

ABSOLICON

Energiforsk frukostseminarium

19th of October 2021



JOAKIM BYSTRÖM, CEO ABSOLICON



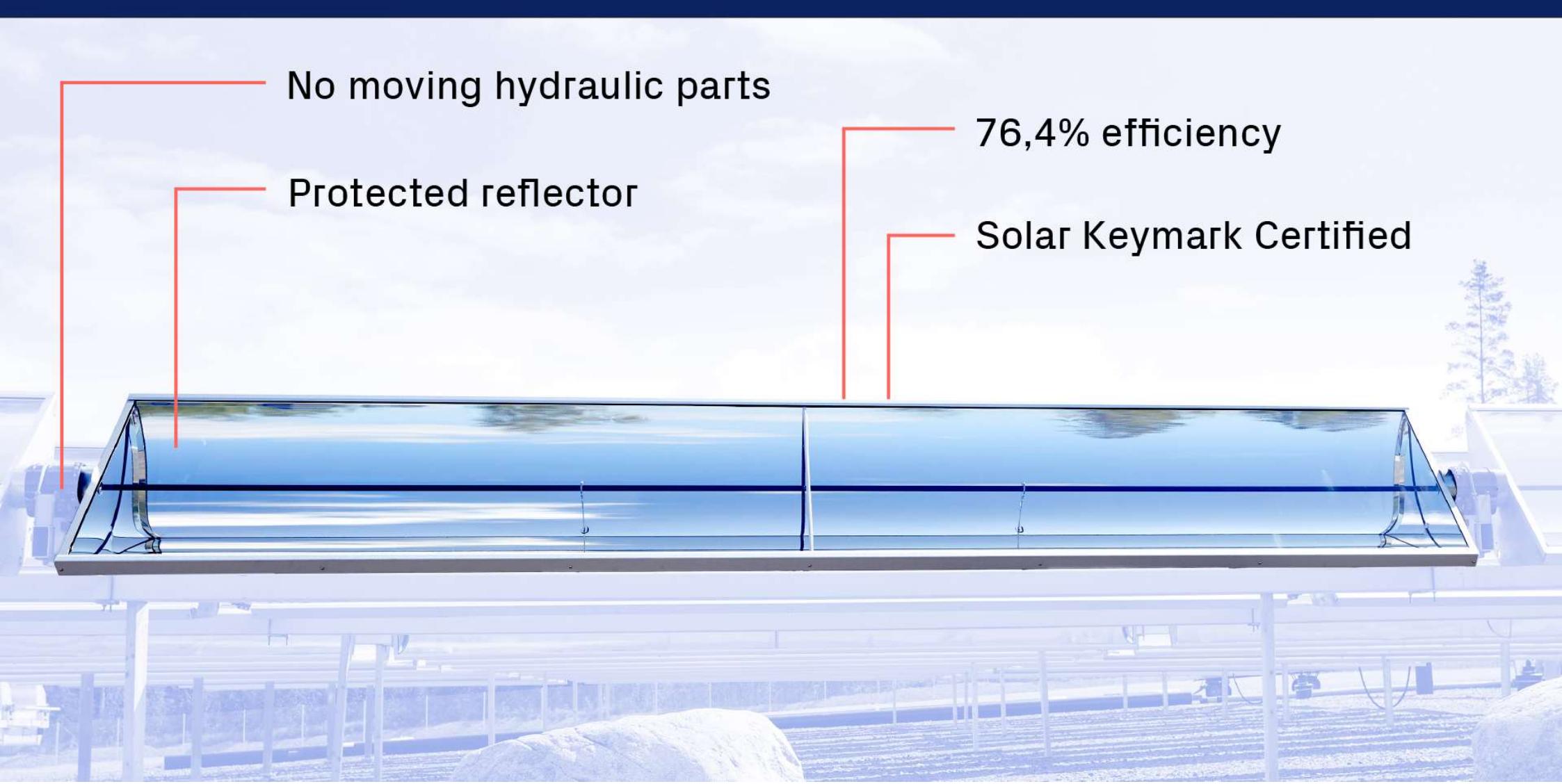
Paris, december 2015

net-zero emissions
of greenhouse gases
“in the second
half of this
century”

“limiting global temperature
increase well below
2 degrees Celsius, while
urging efforts to limit the
increase to **1.5 degrees**”



