



SOLAR HEATING & COOLING PROGRAMME  
INTERNATIONAL ENERGY AGENCY

# Promoting SDH among multiplier organisations / networks

# The background

The IEA SHC ExCo published a call for SHC TCP communication activity proposals at the beginning of 2022.

Solrico together with Absolicon drafted a proposal related to Task 68 and received approval during the ExCo meeting in June 2022. Budget USD 3,500 for solrico + USD 800 for graphic designers.

The proposed activities:

1. Developing a SDH introduction presentation (pptx file in English) explaining the functionality and advantages of SDH that could be used by experts/ExCos (also outside Task 68) in workshops to generally introduce SDH to an audience outside the research community.
2. Reaching out to organisations / networks that unify municipality stakeholders such as Covenant of Mayors Europe / Energy Cities / or networks that work in the field of Energy Communities with the aim to organise joint webinars or to be able to hold the introduction presentation during one of their trainings or workshops.

# Feedback from the Task 68 experts and the ExCo

- The SDH introduction presentation is available on this shared drive  
<https://onedrive.live.com/view.aspx?resid=D3E044FBCD4E235B!2055&ithint=file%2cpptx&authkey=!ACH7IY8y5WwU644>
- Feedback is still welcome until the **20<sup>th</sup> of December**, first presentation is planned on 22<sup>nd</sup> of December in cooperation with the Association REScoop
- The following reviewers provided input, corrections and comments:
  - Pamela Murphy (IEA SHC)
  - Pedro Dias (Solar Heat Europe)
  - Magdalena Berberich (solites)
  - Bojan Bogdanovic (EBRD)
  - Christian Holter (SOLID Solar Energy Systems)
  - Christian Stadler (Viessmann)
  - Guglielmo Cioni (TVP Solar)
  - Joakim Byström / Maria Alipatova (Absolicon)
  - Viktor Unterberger (BEST Research)
  - Goeffroy Gauthier (PlanEnergi)
  - Christian Kok Skov (former PlanEnergi)
  - Jonas Sørensen (Aalborg CSP)

