Solar Heat Europe
ESTIF

70% efficient solar heat today provides heat and steam for 266 district heating networks and 10 million homes in Europe

Joakim Byström, CEO Absolicon
Former board member of SHE

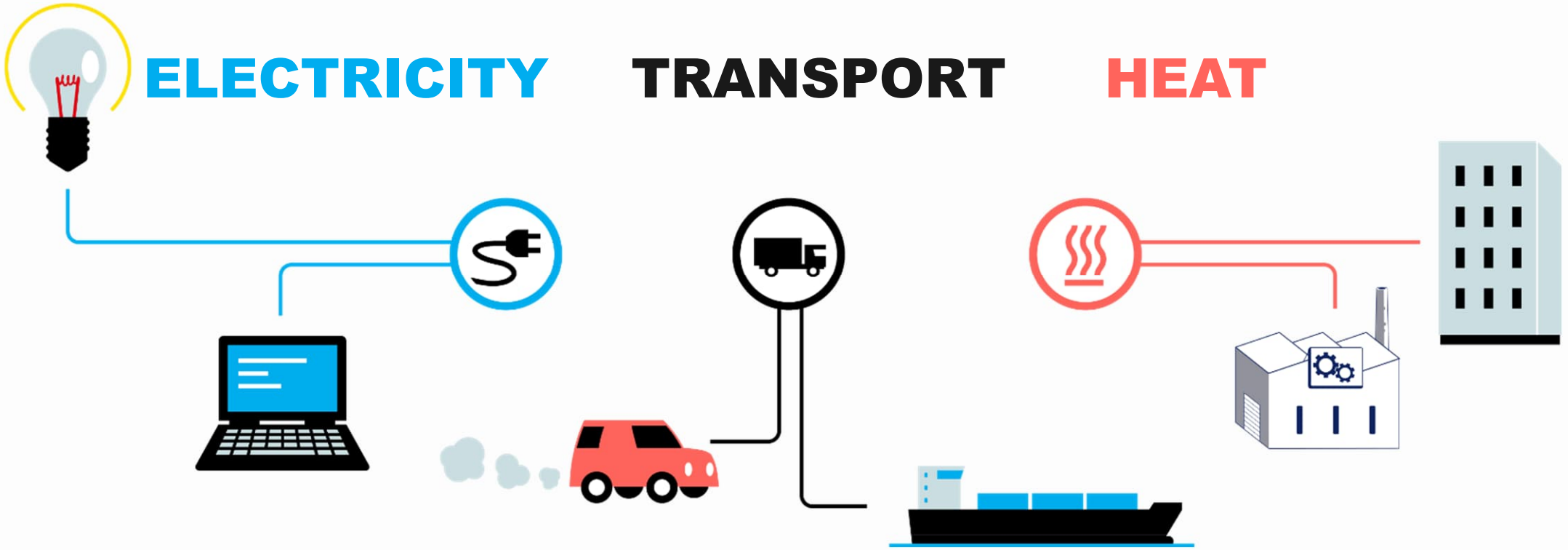
October 27th 2023

Two solar technologies - two organisations

“Solar

- Solar collectors has 70% efficiency producing heat
- Heat stored in hot water tanks
- Solar thermal is a European export market