Designed for large fields in tough climate



No moving hydraulic parts

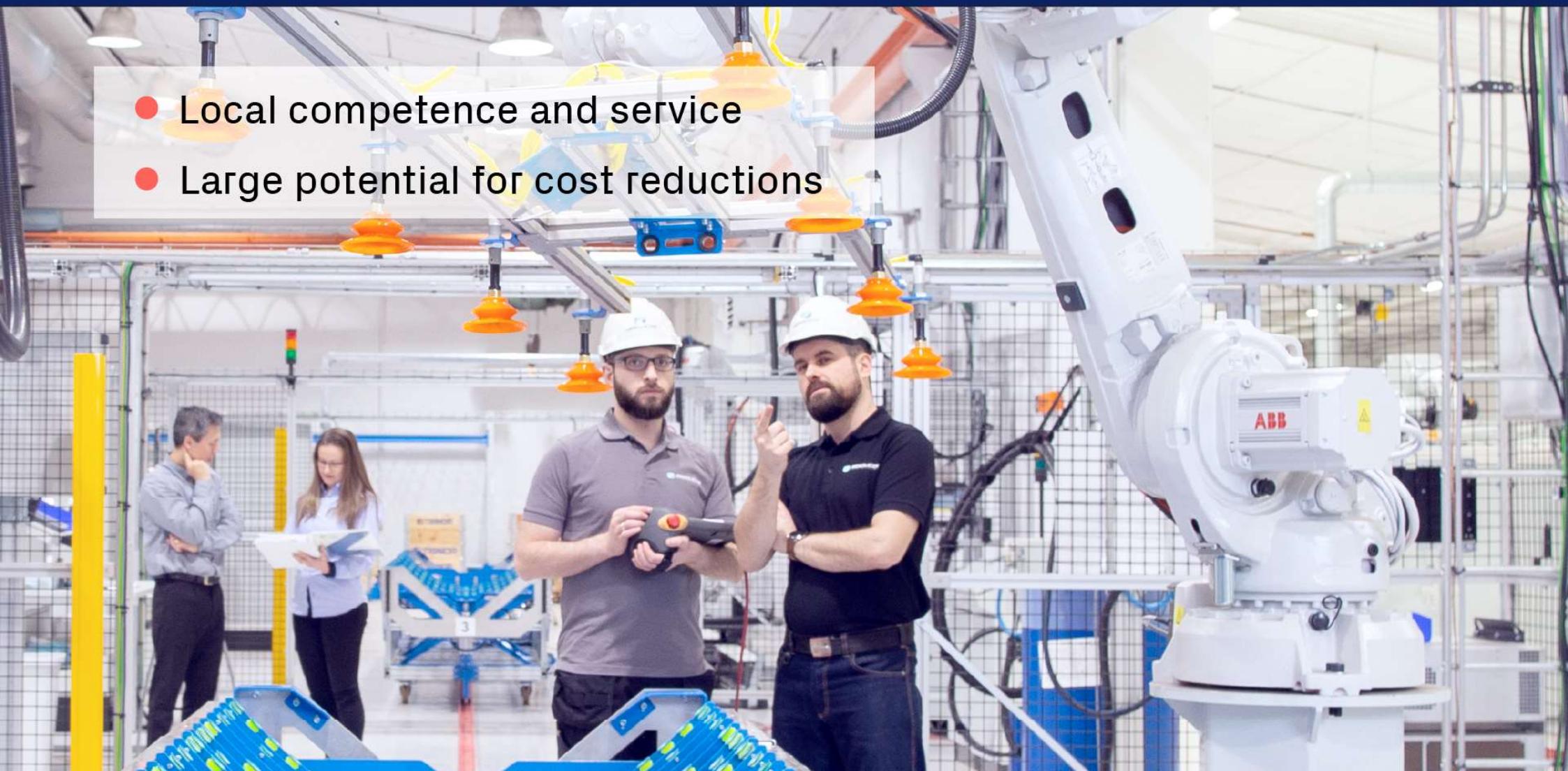
Protected reflector

76,4% efficiency

Solar Keymark Certified

Local production line in Chile

- Local competence and service
- Large potential for cost reductions



Strong R&D - New T200 at SPF

- 
- 70 patent granted or pending
 - Reflector, receiver and glass
 - New T200 at SPF

Strong partnerships

- 
- Stock listed company
 - AlfaLaval, Siemens and ABB
 - AB InBev and Carlsberg

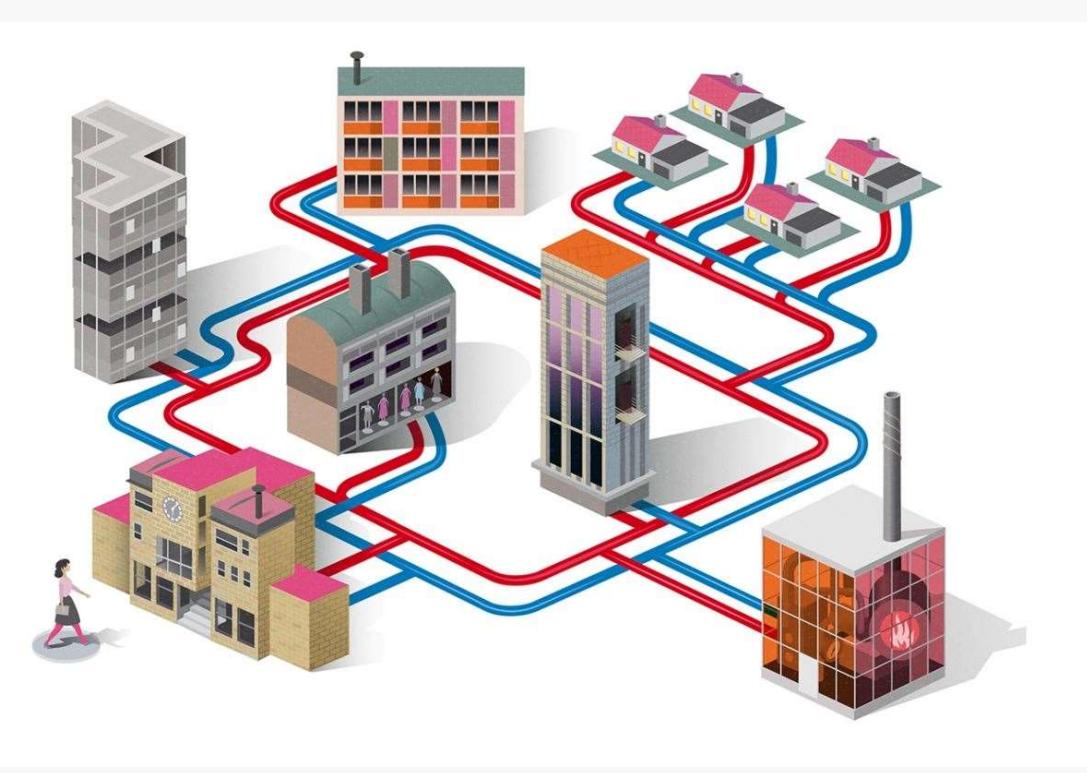


Storskalig solvärme

Upp till **8 TWh solvärme** i fjärrvärmenäten för minskade kostnader och frigörande av **8 miljoner m³ biobränsle** som ersätter **3 miljoner ton CO₂** utsläpp samt undviker elektrifiering av värmesystemet som skapar effektoppar på vintern