# Infographics

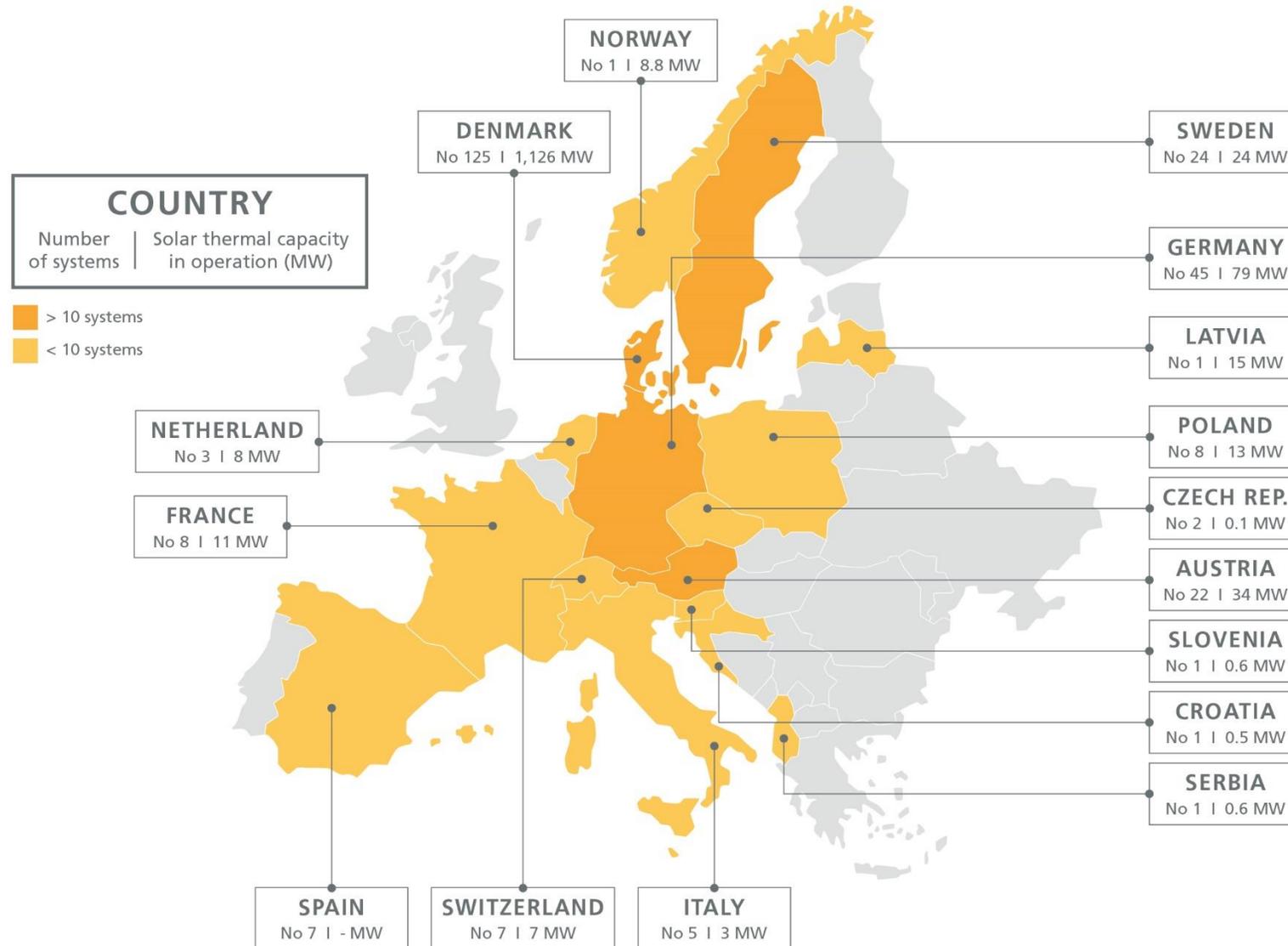


Chart: IEA SHC Task 68  
 Source: IEA SHC Solar Heat  
 Worldwide Report Ed. 2022 /  
 own researches

# Latvian utility company is cutting down on fossil fuel use



INA BERZINA-VEITA

Managing Director at  
Salaspils Siltums

“We’ve been working on this project since we visited Denmark in 2016 to attend a conference on district heating. The aim is to reduce our carbon footprint and become less reliant on fossil fuels.”



Photo: Salaspils Saltums

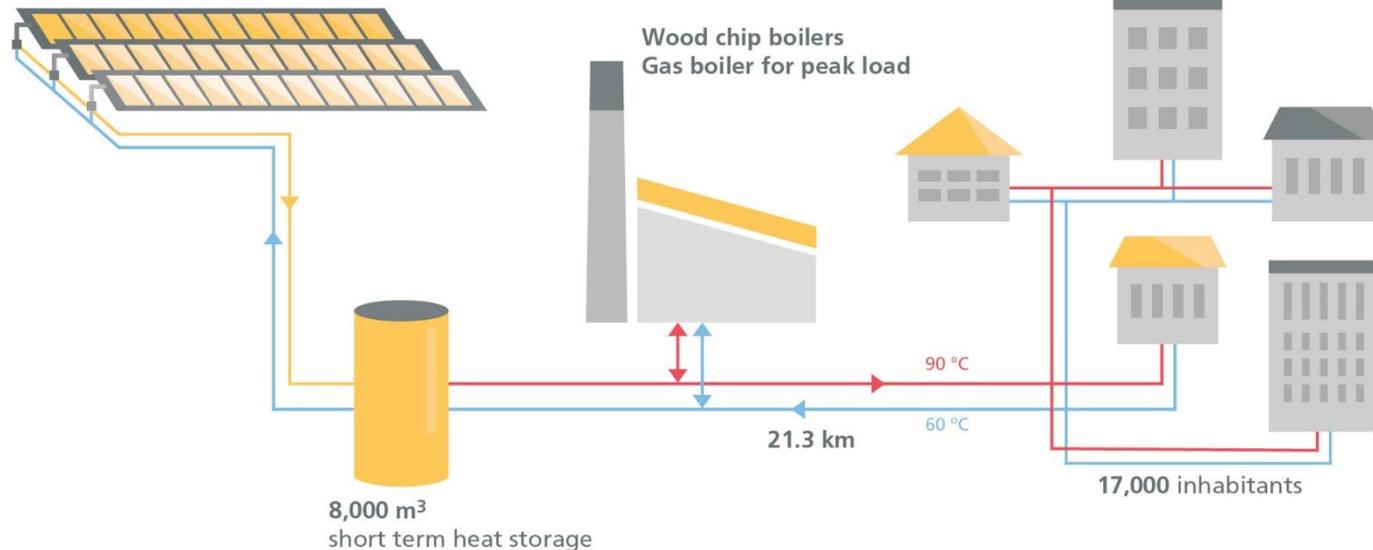
# Salaspils, Latvia: 90 % renewable district heat since 2019



Contribution to total heat demand .....	65 GWh / year
Solar thermal .....	16 %
Biomass boilers + flue gas condenser .....	72 %
Gas boilers .....	12 %
Ø solar yield 2020/2021 .....	486 kWh/m <sup>2</sup> a

## FLAT PLATE

21,672 m<sup>2</sup>, 15 MW  
MANUFACTURER: Arcon-Sunmark, Denmark  
SUPPLIER: Filter, Latvia



# Salaspils, Latvia: Constant solar heat prices over 25 years

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## The price of heat energy for Salaspils Siltums customers will remain unchanged

31 August 2021 HEATING NEWS

“We are proud to have taken care of fuel diversification in the past, thus avoiding the effects of rapid fluctuations in the price of natural gas. The price of heat energy for Salaspils Siltums customers is stable and will not be increased.”



