

Decarbonising heat with Solar thermal

Market outlook 2022/2023



40.5_{GW_{th}}

Cumulative capacity
in operation in Europe



+12%

market growth
(2022 vs 2021)

#Heatishalf



Heat is half of our current energy needs

Giving heat the visibility it deserves...

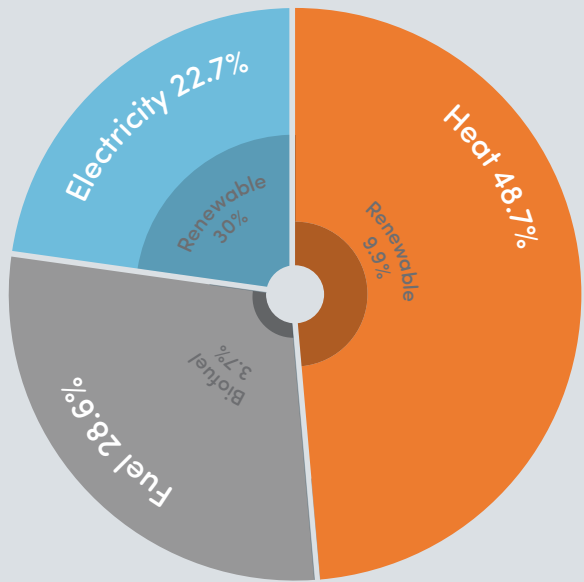
Heat is half of the total energy that we need – far more than the energy required for fuel/transport and electricity.

Despite this, only 10% of our heat worldwide is generated from renewable sources.*

In addition, REN 21 reports that globally:

- demand for energy increased by +4% in 2021, based on more use of fossil fuels
- most national renewable targets are based upon electricity generation, not heat

Total final energy and total modern renewable energy share, by energy carrier, global data (Source: REN21)



Energy demand grew **4%** in 2021 compared to the pre-pandemic level

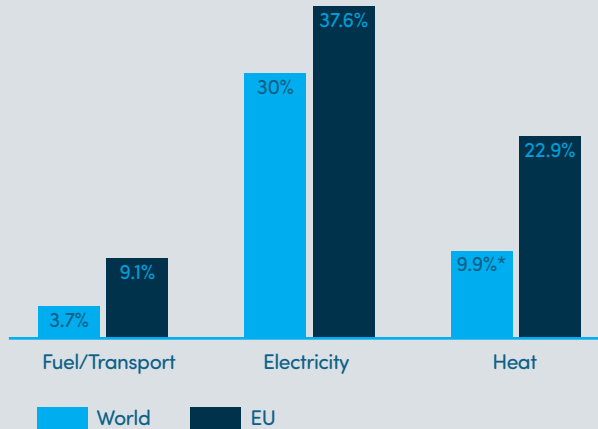
* Essentially biomass



EU Renewable Energy Directive (RED) targets (2023):

- Art. 3: Total share of RES sources in 2030: 42.5%, aiming for 45%
- Art. 23: Binding target for the share of RES for heating and cooling: Member States to increase by at least 0.8 percentage points annually (for 2021–2025) and by at least 1.1 percentage points annually (for 2026–2030).

Share of Renewable Energy Sources (RES) Worldwide (Sources: REN 21, Eurostat April 2022)



Europe is a clear role model in terms of roll out of renewable energies compared to the rest of the world. Yet, a great percentage still remains ahead to achieve the climate targets and CO₂ emission reductions, EU energy security and reduction of dependency from fossil fuel imports.

In addition, most policy measures implemented to date in Europe have essentially tackled the electricity agenda.

Giving more visibility to heat and its decarbonisation, notably through direct RES heat sources such as Solar Thermal, is therefore urgent and of utmost importance to:

- **relieve pressure on the grid**
- **create a level playing field for all technologies.**

Solar Thermal:

An obvious source of energy to provide hot water and heating for millions of applications, from individuals to professional users...

Solar thermal is based on a simple principle: capturing the free energy of the sun to deliver hot water and heat.

Members of Solar Heat Europe are proud of their strong manufacturing base of solar thermal collectors in Europe, meeting 90% of EU demand and being a net exporter worldwide.

Technological innovation has resulted in various ways to harness solar thermal for domestic and industrial use. Certification, including the Solar Keymark, provides reassurance to consumers and public authorities.

The Solar Keymark CEN Keymark Scheme



- Over 20 years of certification standards
- More than 1150 certificates granted
- CEN scheme
- Transparent and open
- More than 300 stakeholders

Why Solar Thermal?

