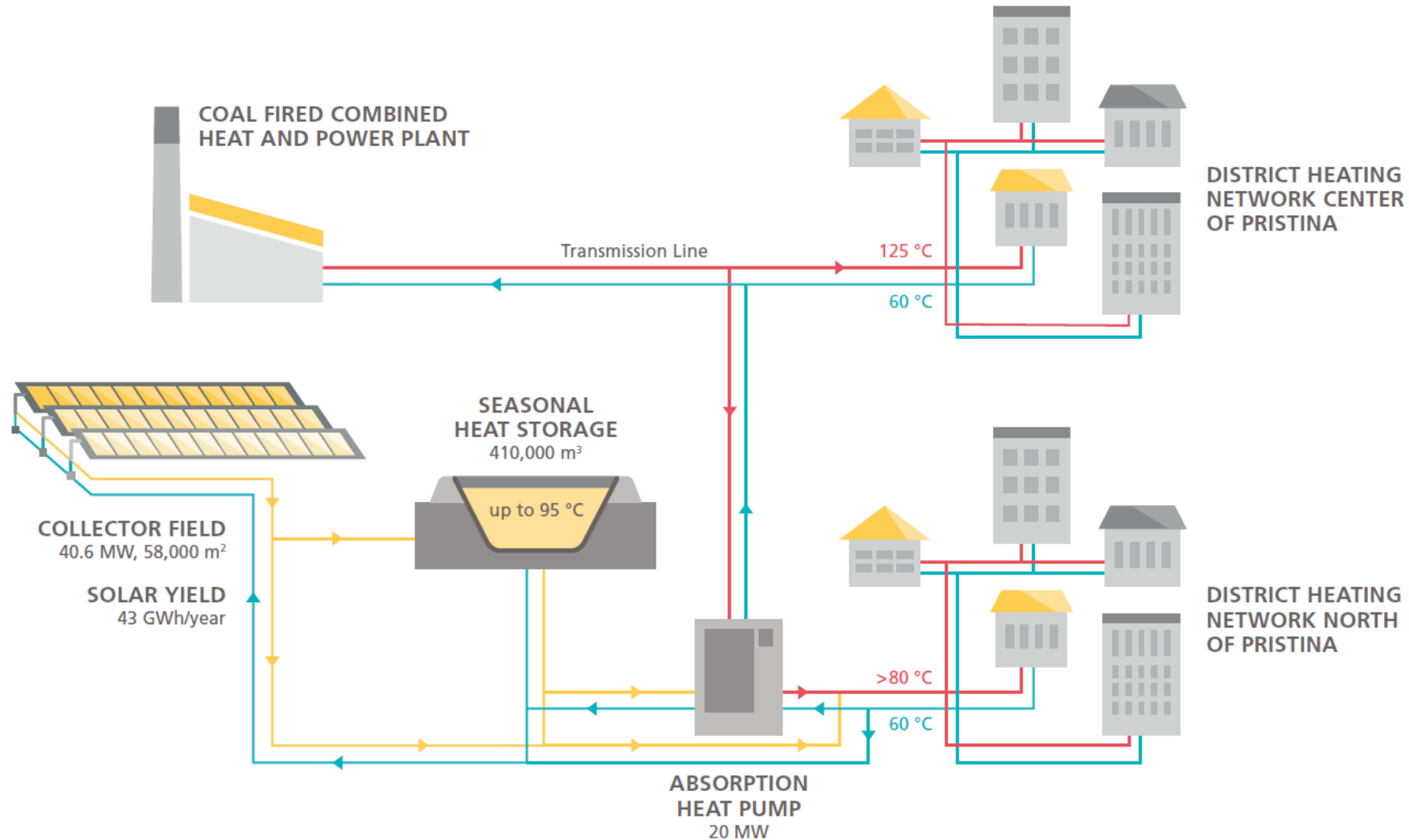
Trend towards larger solar district heating systems providing heat with higher temperatures