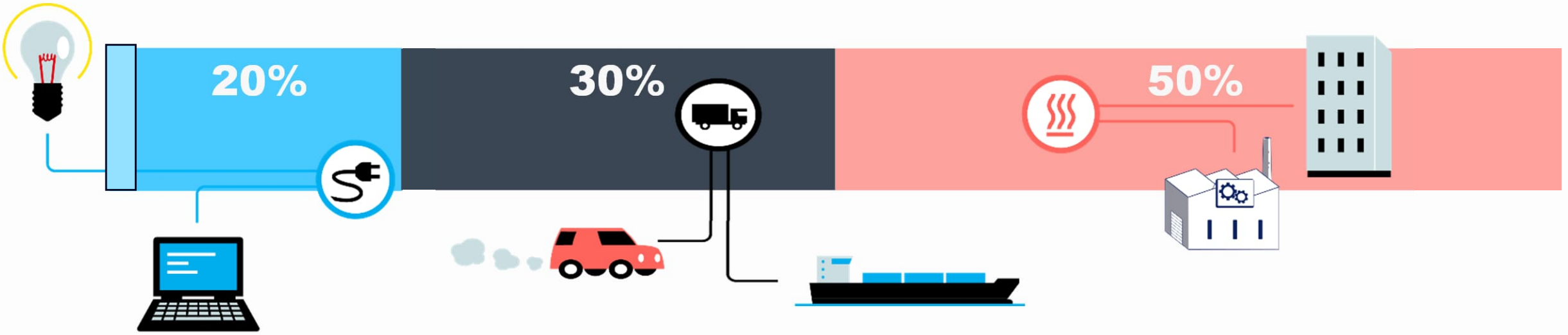
END USE OF ENERGY IN SOCIETY



HEAT IS HALF

50 percent of the world's energy demand comes from heat

40 percent of CO2 emissions comes from heat



SOLAR HEAT EUROPE – Its members

In 30 years representing the full value chain of the Solar Thermal (ST) sector

Solar thermal sector companies has 20 000 employees.