A ready-to-deploy technology, from

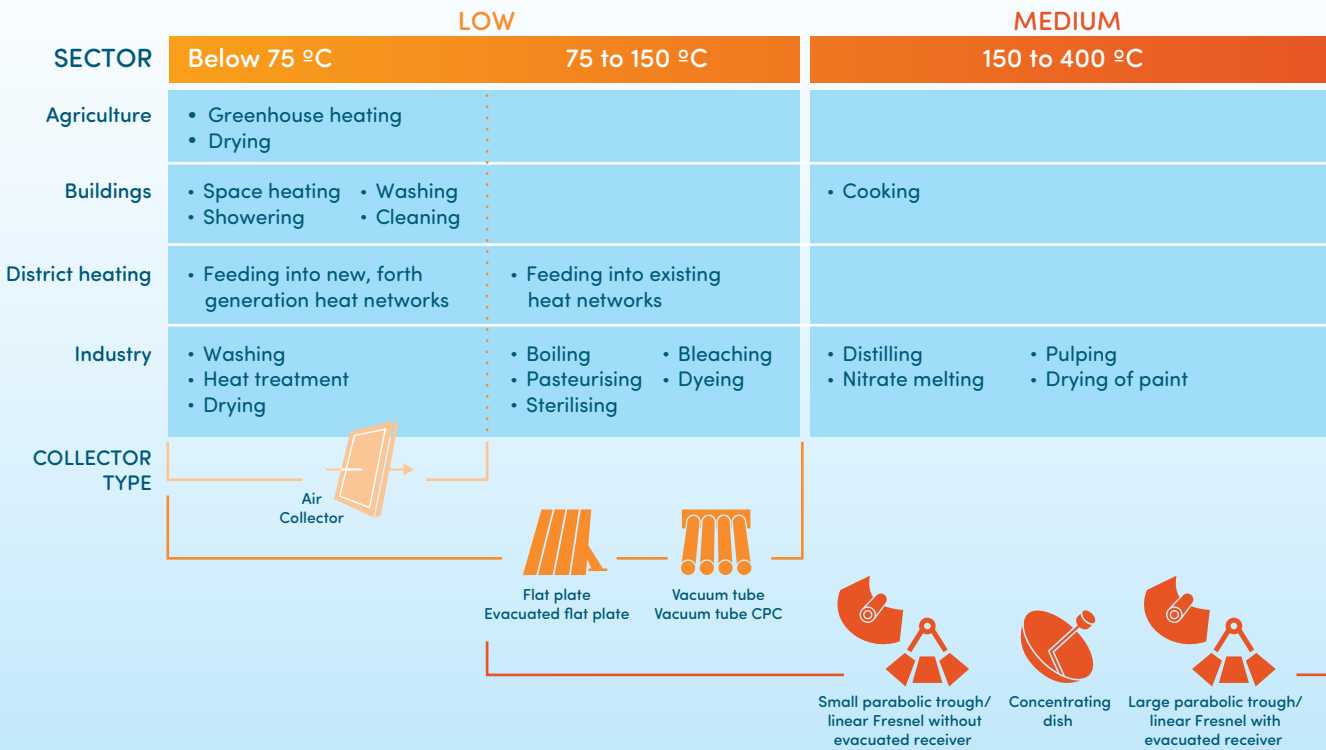
30°C to 400°C



A strong European manufacturing base meeting 90% of the EU demand, and a net exporter worldwide

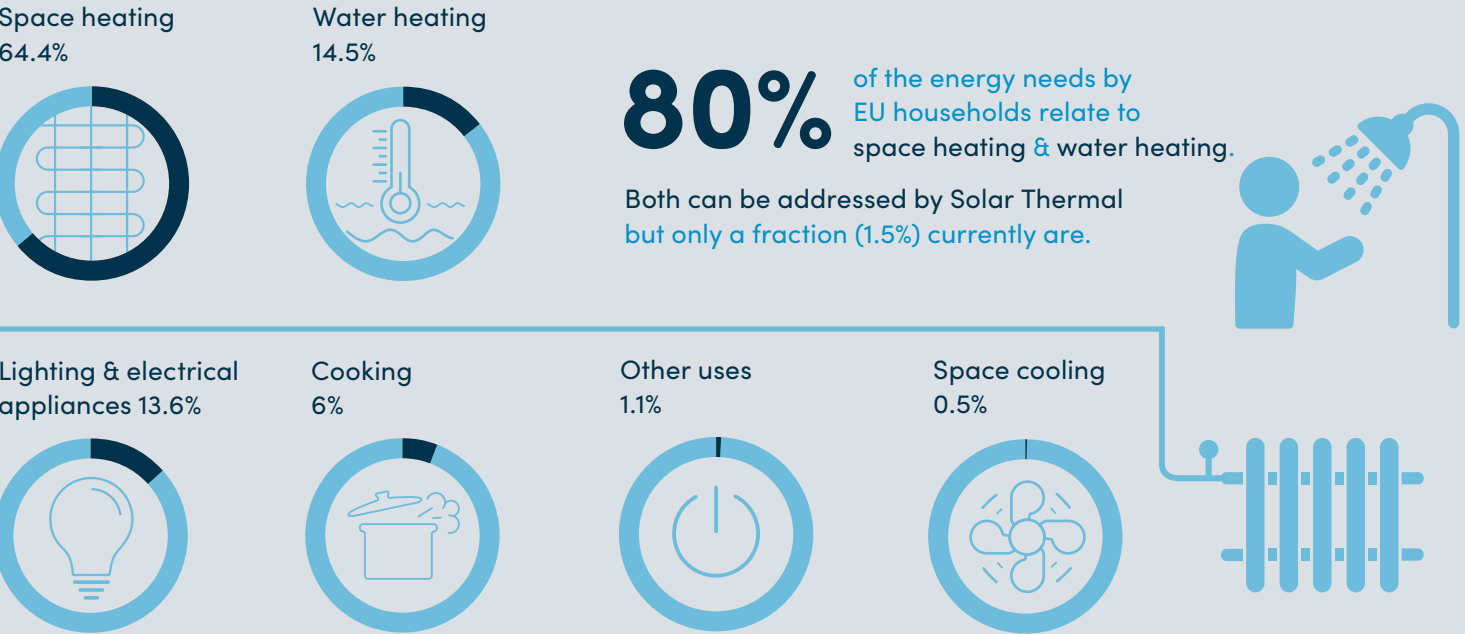
145.4 million tons of CO₂ saved per year thanks to 115 million solar thermal systems installed worldwide