Source: Screenshot from <https://salaspilssiltums.lv/>

# 110 MW in Silkeborg, Denmark, sets lowest benchmark costs

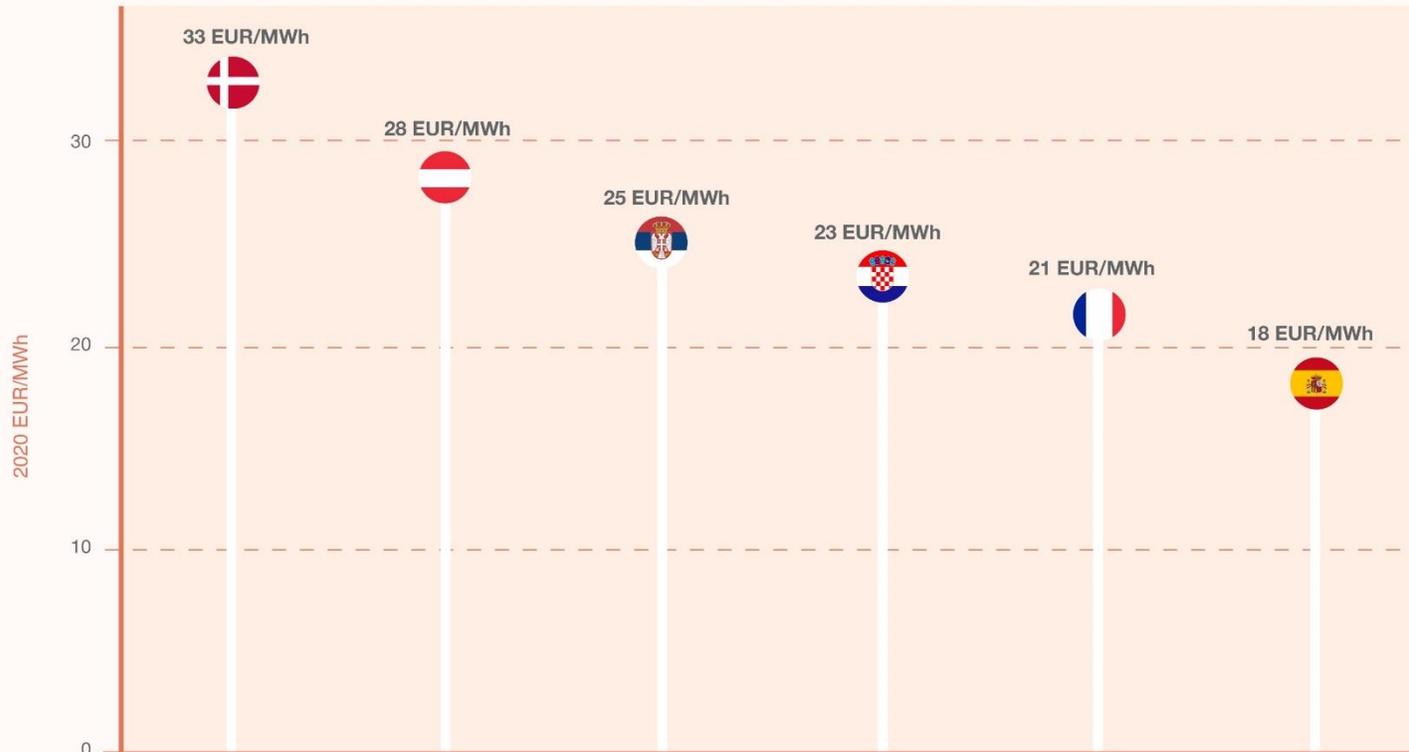


Photo: Arcon Sunmark

Site	Silkeborg, Denmark
Connected heat consumers	21,000
Annual solar share	20 %
Capacity of solar field	110 MW
Commissioning date	December 2016
Investment costs	DKK 250 million [in 2016] <b>EUR 35 million [in 2020]</b>

# Investment costs and heat prices

Weighted-average LCOH assuming the capital costs of the 110 MW SDH plant of Silkeborg at different sites in Southern Europe



How to read this chart:

The 110 MW SDH plant in Silkeborg, Denmark, reaches 511 kWh/m<sup>2</sup> per year at a site with global annual horizontal irradiation of 1,006 kWh/m<sup>2</sup>. The LCOH were calculated with the same total installed costs but for the higher specific solar yield at sunnier regions (linear extrapolation).