An industry born in Europe. Solar heat and hot water in 10 million homes

Worldwide export of components, systems and knowledge

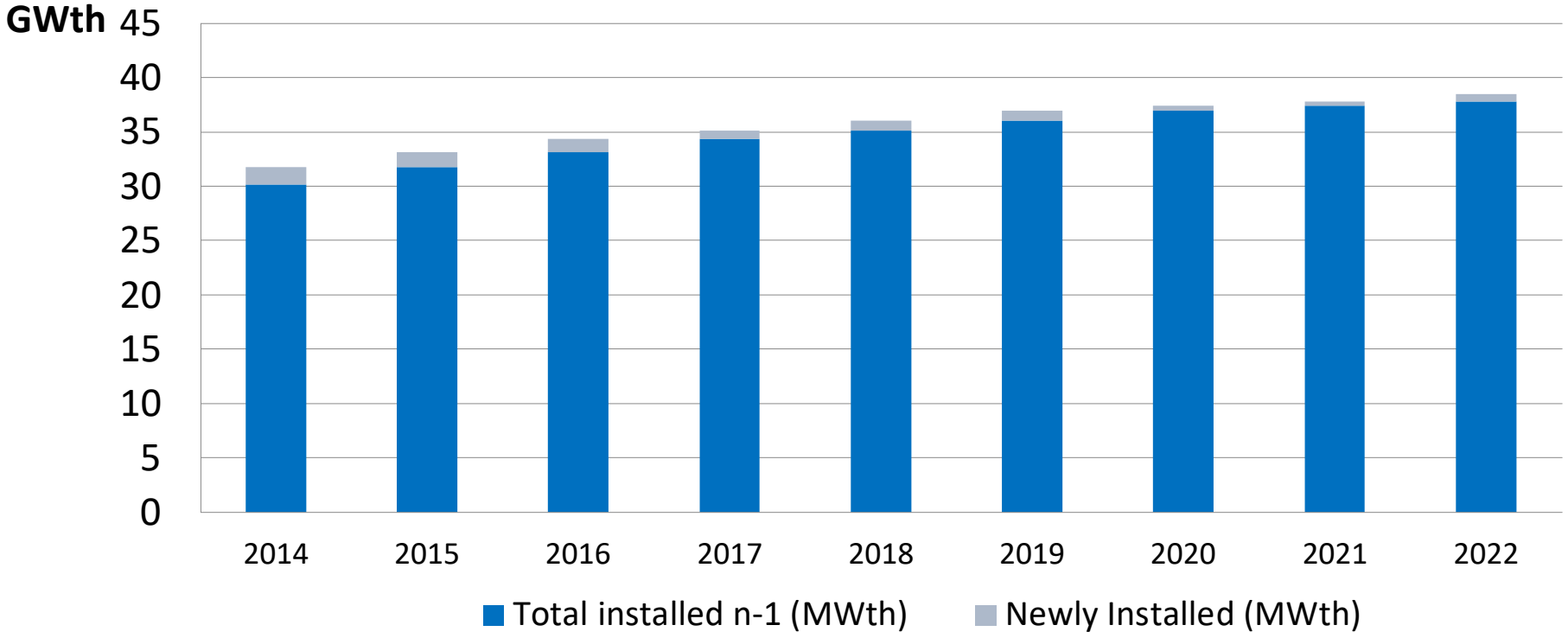
SOLAR THERMAL NATIONAL ASSOCIATIONS

SOLAR THERMAL ENGINEERING, OPERATORS AND COMPONENT & SYSTEM MANUFACTURERS

UNIVERSITIES, CERTIFICATION LABS, CONSULTANTS

SOLAR THERMAL: Solar Heat for homes and buildings

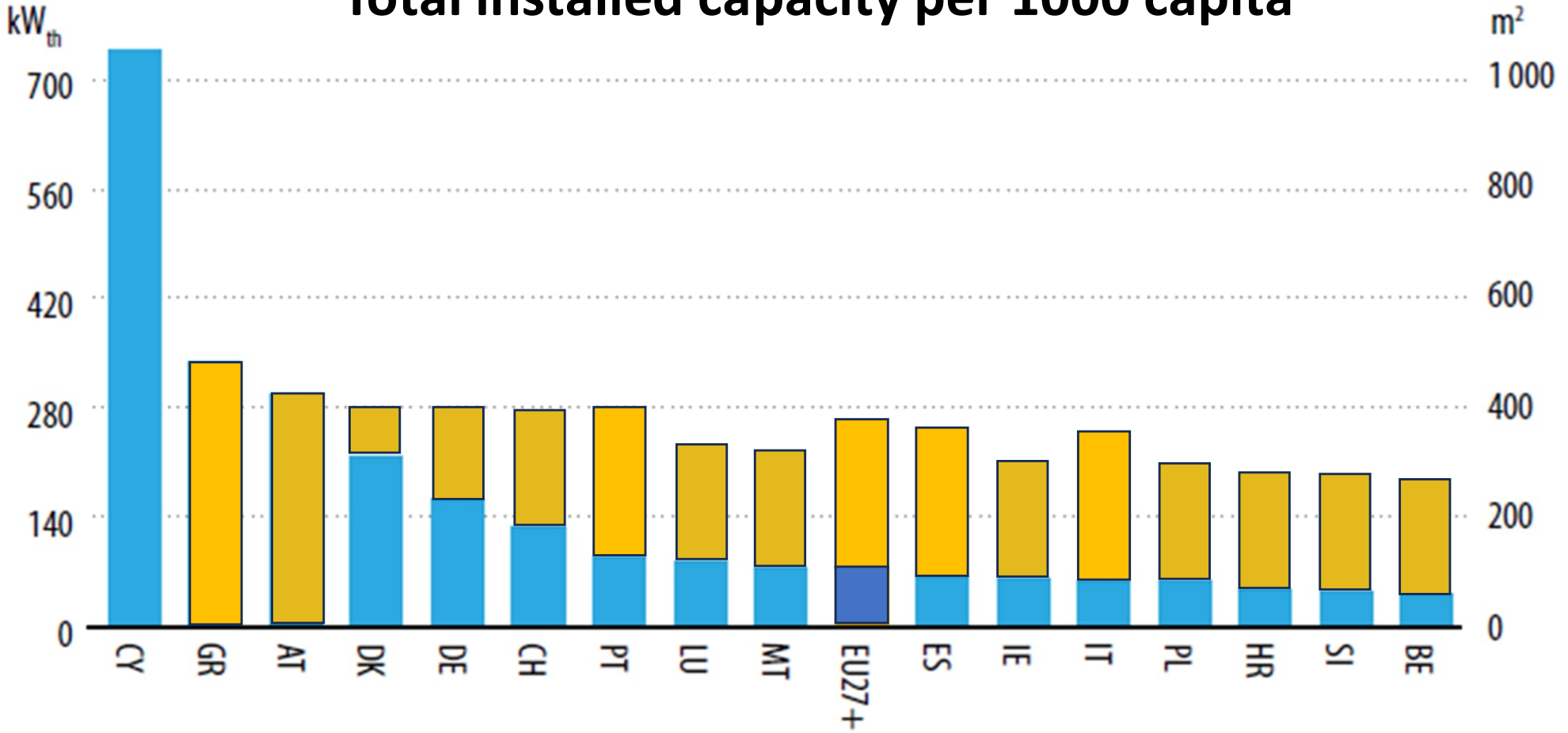
Solar Thermal Market in Europe large and growing