> 95% recyclable (copper, glass, stainless steel, aluminium)



Residential buildings

The needs



EU Renewable Energy Directive (RED) targets (2023):

- Art. 15a (new): sub-sectoral target for the share of RES in buildings: 49% in 2030.
- Art. 15c: introduction of renewable acceleration areas, where permit-granting shall be further streamlined.
- Art. 16c: specific provisions regarding permitting for the installation of solar energy equipment and co-located energy storage assets.



14%
renewables

Energy consumption for heating in buildings by source, global data, 2021 (Source REN 21)

63%
fossil fuels & other

23%
traditional biomass

- 0.6% Renewable district heat
- 1.0 % Geothermal heat
- 1.5% **Solar heat**
- 3.0% Renewable electricity
- 3.6% Ambient heat
- 4.6% Modern bioenergy

Residential buildings

The solution: Providing hot water and heat directly from the sun's energy with Solar Thermal

More than **10 million** rooftops in Europe are equipped with solar thermal & thermal storage

Total installed capacity in Europe (mainland): **40.5 GW_{th}**

That's 58 million m² of collectors

Constituents of the total installed capacity in 2021
Source: Solar Heat Europe/IEA Solar Heating and Cooling Programme - Solar Heat Worldwide

	Technology	% of total
Water-based solar collectors m ²	Unglazed	3.27%
	Flat Plate Collector	87.68%
	Evacuated Tube	8.92%
Air-based solar collectors m ²	Unglazed	0.05%
	Glazed	0.08%

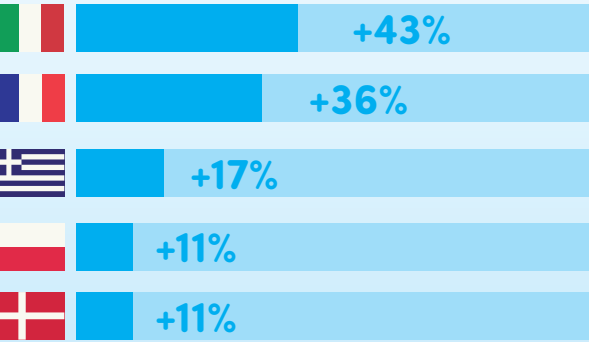
Did you know that Super Bonus in Italy, or Ma Prime Rénove in France have been significantly supporting the increase of sales in residential buildings in 2022?



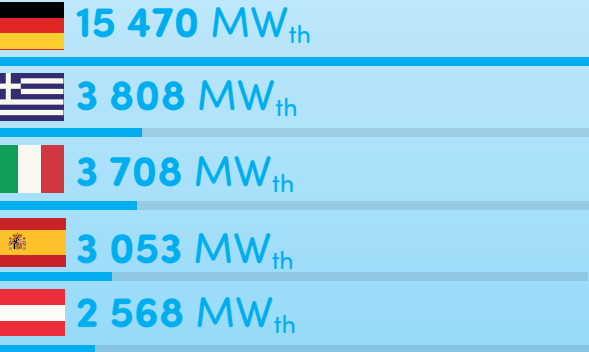
Total installed capacity in 2022: **1.63 GW_{th}** **+12%**

An increase of 2.2 million m²

Countries with largest increase of sales in 2022 (vs 21)