 Average annual solar yield

Silkeborg, Denmark	Graz, Austria	Belgrade, Serbia	Split, Croatia	Marseille, France	Sevilla, Spain
 511 kWh/m <sup>2</sup>	 612 kWh/m <sup>2</sup>	 674 kWh/m <sup>2</sup>	 733 kWh/m <sup>2</sup>	 816 kWh/m <sup>2</sup>	 950 kWh/m <sup>2</sup>

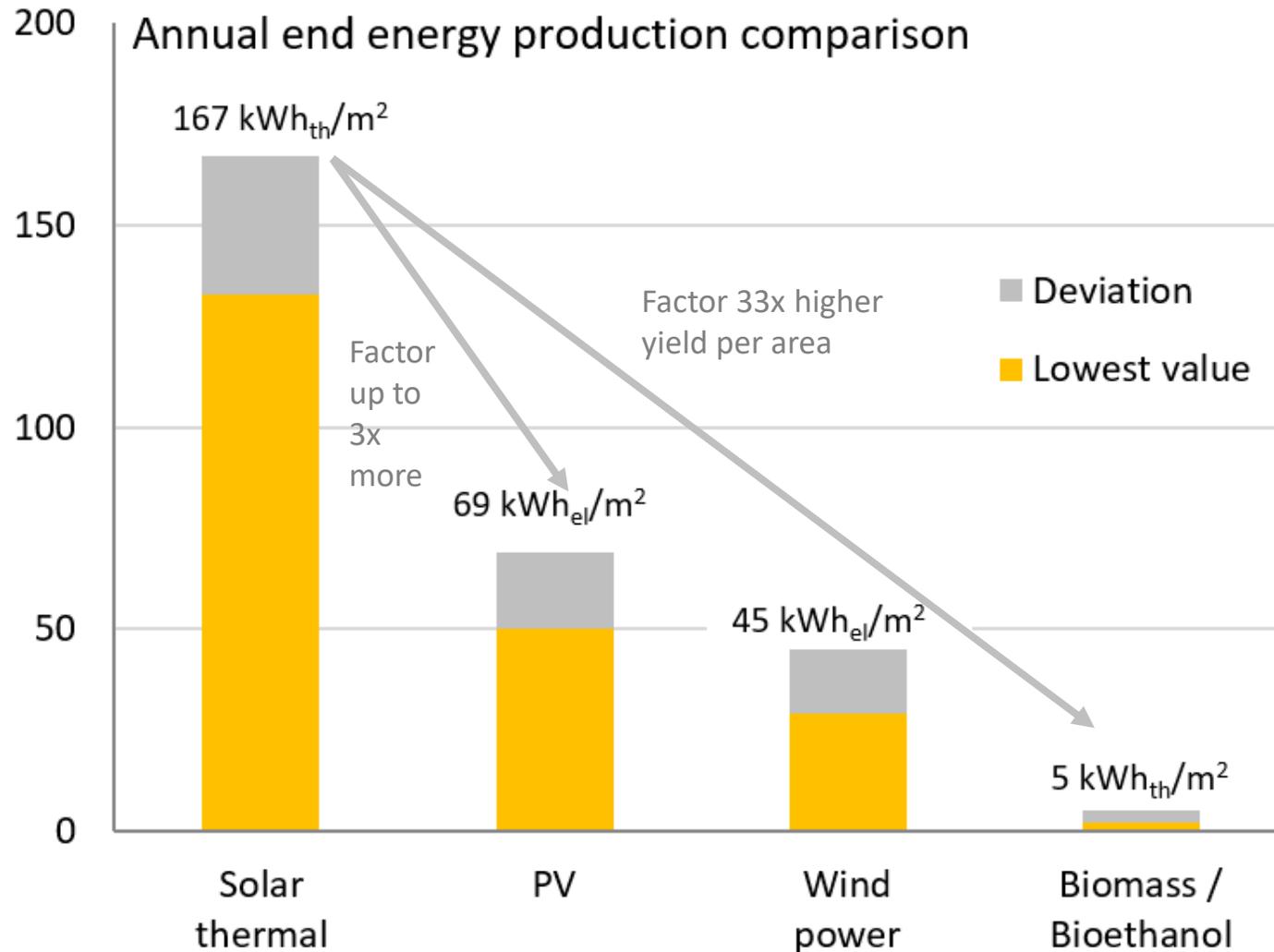


COST ANALYSIS: IRENA



Levelised cost of solar heat over 25 years of operation for a 110 MW plant is between 18 and 33 EUR/MWh.