Big Solar Pristina replaced coal-based electric heating



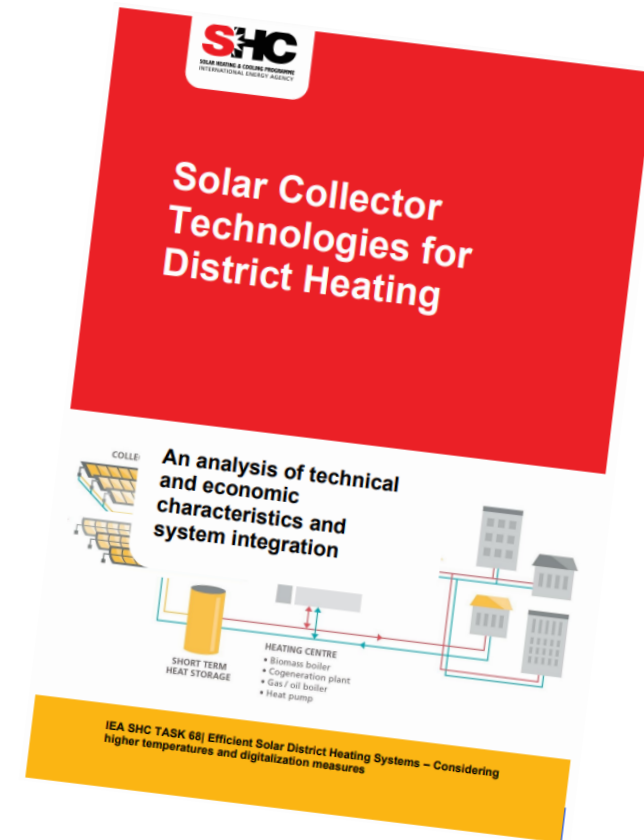
Site	Pristina, Kosovo
New district heat consumers	38,000
Annual solar share	12 %
Capacity of solar field	41 MW
Seasonal storage	408,000 m ³
Investment costs including extension of DH grid	EUR 80 million
Status	Implementation consultant is hired (Clean Energy Solutions from Vienna), tenders for components are being prepared

Big Solar Pristina: absorption heat pumps are key

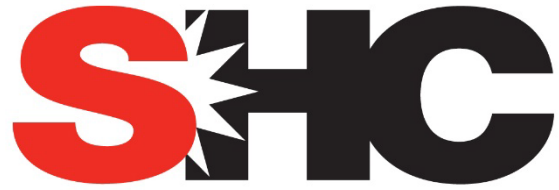


Summary

- ✓ Increasing number of multi-MW solar district heating plants under construction and under planning in Europe
- ✓ Heat pumps in combination with seasonal storages boost solar yield and increase efficiency
- ✓ Recommend Reading: Overview and comparison of different collector types available for solar district heating in new report



<https://task68.iea-shc.org/publications>



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Thanks for your attention!

IEA SHC Task 68: <https://task68.iea-shc.org/>

Bärbel Epp, solrico, <https://solarthermalworld.org/>

SunPeek Open-Source Platform for ISO 24194 Performance Analysis

Philip Ohnewein

is researcher in the field of renewable and hybrid energy systems at the Austrian Institute of AEE INTEC since 2010. His focus is on modeling and data analytics in projects such as MeQuSo, DataDrivenLM and the GEL Open Data Platform. In 2021, he won the Austrian ACR Innovation Award for a digital-twin-based method for ongoing performance assessment in large solar thermal plants.



Levels of Control of Solar District Heating Grids

Dr Klaus Lichtenegger

works as Senior Researcher at the Austrian research institute BEST – Bioenergy and Sustainable Technologies, where he works on modelling, simulation, optimization and control of trans-sectorial energy systems. He is Task Manager of IEA SHC Task 68 on *Efficient Solar District Heating*. Klaus is also strongly involved in teaching at Universities of Applied Science.



Open Data for Solar Thermal Plants: Status, Potential, and Barriers

Lukas Emberger

is a data scientist working at SOLID Solar Energy Systems since 2016, an Austrian company specializing in large-scale solar heat applications. Lukas focuses on monitoring, with a particular emphasis on fault detection, visualization, and digitalization of solar-thermal plants. He is involved in the IEA SHC Programme since eight years.