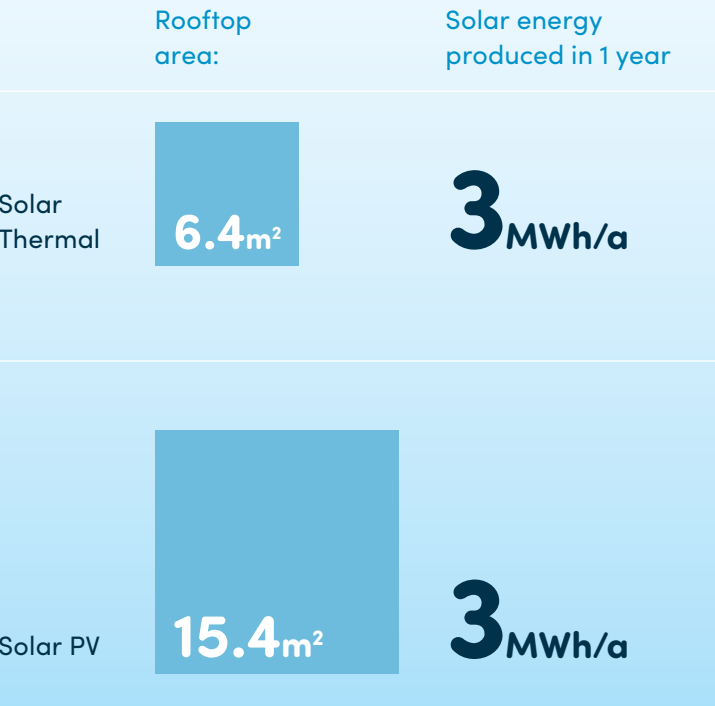
Countries with the largest Solar Thermal installed capacity (in operation):



Did you know that Solar Thermal...

Has a 3x more efficient yield compared to solar photovoltaics.

Yet they can both share the same rooftops.

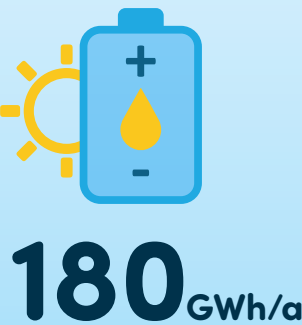


Integrates thermal storage as standard

Leading to much more efficiency of the whole system

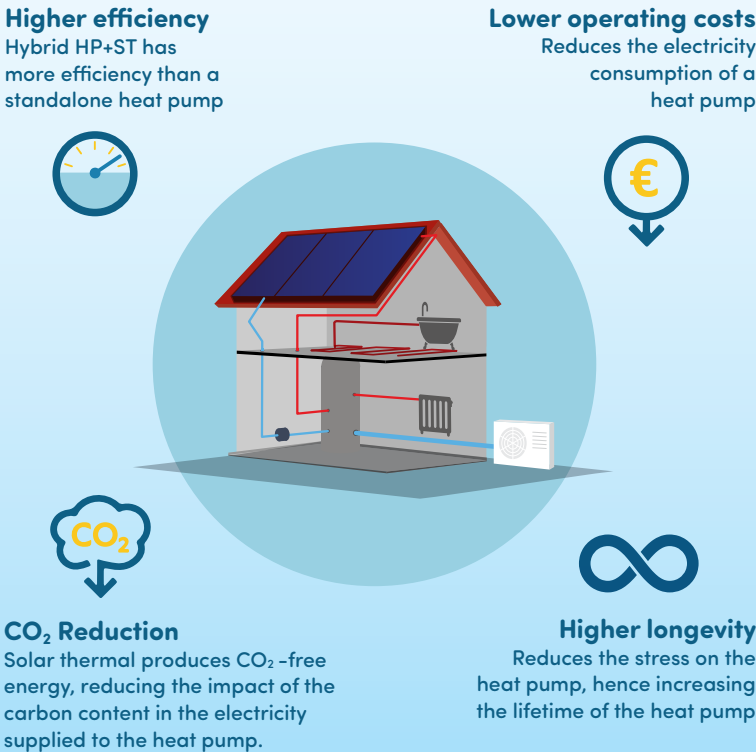
From domestic water tanks of 300 litres, to seasonal storage of 65,000 m³ for district heating, Thermal storage is extremely cost efficient.

Solar thermal storage (Europe):



Can easily hybridise with a Heat Pump

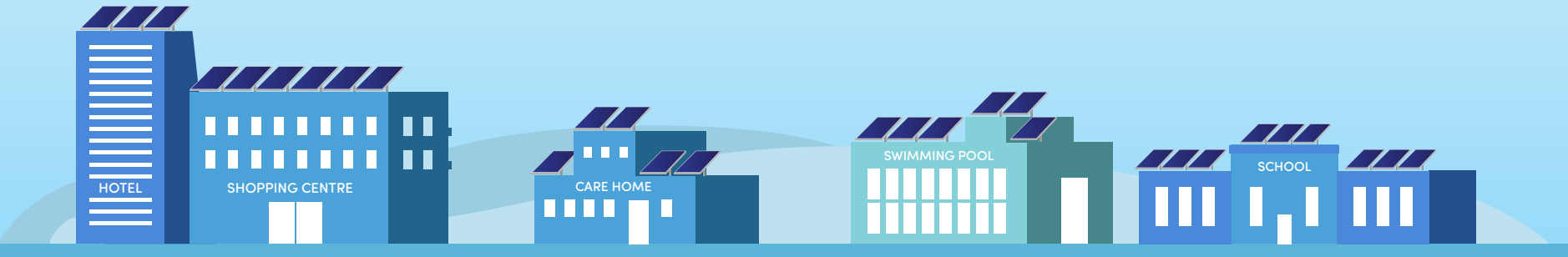
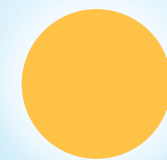
Increasing the efficiency and durability of the whole system.