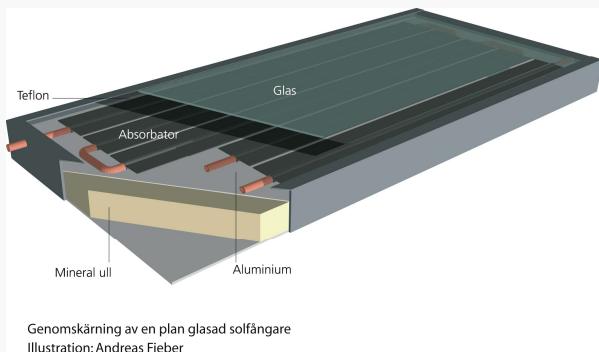
Storskalig solvärme för fjärrvärmenät

- När du lägger handen på ett element, varifrån kommer värmen?
- 9 av 10 flerfamiljshus och hälften av alla bostäder i Sverige får sin värme från fjärrvärmenät.
- Fjärrvärmen står för 61 TWh av Sverige energiförsörjning. Där eldas varje år 38 TWh biobränslen (14 miljoner ton) och 4,6 TWh olja, kol och naturgas.



Vad är solvärme och vad är solceller?

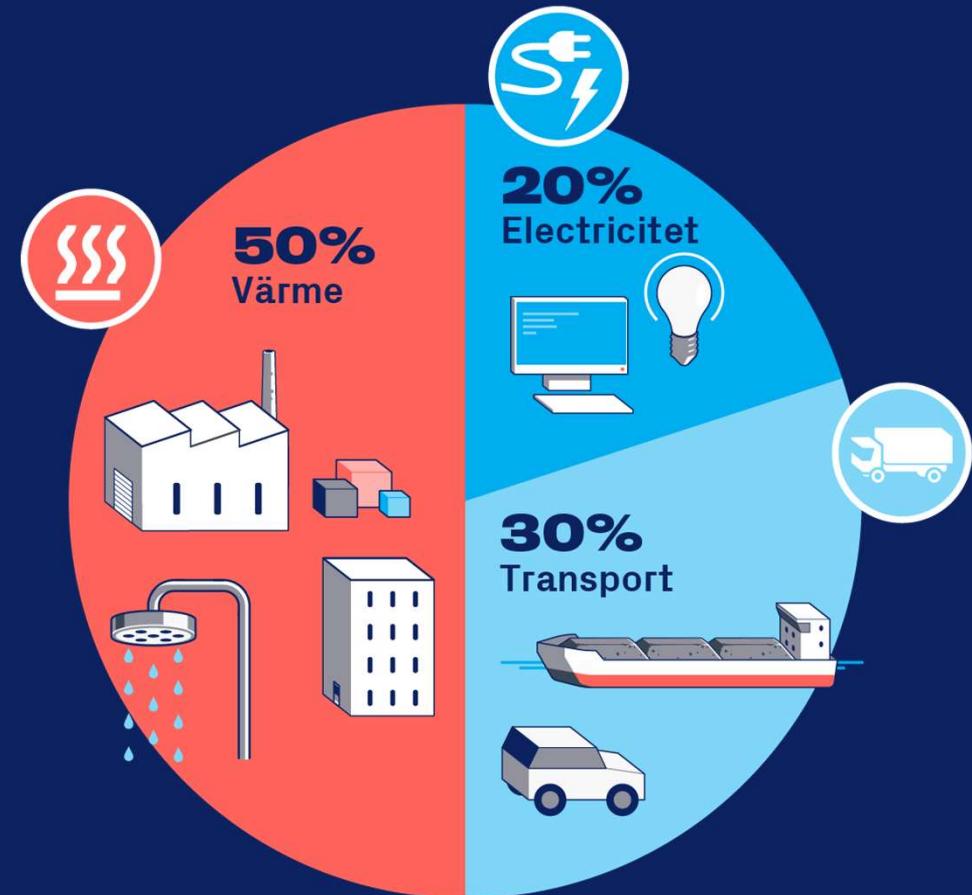
- **Solvärme** genererar **värme** direkt som kan användas för uppvärmning eller varmvatten t.ex. för dusch
- Varmvattnet kan lagras i en ackumulatortank eller varmvattenberedare
- 70% av solljuset omvandlas till värme i solfångaren



- **Solceller** genererar **el** som används i byggnaden eller matas ut på elnätet
- Elektriciteten kan lagras i batterier
- 20% av solljuset omvandlas till el i solcellerna



**HÄLFTEN AV VÄRLDENS
SLUTANVÄNDNING
AV ENERGI ÄR VÄRME**



Solar thermal for district heating



Solar District Heating in Europe



Market figures EU:

~ 300 plants (> 350 kW_{th})
Capacity: 1,100 MW_{th}
Newly installed: +30 %/a
Production: 660 GWh/a
(Source: Solites, 2019)

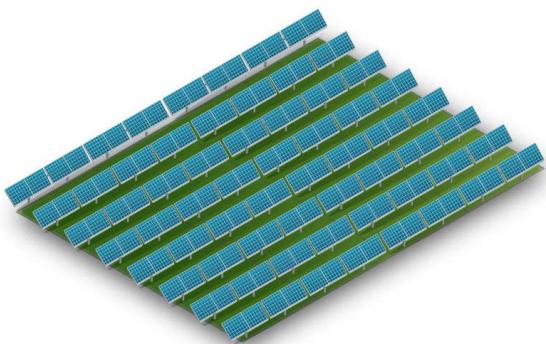
SDH i Danmark

- 1 000 MW_{th} solar heat in 158 cities
- 127 000 m² in Silkeborg



Performance on ground area in Sweden – if there is limitation on land or land is expensive