# Yield per area comparison of different renewable technologies



Solar thermal harvests three times more kilowatt hours than photovoltaics and 33 times more than biomass on the same area.

# 1 MW solar heat capacity requires an area of 1,350 m<sup>2</sup>



You need around twice as much land as the size of the collector field.



8,300 m<sup>2</sup> collector area on 20,000 m<sup>2</sup> land



9,181 m<sup>2</sup> collector area on 17,000 m<sup>2</sup> land



14,797 m<sup>2</sup> collector area on 25,000 m<sup>2</sup> land

Source: Brochure about solar district heating from BSW Solar, Germany  
Photos: Stadtwerke Senftenberg, Stadtwerke Lemgo, Stadtwerke Ludwigsburg-Kornwestheim

# 112 smart cities in Europe

EU Commission's target: 112 selected mission cities should be climate-neutral by 2030.

The solar field simulator of Task 68 “Efficient Solar District Heating Systems” identifies the area that is necessary to cover 20 % of the total district heat demand in 12 of these cities using the sun.

Field simulator

<https://www.absolicon.com/fs/>

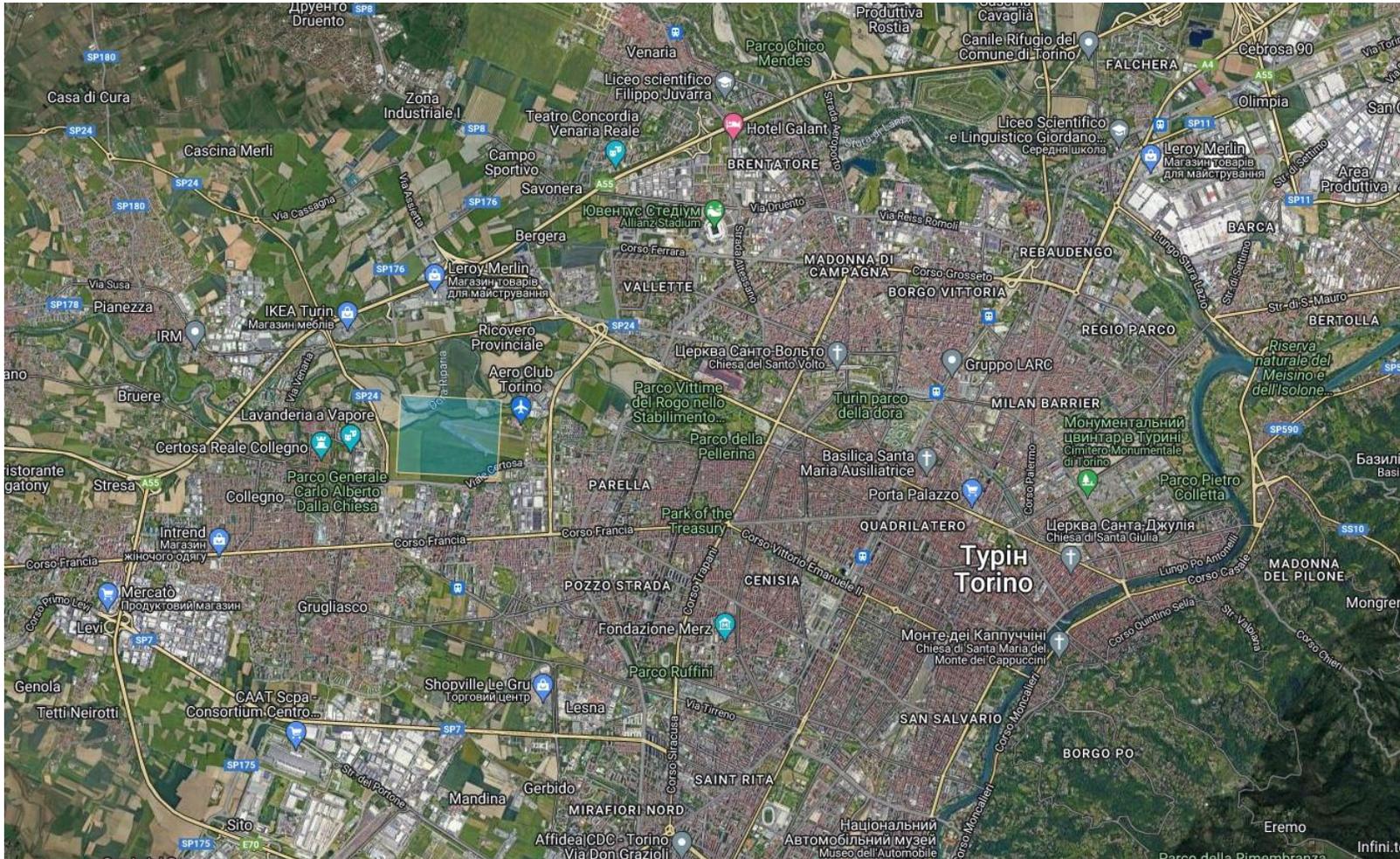


Source: <https://eurocities.eu/>

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



# There is space for solar heat even in larger cities



Site	Turin/Torino, Italy
Inhabitants	847,000
Heat demand in heating grid	1,815 GWh/a
Solar irradiation	1,476 kWh/m <sup>2</sup> a
Land size of solar field	129.7 hectares
Capacity of solar field	401.1 MW
Solar share	20 %