Tertiary Buildings

PVT: A hybrid technology combining both PV and thermal

PVT technology is currently used on tertiary buildings including hotels, restaurants, leisure centers, and retirement homes. It is also applicable to residential developments.



2022 PVT data Highlights

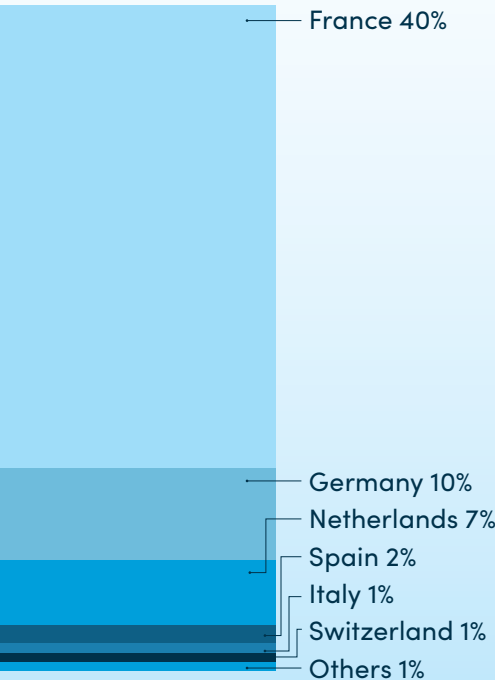
950 155m² installed in Europe (FR, DE, NL, ES, IT)

+9% on average globally between 2017 and 2022

+414% +126% +52% versus 2021

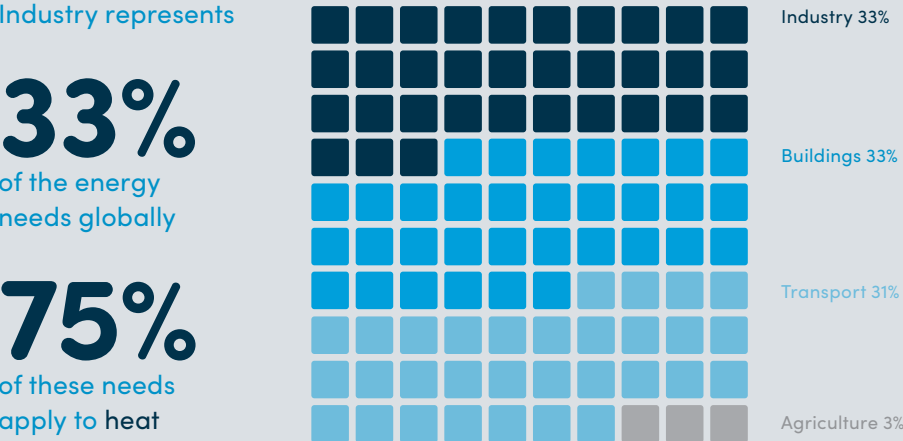
Source : IEA Solar Heating and Cooling Programme, Solar Heat Worldwide

Share of PVT capacity in Europe (in %)



Industry Decarbonisation

The needs



Source: REN 21

Industrial process heating in 2016 emitted 7.5 metric gigatons of CO²

That's the equivalent to:



IEA reported that only 9% of the total industrial energy uses were based on renewables sources. 45% from Coal, 30% from Natural Gas, 15% from Oil.

Source: WBCSD/Bloomberg NEF report "Hotspots for Renewable Heat", Sep. 21

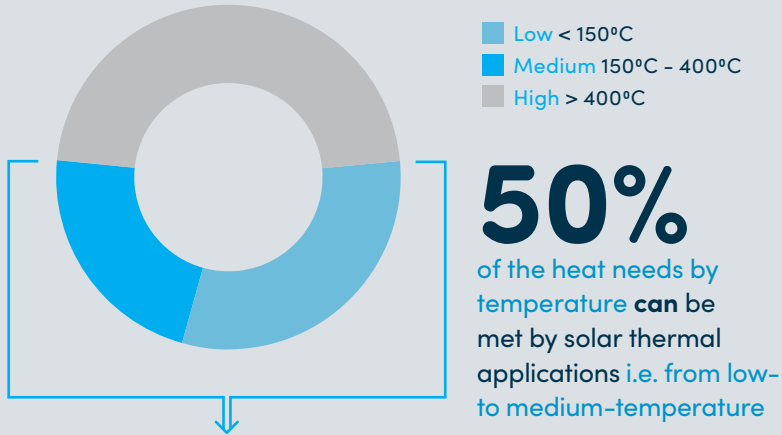
Decarbonising industrial heat will play a key role in achieving net-zero targets