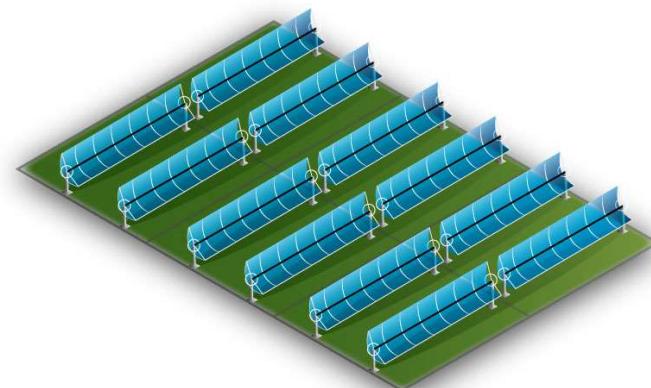
PV



60 kWh/m²

Solar Thermal

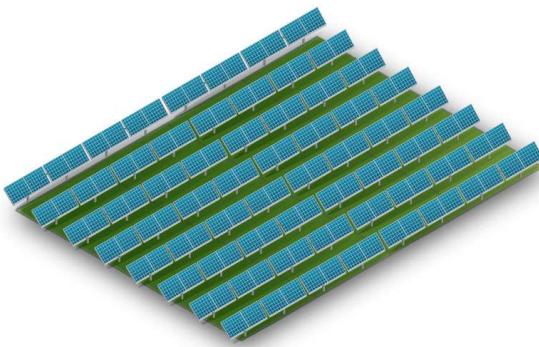
x 2,5



150 kWh/m²

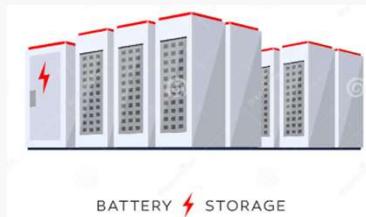
Energy storage for electricity vs heat

PV



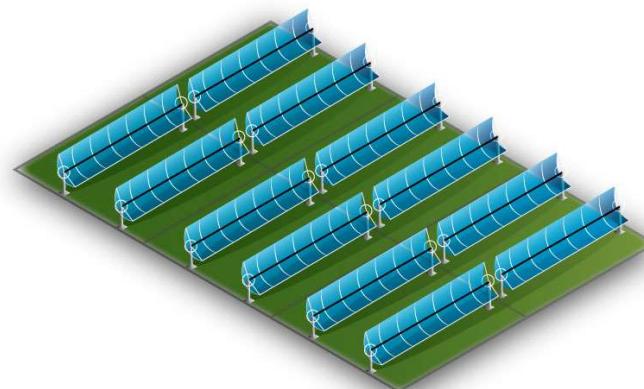
Battery electric storage

€200/kWh



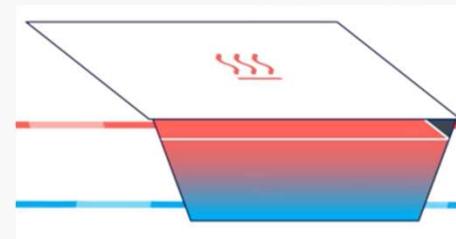
Solar Thermal

x 600



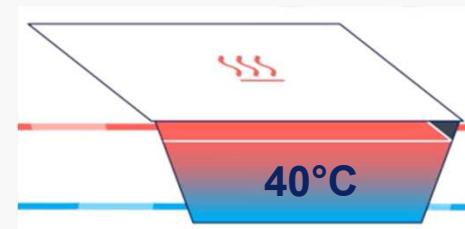
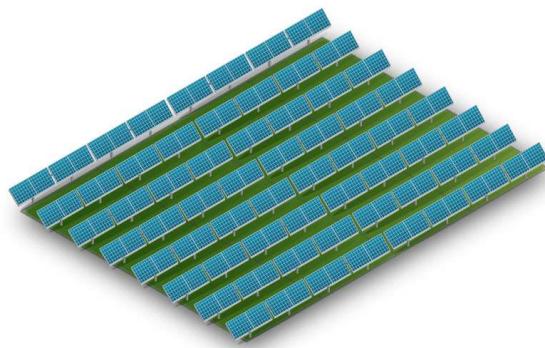
Pit storage for district heating