SHE: Total and newly installed solar thermal capacity (glazed collectors) in EU 27 + UK and Switzerland

SOLAR THERMAL: : Solar Heat for homes and buildings

Total installed capacity per 1000 capita



SHE: Glazed surface per capita 2021, aggregated volume

SOLAR THERMAL: Solar Heat for homes and buildings

- In Europe 130 million buildings – 10 millions of them are using Solar Thermal for domestic hot water
- Solar thermal market has 2 billion Euro turn over and 20 000 employees
- Solar thermal has 200 GWh thermal storage compared to 9 GWh of battery storage
- Solar thermal is a big export market – photovoltaic is an import market

SOLAR THERMAL: Solar Heat for homes and buildings

SOLAR THERMAL: Solar District Heating

156 000 m2, 44 000

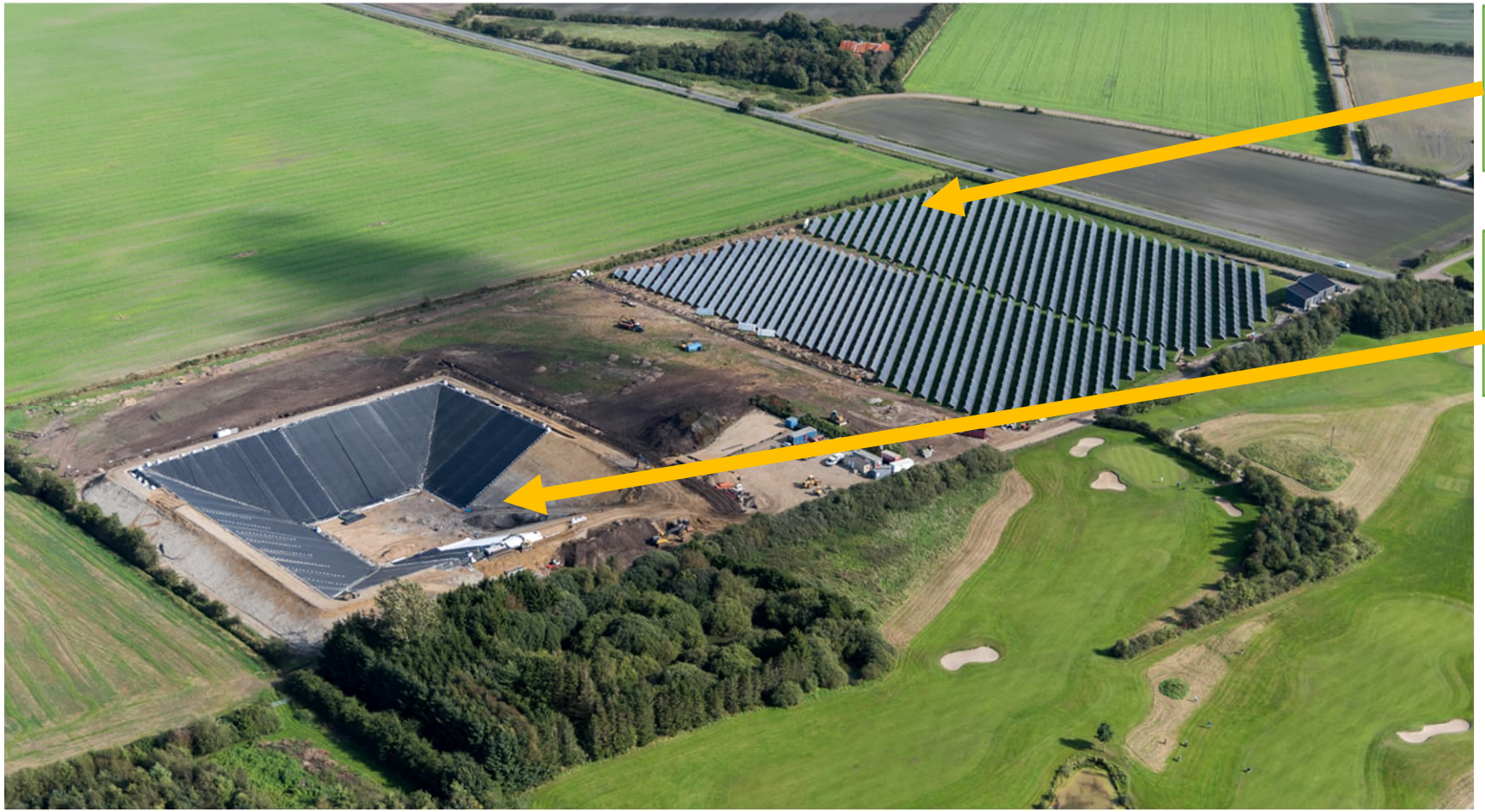
SOLAR THERMAL: Dronninglund Solar District Heating