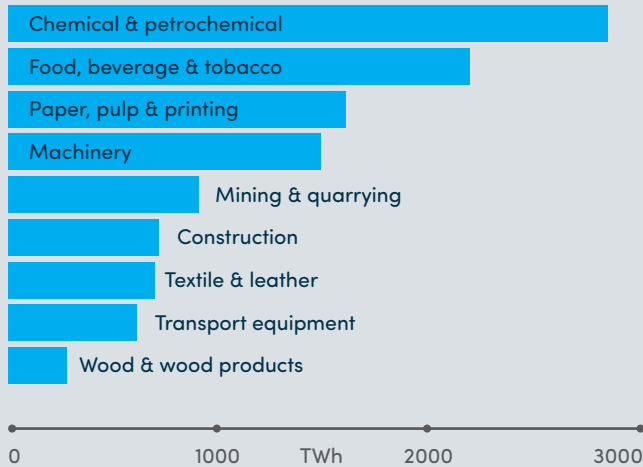
EU Renewable Energy Directive (RED) targets (2023):

- Art.22a: new sub-sectoral target for industry: average increase of 1.6 percentage points for the share of RES (for the periods 2021-25 and 2026-30).

Global industrial heat demand by temperature (2018)
(Source: IRENA, IEA)



Demand for low- to medium-temperature heat in selected industries globally 2018 (TWh):



Source: IEA. Note: Demand for low- to medium-temperature heat in energy-intensive industry is excluded since it represents a small portion of the total and is usually available as a by-product of high-temperature heat.

Industry Decarbonisation

The transition, with Solar Thermal for heating and/or cooling needs



Worldwide data:

1 089

Solar Thermal systems in operation
(of at least 50 m² collector area or 35 kW_{th})

Covering

1.22
million m²

Representing a capacity of

856 MW_{th}

In 2022:

114

NEW systems were installed worldwide
With a capacity of

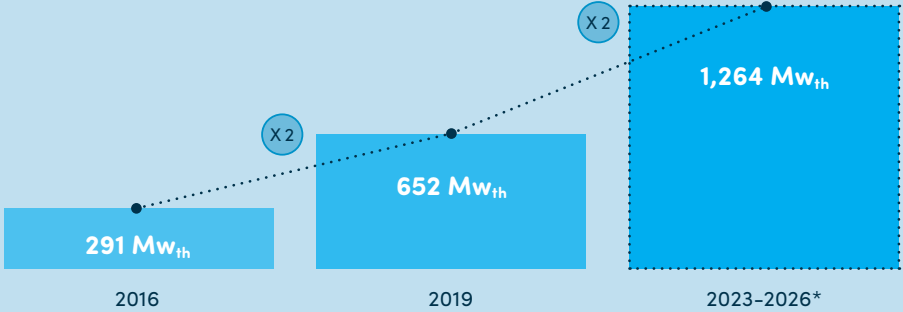
30 MW_{th}



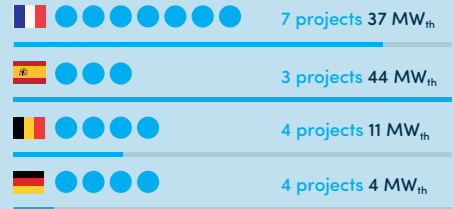
More details on 494 of these systems (incl. 197 ie 40% from Europe) via ship-plants.info

Sources: IEA SHC, Solar Heat Worldwide

The outlook is bright: A doubling of capacity between 2016 and 2019 and a forecast of similar growth from 2019 - 2023/2026
(NB: first preliminary estimates based on enquiry done mid 2023)



In Europe 31 projects in the pipeline totalling 146 MW_{th}. These include:



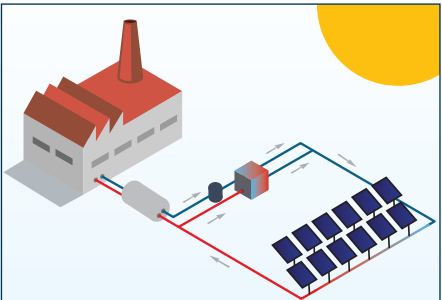
99%
of these 31 projects' capacity are developed by EU companies



The 62 projects worldwide apply to a vast number of industry applications:



*2023 - 2026 includes all announced projects at full capacity. Projects in China are not considered in this chart.
Source : Enquiry by Solrico, Sept 23. <https://solarthermalworld.org/news/promising-solar-industrial-heat-outlook-2023-2026/>



What is SHIP?
Solar Heat for Industrial Processes (SHIP) are systems which provide solar heat in a factory. A collector field heats a process fluid, and a heat exchanger transfers this heat as hot water, air flow, or steam. Storage units enable this heat to be used when required.



Did you know that a SHIP project is currently being finalised in Croatia, partially benefitting from the EU Innovation fund?

District heating

282

towns and cities in Europe use solar heat¹, with

1 373 MW_{th}

in operation

In 2023, the total number of District Heating networks existing in the EU reached 17,000²

Yet the share of Solar Thermal, based on total energy output, is only 0.5%.

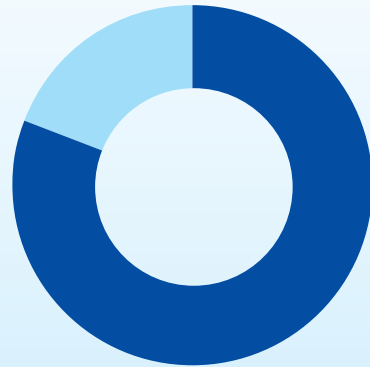
Solar Thermal has great potential to be the route towards district heating decarbonisation.