€0,3/kWh

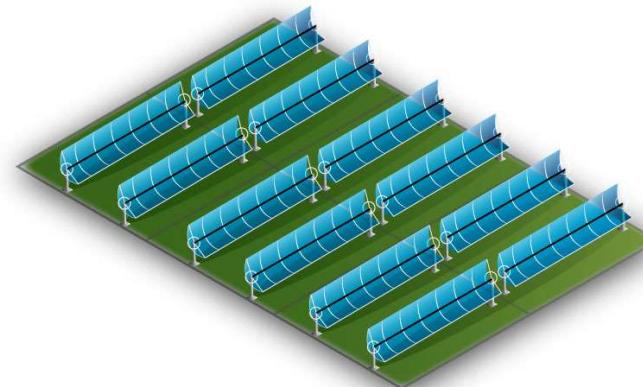


Heat pump operation electric vs thermal

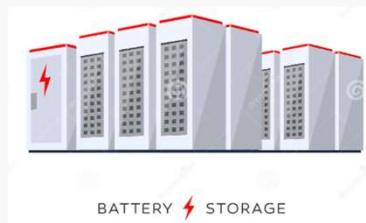
PV



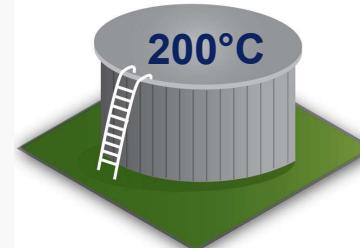
Solar Thermal



Battery electric storage



Pit storage for district heating



Grid backup

Electric COP 3,5

Biofuel boiler backup

Li-Br 3-stage COP 2,2

Peak power of single panel factory gate

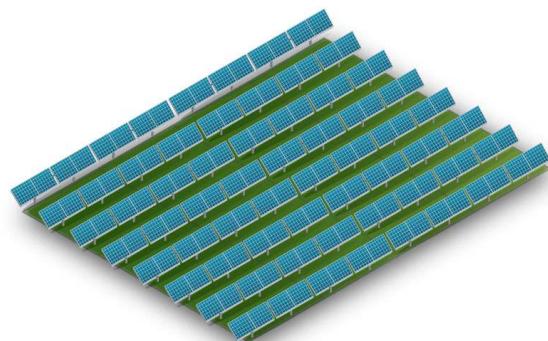
€40/m²

200 Wp/m²

€70 / m²

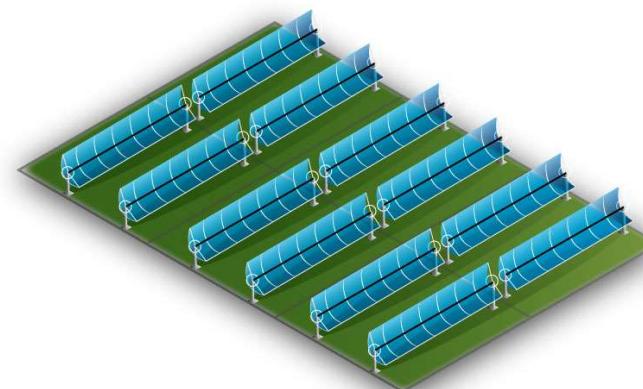
700 Wp / m²

PV



Solar Thermal

x 2



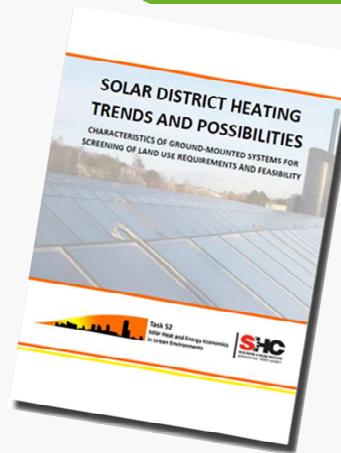
€0,2 /Wp

€0,1 / Wp

Energy price for an installed system?

Härnösand example

- Heat demand: 165 GWh/year (high density)
- Green areas within 1000 m vicinity: 1.7 mio. m²
- Horizontal solar radiation: 869 kWh/m²/year

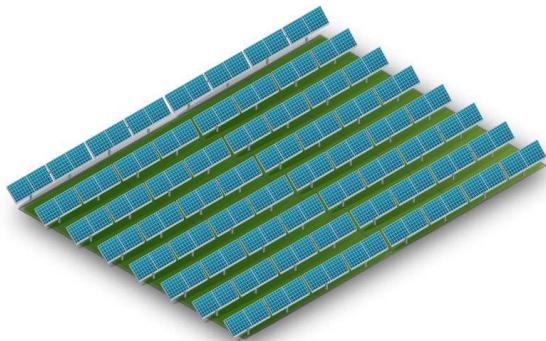


IEA SHC Task
55 • Härnösand
• 07.10.2019 •
Christian Kok
Skov

Solar fraction (to DH network)	20 %	40 %
Area of collector field	95 000 m ²	237 000 m ²
Ground area of collector field	330 000 m ²	830 000 m ²
Share of available ground within 1000 m	20 %	50 %
Storage volume	19 000 m ³	710 000 m ³
Solar heat production	33 GWh	83 GWh
Estimation of heat losses	2.6 % of solar heat	20.9 % of solar heat
Estimated heat price (delivered at network)	35,6 € (385 SEK)/MWh	55,5 € (600 SEK)/MWh