26 MW (37 500 m2) solar collectors

Heat storage 60 000 m3

Since 2012, solar thermal provide 50 % of the heat for the 3500 people in Dronninglund

TOFTLUND SOLAR DISTRICT HEATING



27 000 m2
solar collectors

Heat storage
12 500 m3

Since 2017, Toftlund has received 50 percent of its heat from solar heat


Zoom in on dronninglund
Joakim Byström
MI
QC
OH
NY
NL
DE
NB
NS
Grönland
Island
Sverige
Finland
Norge
Storbritannien
Belarus
Polen
Ukraina
Tyskland
Österrike
Rumänien
Frankrike
Italien
Turkiet
Spanien
Grekland
Portugal
Innehållsförteckning
2/7

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SOLAR THERMAL: Solar District Heating

Solar heat up to 110 °C

SOLAR THERMAL: Solar District Heating

266 towns in Europe use solar district heating

Germany has **25 new** large-scale SDH projects in pipeline

Spain planning 25+ new SDH installations

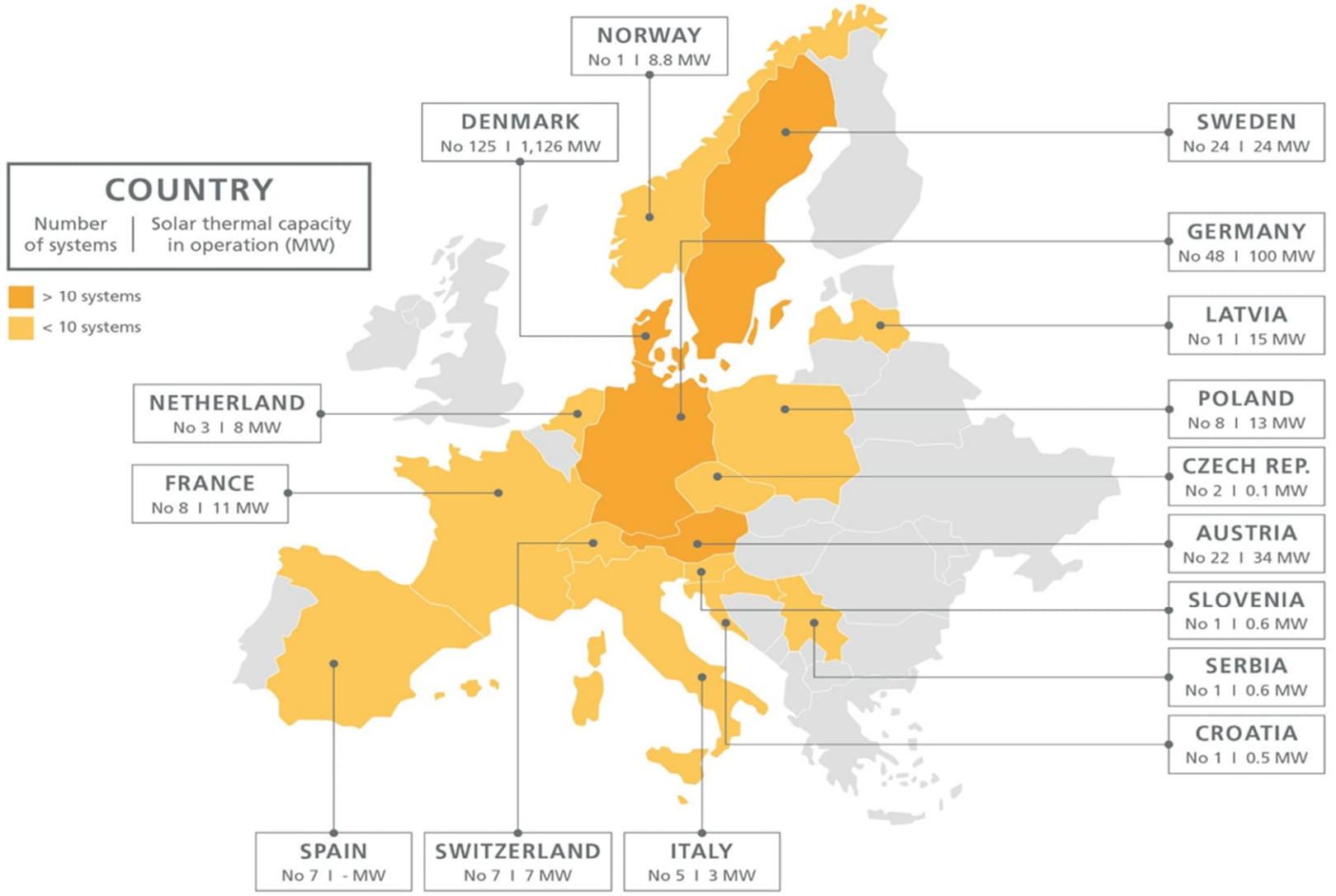
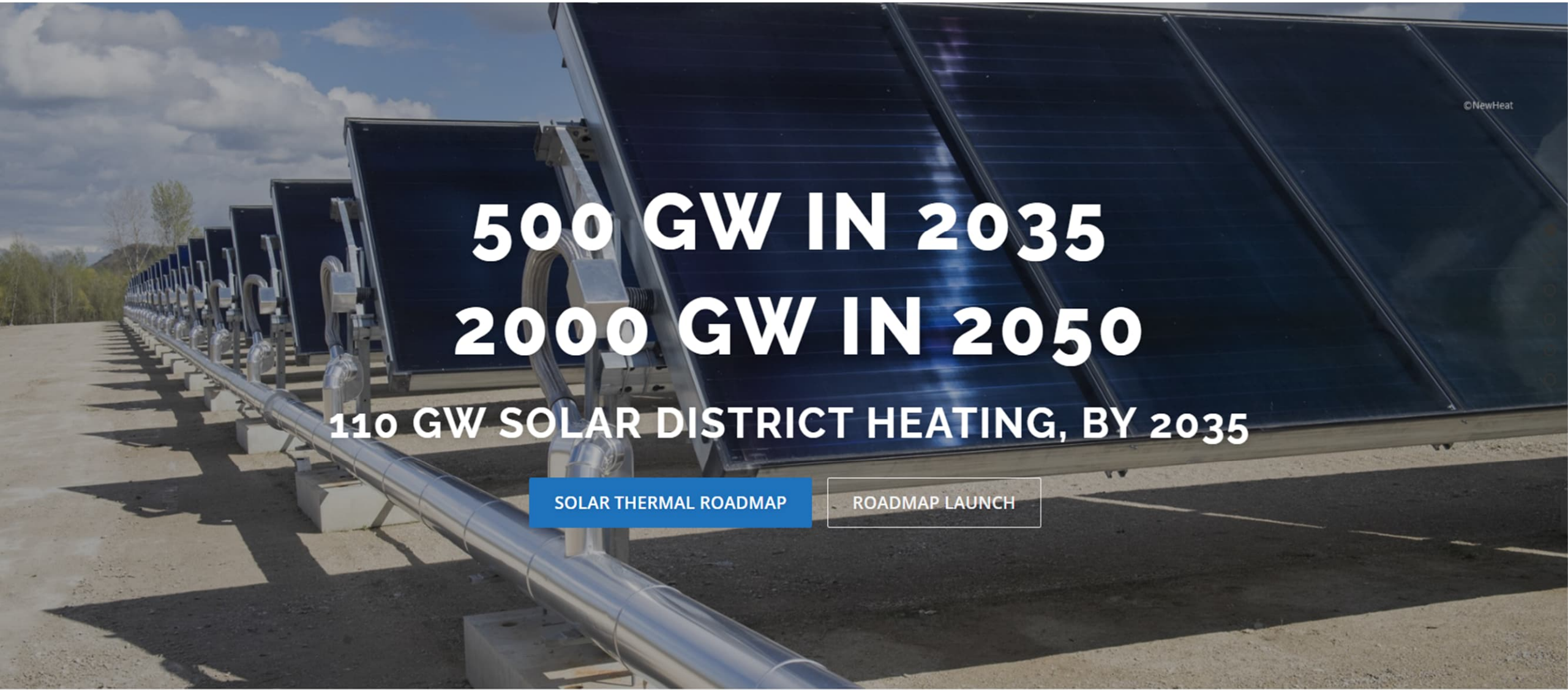