Source: <https://www.absolicon.com/fs/>

## Each temperature level has a suitable collector type



By adjusting the speed of the pumps in the solar circuit, the target temperature of 90 °C is consistently achieved.



This 9,118 m<sup>2</sup> vacuum tube collector field supplies heat at 90 °C to the district heating system of the German town of Lemgo.

Photo: Viessmann

# How big does the solar storage need to be?

- At solar shares below 5 % **no daily storage** tank is necessary.
- For solar shares between 10 and 20 % **a daily storage tank** is necessary and between 50 and 100 litres of storage per square metre of collector area are needed.
- If solar heat should cover **100 % of the heat demand** in the summer months, a storage volume of above 200 litres per square metre collector area is recommended.
- If solar shares of above 30 % over the year are to be achieved, then **a seasonal storage** tank is necessary.

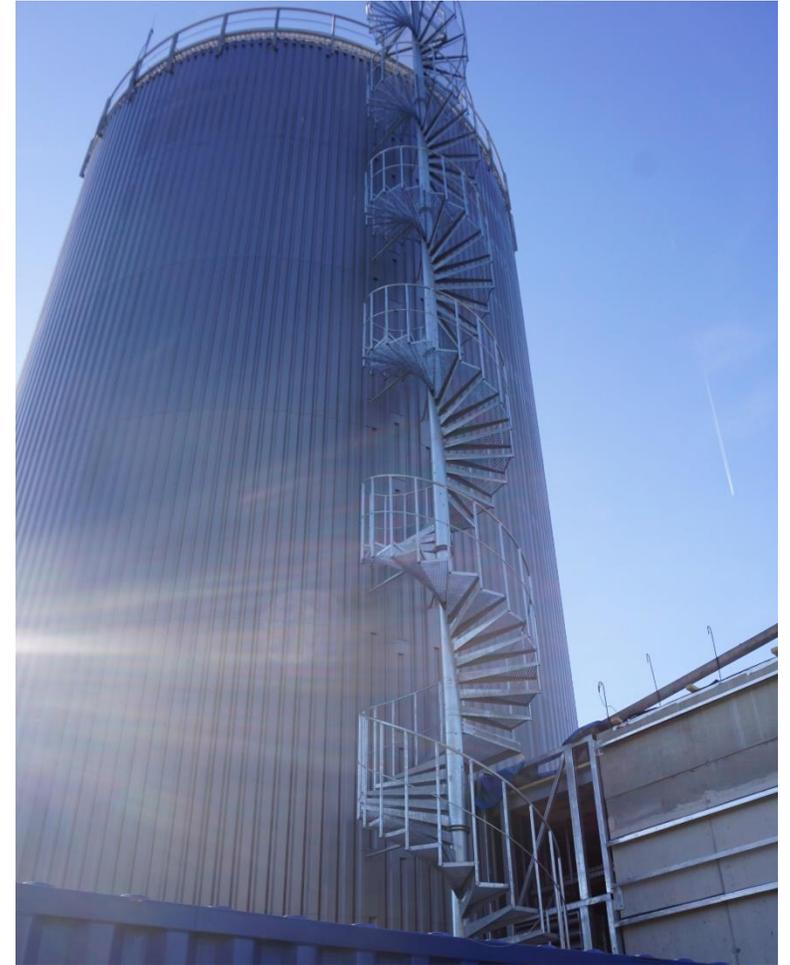


Photo: AEE INTEC

# Storing solar energy in summer for heating in winter

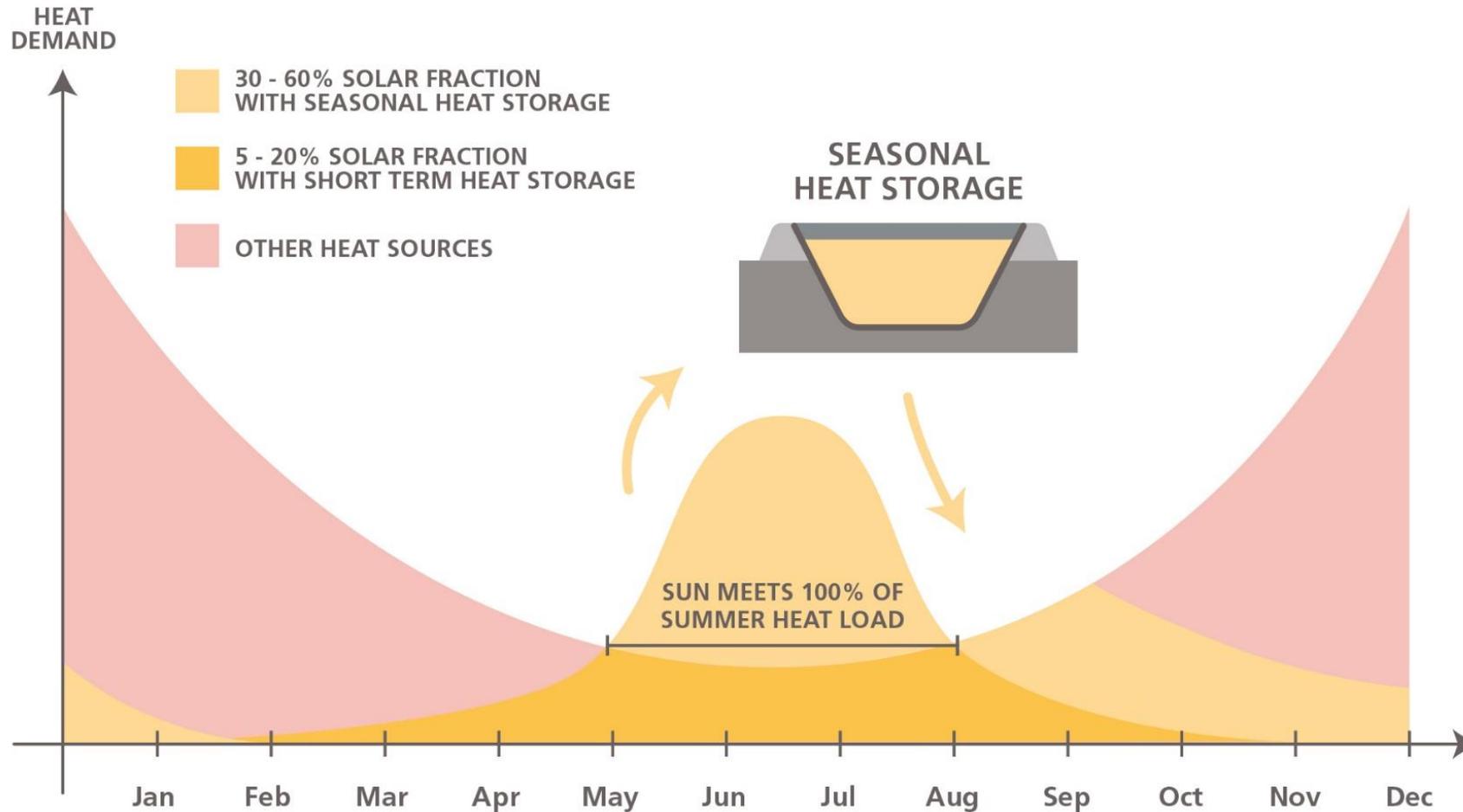


Chart: IEA SHC Task 55

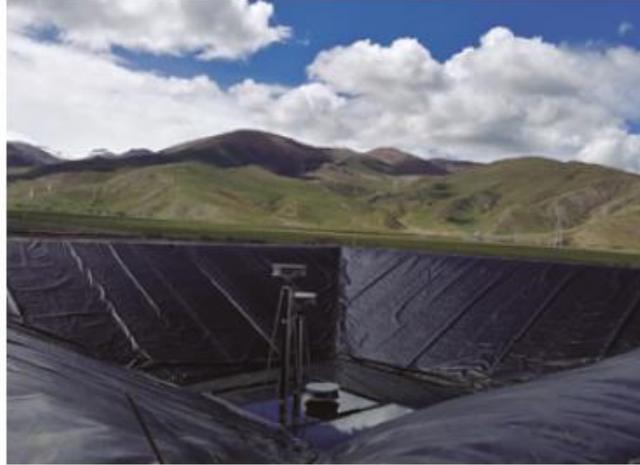
# Construction of a pit heat storage



1. Dig a hole in the ground and put the soil around the edges.



2. Add a watertight liner at the bottom of the pit.



3. Fill the pit with water.



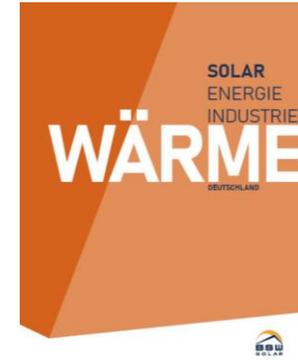
4. Put an insulating and floating cover on top.