Total energy cost for solar energy in Sweden

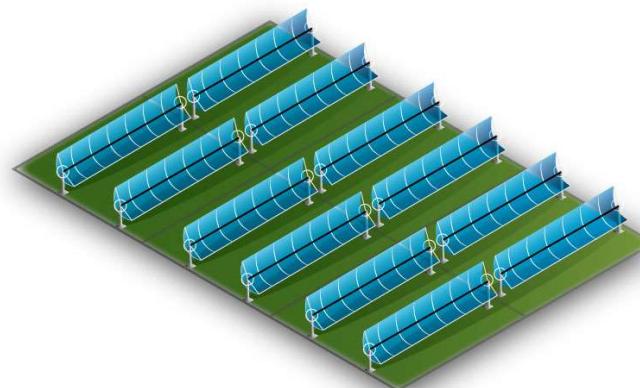
PV



€60/MWh

Solar Thermal

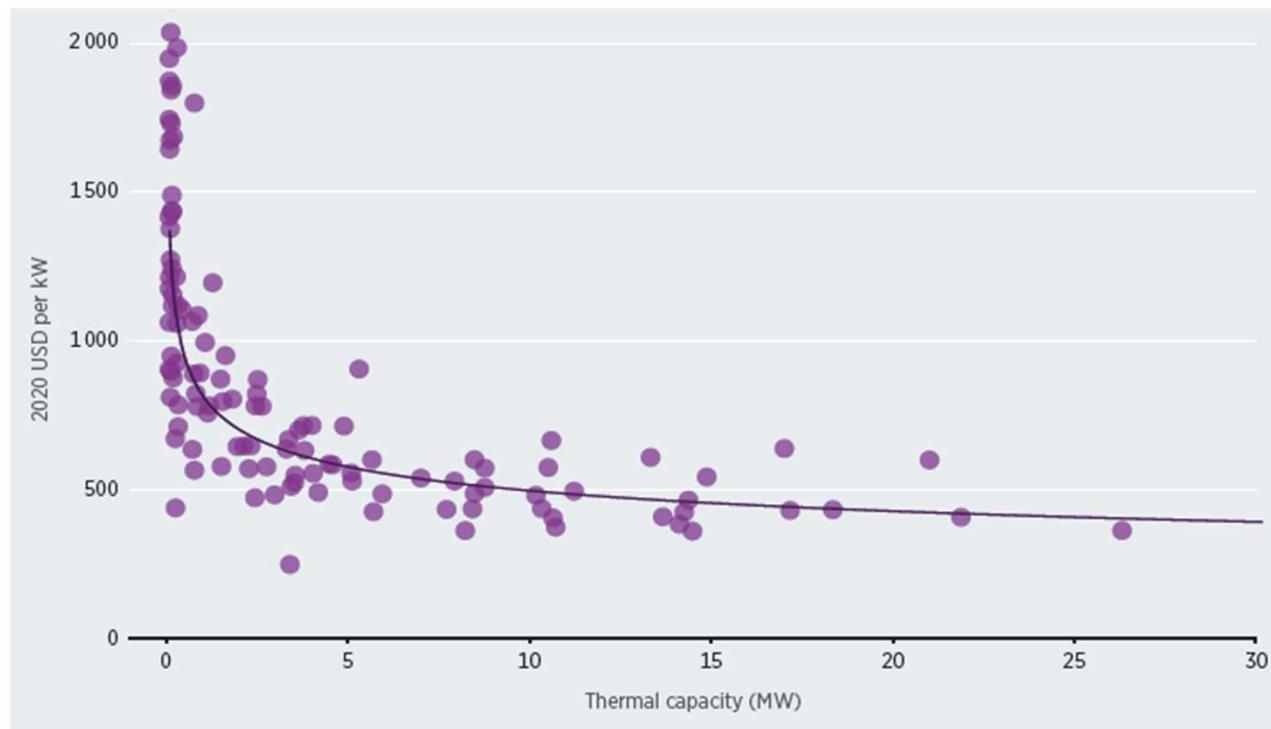
x 2



€30/MWh

Economy of scale – 12% lower cost for each doubling of size

Figure 9.3 Total installed costs for district heating projects by installed capacity in Europe, 2010-2020



Source: IRENA and Solar Payback, 2021

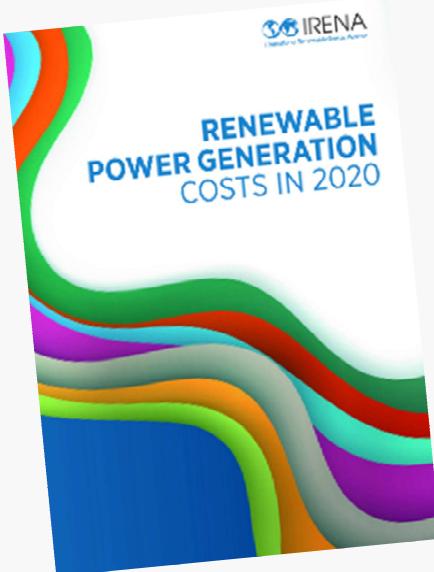
Biggest SDH installation in the world is 90 MW (127 000 m²) for 20% solar fraction for a city with only 44 000 inhabitants

Installations for larger cities or higher solar fraction reduce the cost

For a city like Helsinki with 600 000 inhabitants in the DH network would be 12 times bigger and with 35% lower cost.

LEARNING CURVE - SOLAR HEAT REDUCE 18% FOR EACH DOUBLING OF INSTALLED CAPACITY

2021-10-18



Solar District Heating
learning curve 17% - 19%

1 GW solar thermal installed
in Denmark. PV globally
installed 700 GW

SOLAR THERMAL FOR DISTRICT HEATING IN DENMARK

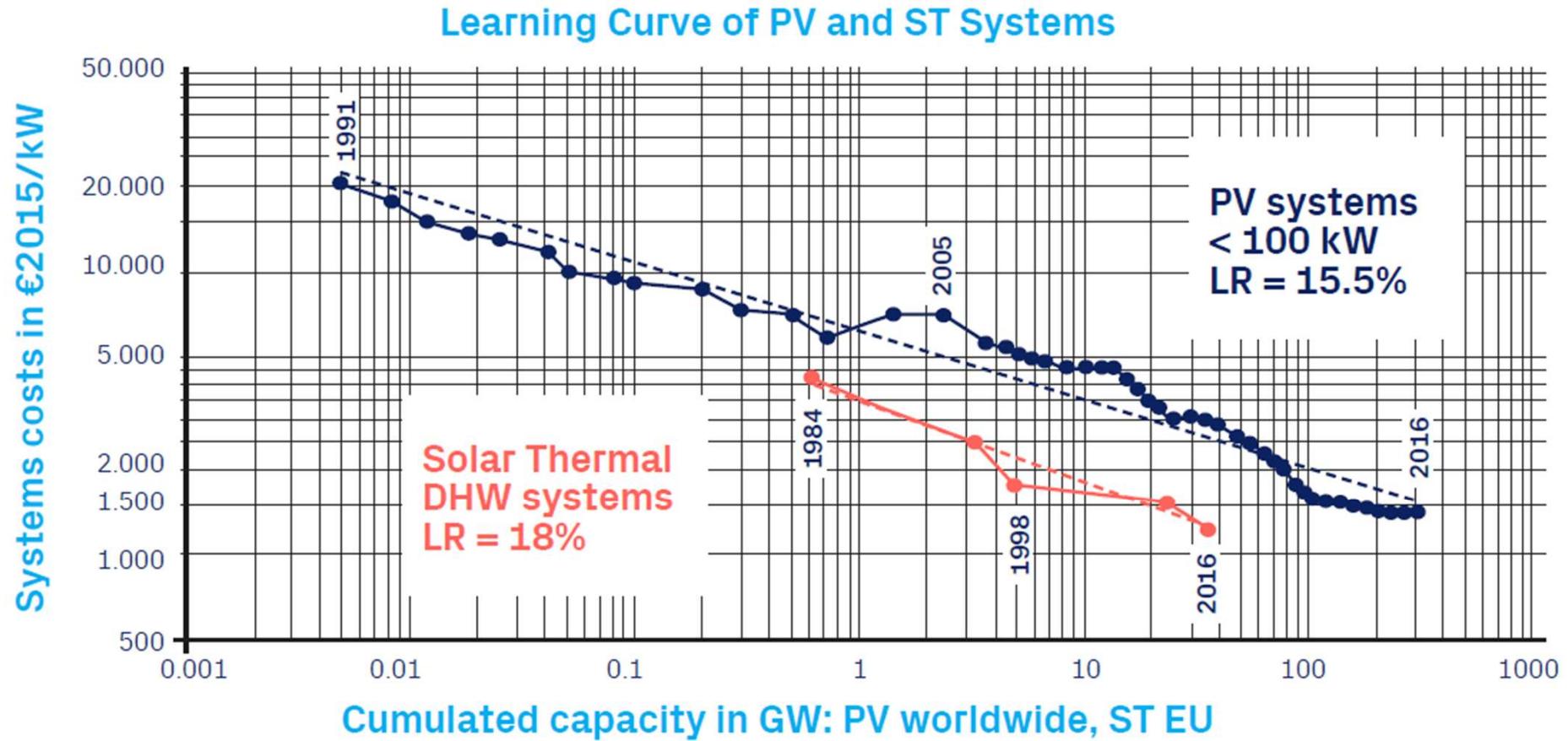
Denmark leads the world for total district heating capacity in operation, with more than 1 GW_{th} at the end of 2020. Around 120 villages, towns and cities use solar heat in their municipality-owned district heating networks.