1 source IEA SHC/solrico/Austria Solar
2 source EHP



81%

of the total Solar District Heating networks in the world are in Europe



EU Renewable Energy Directive (RED) targets (2023):

- Art. 24: raises the indicative target for the share of RES and waste heat in district heating and cooling from a 1 percentage point increase to 2.2 percentage points (for 2021–2030).

Solar thermal district heating networks in operation by European country:



Did you know?



In the Netherlands a 48,000m² project is under construction?

This will be the fourth biggest district heating network supplied by solar thermal in the world, with a capacity of 37 MW_{th}.



In 2022 Germany's Solar Thermal district heating capacity grew by

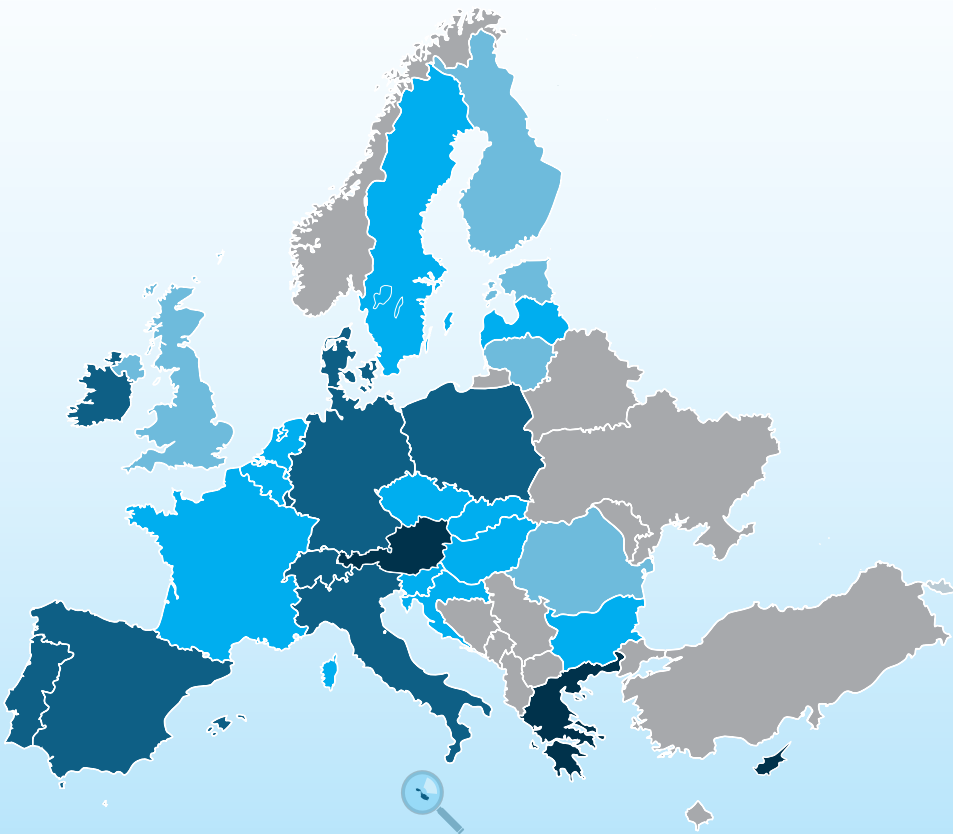
+30%

9 new systems representing a collector area of 28,000 m² with a capacity of 19.6 MW_{th}.



Out of the 20 biggest SDH in operation in the world, 16 are in Denmark, totalling an installed capacity of 394 MW_{th}.

Recap: Solar Thermal 2022
Market overview – All applications



1) The relation between collector area and capacity is 1m² = 0.7kW_{th} (kilowatt-thermal)
2) Capacity "in operation" refers to the solar thermal capacity built in the past and deemed to be still in use. Solar Heat Europe/ ESTIF assumes a 20 year product life for all systems installed since 1990. Most products today would last considerably longer, but they often cease to be used earlier, e.g. because the building was demolished, or there has been a change of building use.
3) The figures shown here relate to Metropolitan France (mainland). As a reference, in 2021 the newly installed capacity in overseas departments is estimated to be around 60 MW_{th} (86 000 m²).