A pit heat storage tank with more than 50,000 m<sup>3</sup> loses 10 to 20 % of the stored energy over the year. The losses depend significantly on the size of the cover.

# Observations

- Investor brochure from IEA SHC Task 5 was very helpful
- Large variety of case studies with testimonials were available together with the BSW Solar brochure about SDH from March 2022
- A great approach from Absolicon to illustrate collector fields to cover 20 % of the heat demand in the 112 smart large cities chosen by the European Commission.
- Difficulties to agree on general recommendations regarding the necessary storage volumes.
- A nice-to-have would be a comparison of thermal storage costs with electric battery storage costs.



# Distribution cooperations

Organisation	Contact person
<b>Euroheat &amp; Power based in Brussels</b> Membership of 130 utilities	Arianna Scenna, Head of Events, Brussels
<b>Covenant of Mayors Europe</b> Office in Brussels, Belgium (hosted by Energy Cities) <a href="https://www.eumayors.eu/en/">https://www.eumayors.eu/en/</a> 9,000 cities and towns are members	Floriane Cappelletti, Head of Communication & Events at Brussels office
<b>REScoop.eu</b> European federation of citizen energy cooperatives	Felix Kriedemann, Project Manager, REScoop
<b>ICLEI – Local Governments for Sustainability</b> <a href="https://iclei.org">https://iclei.org</a> 2500 local and regional governments	Carsten Rothballe, Coordinator - Sustainable Resources, Climate and Resilience at ICLEI , in Freiburg
<b>Energy Communities</b> <a href="https://energycommunities.gov">https://energycommunities.gov</a> The Energy Community is an international organisation which brings together the European Union and its neighbours to create an integrated pan-European energy market. (Albania, Bosnia and Herzegovina, Kosovo, North Macedonia, Georgia, Moldova, Montenegro, Serbia and Ukraine.)	Biljana Grbic, District heating consultant at Energy Communities, and Naida Taso, Heat of Renewable Energies as Energy Communities

First big challenge was to find out the right contact person for training or event organisation

# Distribution cooperations

Organisation	Status of negotiations
Euroheat & Power based in Brussels	A Webinar on SDH is under discussion together with Solar Heat Europe in the first quarter of 2023
Covenant of Mayors Europe,	Difficult to follow up, because Floriane is not the right person, but blocks to give colleagues names. Second try via Pedro Dias and his contacts at Covenant of Mayors
REScoop.eu	Online presentation on the 22 <sup>nd</sup> of December between 10 and 11 am during the regular meeting of the working group on Citizen-Led-Renovation which will also start covering the RES H&C dimension
ICLEI – Local Governments for Sustainability	<ul style="list-style-type: none"> <li>➤ Online Webinar in February 2023 about renewable district heating with the introduction presentation within the project Act!onHeat. Recording will be available as training material online.</li> <li>➤ Further opportunity later in the year within CINTRAN: Carbon Intensive Regions in Transition – Coal-substitution measures</li> <li>➤ Contribution to the toolkit on coal-substitution measures</li> </ul>
Energy Communities	They provide high-level policy support, SDH is a relevant topic. Workplan 2023/2024 is currently put together and SDH might be a topic, follow up in January 2023

The second challenge was to raise enough awareness to accept a call.

The appealing style of the SDH presentation helped a lot!

Two presentations are confirmed!

# Observations

- After the right contact persons at REScoop, ICLEI and Energy Communities saw the presentation they agreed on a call to get to know the background of IEA SHC and Task 68.
- The first calls were able to arouse interest, but implementation is still taking a long time.
- Solar Heat Europe needs to be the door opener for Covenant of Mayors .
- For Rescoop the key topic is energy communities and their business models.
- For ICLEI and Energy Communities the most urgent topic currently is substitution of coal in district heating. This needs additional research, as most of the well-known SDH plants substitute gas or biomass.

## Issue for the ExCo

- With the two presentations in December 2022 (REScoop) and February 2023 (ICLEI) the solrico budget will be used up.
- Additional solrico budget in 2023 would be necessary to:
  - Pursue the idea of joint webinars or trainings in 2023 with ICLEI, Energy Communities and REScoop.
  - To follow up with Solar Heat Europe to develop a direct contact with Covenant of Mayors.
  - To participate in a webinar with EuroHeat & Power about SDH in the first quarter of 2023.
  - To fill the gap in the SDH presentation regarding coal-substituting SDH plants.

**Solrico could carry out these activities with a budget of USD 1,800.**



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# Solar Heat for Cities and Towns

Introduction to solar district heating by the  
IEA SHC Task 68 - Efficient Solar District Heating Systems  
<https://task68.iea-shc.org/>