The total installed cost of district heating scale solar heat in Denmark fell from a weighted average of USD 573/kW in 2010 to USD 409/kW in 2019. This represents a learning rate for the period of around 17% – slightly higher than that of onshore wind for the period 2010 to 2020. These cost reductions have made solar thermal heating systems a competitive source of heat for district heating, as the weighted-average levelised cost of heat (LCOHEAT) fell from USD 0.066/kWh in 2010 to USD 0.045/kWh in 2019 (Figure 9.1).

In the first years of this period, prices were fairly stable. Then, there was a steep decline of LCOHEAT after 2014, driven by an increasingly competitive supply chain and growing developer experience amongst a small number of highly competitive project developers. Economies of scale are also evident in the most recent years.

The figure excludes a 110 MW_{th} project commissioned in 2016, as this project has lower costs and is something of an outlier in the database. Including this project in the chart would increase the learning rate to 19%. The other important point to note is that since 2016, 55% of the projects commissioned have included storage tanks to meet demand throughout the entire day.

LEARNING CURVE - SOLAR HEAT REDUCE 18% FOR EACH DOUBLING OF INSTALLED CAPACITY



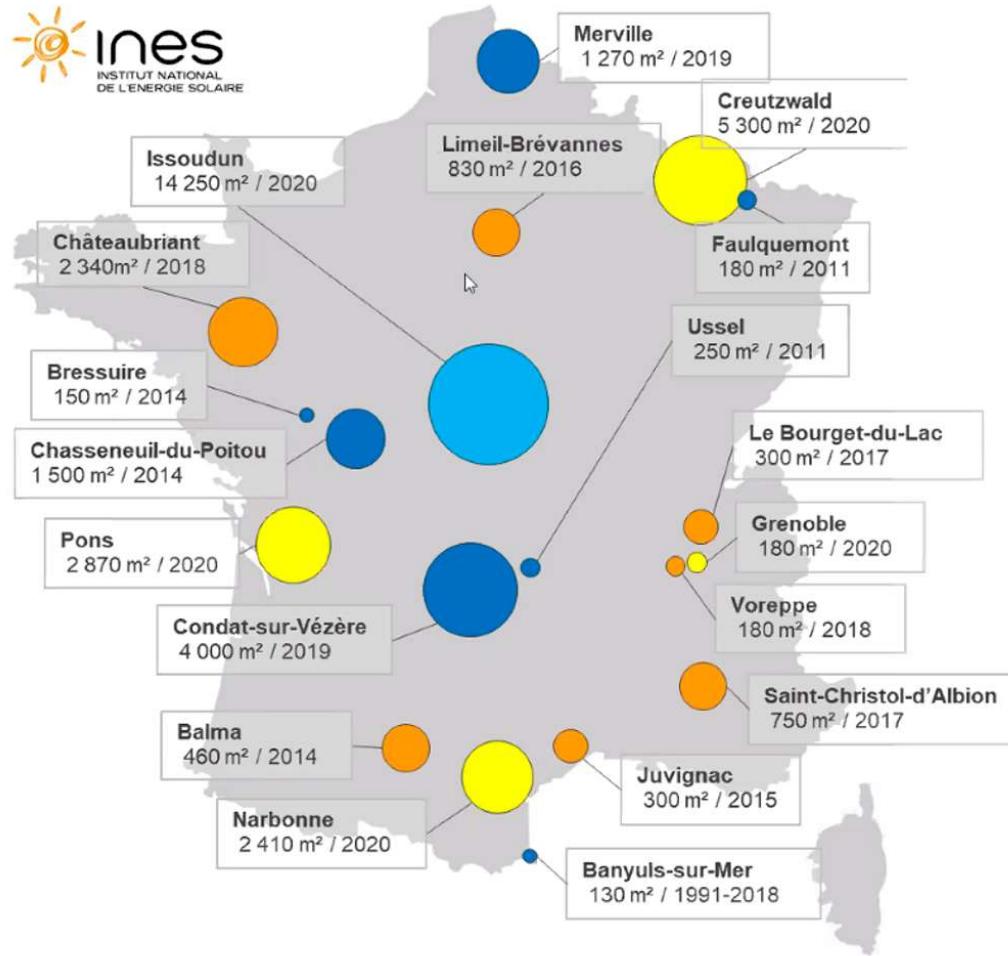
Large scale Solar District Heating (SDH) for cities and industries

- In the past, solar heat was mainly used for domestic hot water and for single houses
- Today, SDH can replace fuels also in large district heating networks
- SDH is a natural compliment to other energy sources