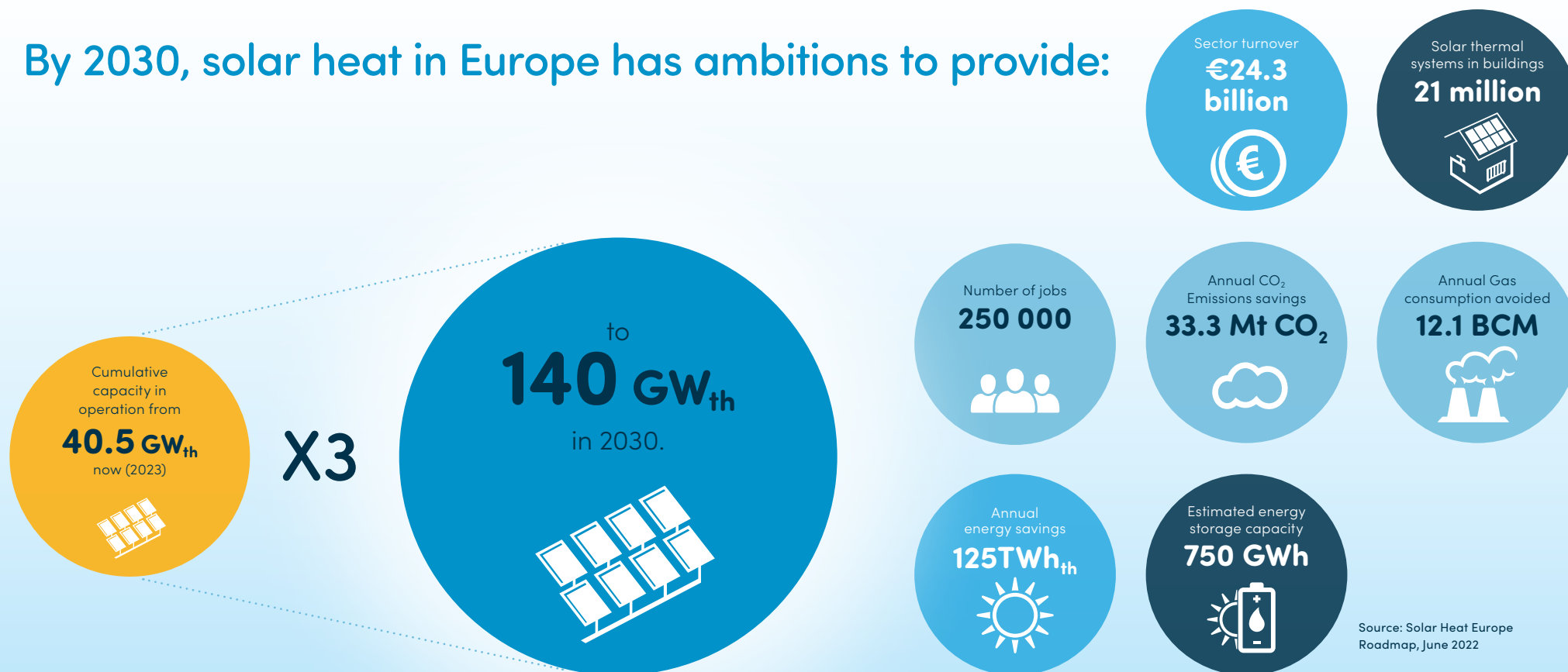
Country	Use of Solar thermal per capita	Cumulative Installed Capacity in Operation (MW _{th})	Annual evolution Total Installed Capacity 2022/2021	New installed capacity in 2022 (in m ²)	New installed capacity in 2022 (MW _{th})	Annual Evolution New Installed Capacity
DE		15 470	2%	710 000	497 000	11%
GR		3 808	5%	419 000	293 300	17%
IT		3 708	5%	321 750	225 225	43%
ES		3 053	2%	145 500	101 850	-3%
AT		2 568	-3%	58 970	41 279	-15%
PL		2 354	6%	210 000	147 000	11%
FR		1 956	3%	106 175	74 323	36%
DK +		1 261	-1%	2 664	1 865	-67%
CH		1 072	0%	24 605	17 224	-9%
PT		964	5%	68 565	47 996	-11%
CY		676	5%	73 924	51 747	5%
BE		501	2%	18 500	12 950	11%
UK		495	-2%	4 825	3 378	-14%
CZ +		459	3%	25 503	17 852	49%
NL		443	2%	42 097	29 468	38%
IE +		292	0%	1 116	781	-71%
HU *		258	3%	14 000	9 800	0%
HR		202	4%	13 558	9 490	5%
RO *		186	6%	16 932	11 852	3%
SE		180	-5%	2 014	1 410	3%
BG +		150	7%	18 500	12 950	-27%
SK *		142	5%	14 060	9 842	5%
SL		93	0%	1 479	1 035	3%
FI +		54	9%	8 000	5 600	127%
LU +		53	3%	3 681	2 577	3%
ML +		36	-3%	1 083	758	-18%
LV *		30	4%	1 700	1 190	3%
LT *		19	7%	1 751	1 226	-37%
EE *		17	6%	1 425	998	-29%
EU27 + CH + UK		40.501	2.6%	2 331 376	1 631 963	12.7%

* Solar Heat Europe estimations
+ Based on the EurObserv'ER "Solar thermal and CSP Barometer" (2022).

Solar heating & cooling

Perspectives

By 2030, solar heat in Europe has ambitions to provide:



For more information on solar heating & cooling:

Global: **International Energy Agency - Solar Heating & Cooling Programme**
www.iea-shc.org

EU: **Solar Heat Europe**
www.solarheateurope.eu
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