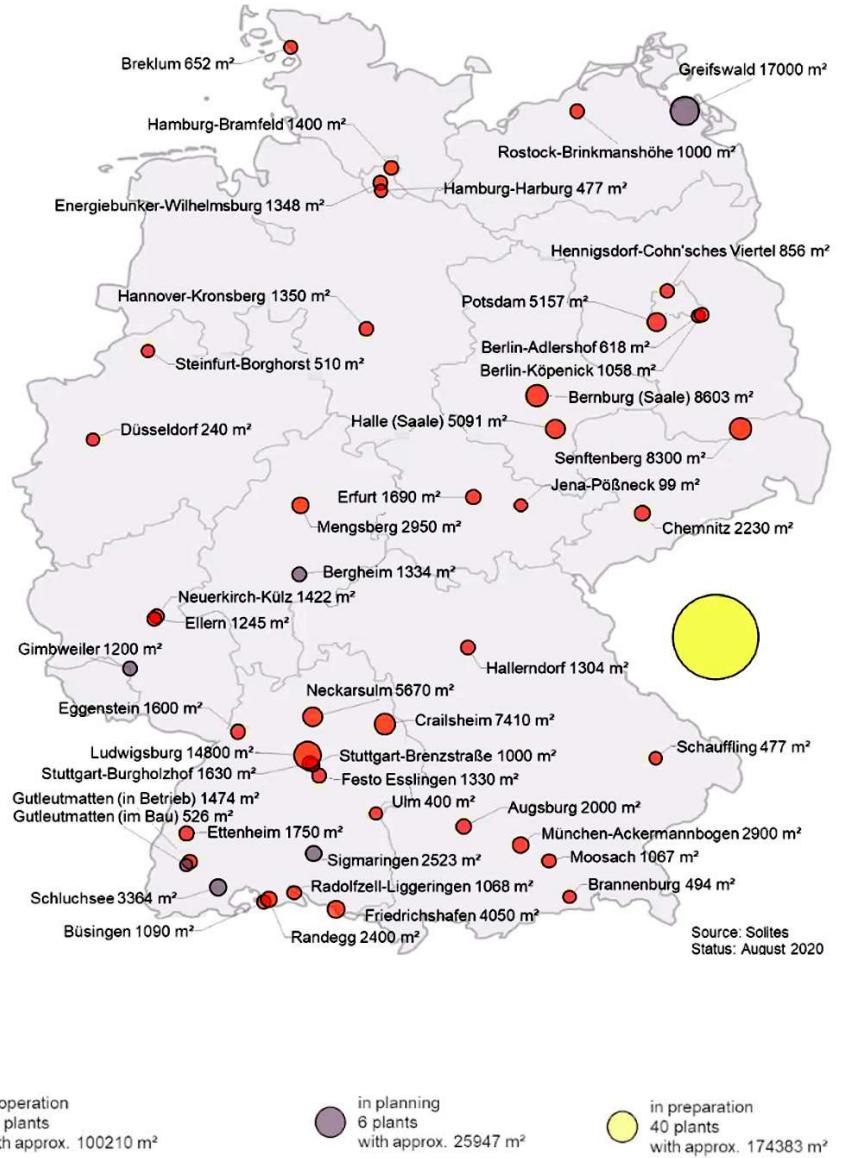
FRANKRIKE

50%-70%
INVESTERINGSSTÖD



TYSKLAND

50%
INVESTERINGSSTÖD



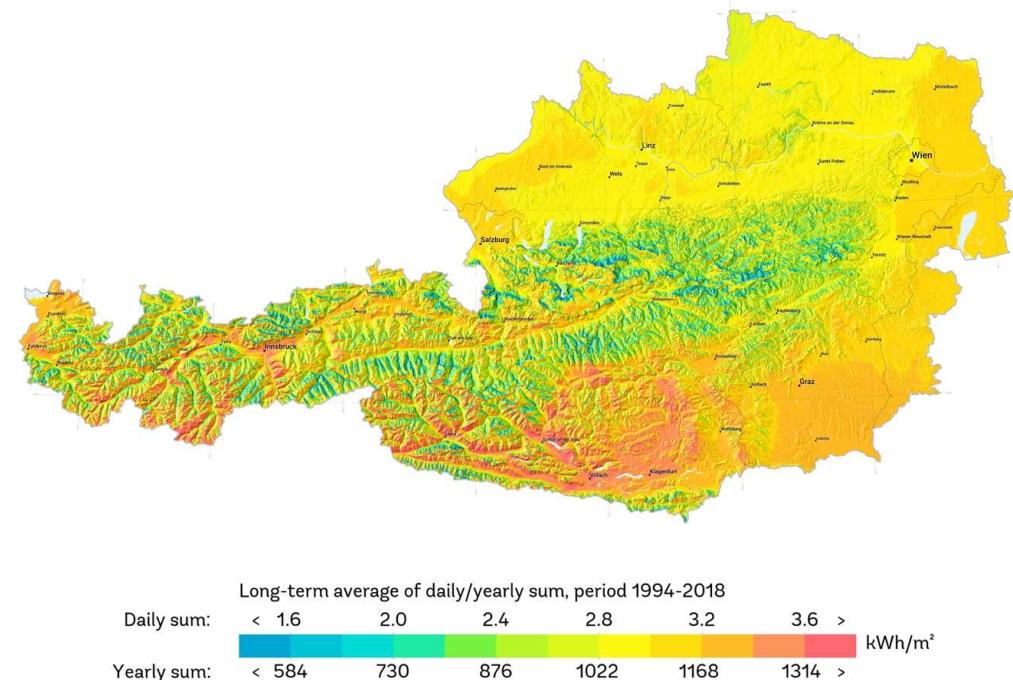
NÄSTA LAND:

ÖSTERRIKE

- €45 miljoner i ett riktat stöd till storskalig solvärme under 2 år
- Investeringsstödet om 30 – 50% ger en marknad på drygt en miljard kronor
- Absolicon har bra samarbete med projekteringsföretaget SOLID

SOLAR RESOURCE MAP

DIRECT NORMAL IRRADIATION





ABSOLICON
S O L A R C O L L E C T O R S



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