Chart: IEA SHC Task 68
Source: IEA SHC Solar Heat Worldwide Report Ed. 2022 / own research

SOLAR THERMAL: Solar District Heating

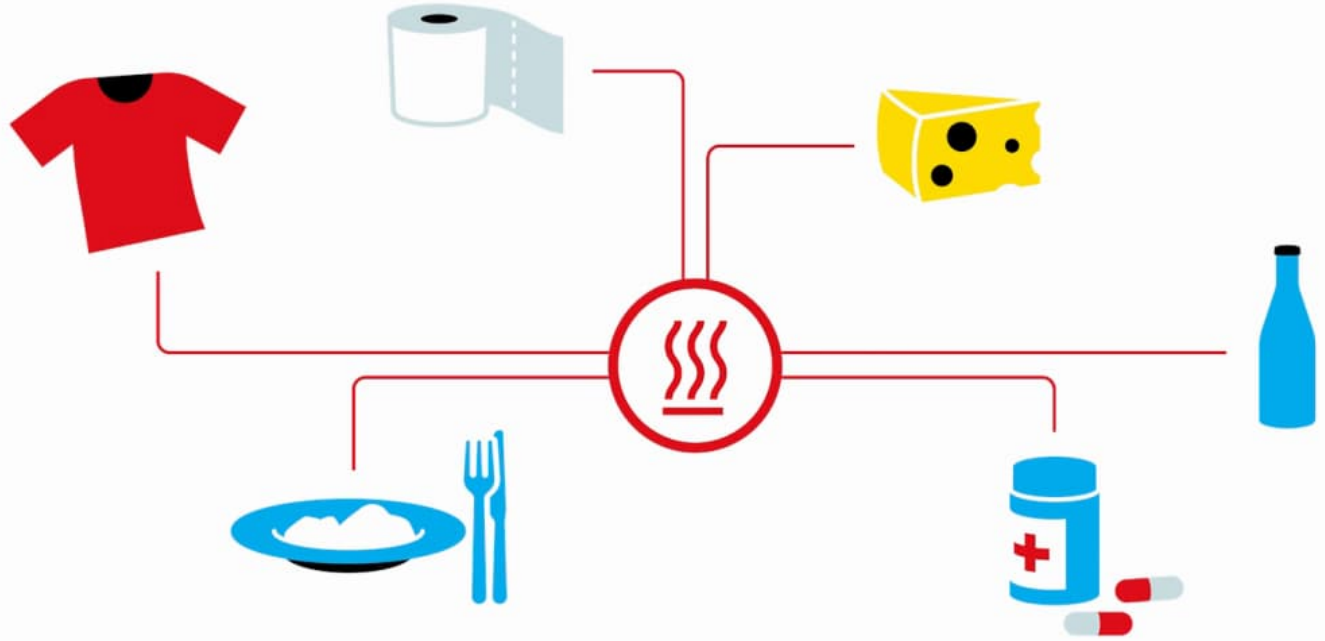


EVERYTHING WE CONSUME IS PRODUCED WITH HEAT

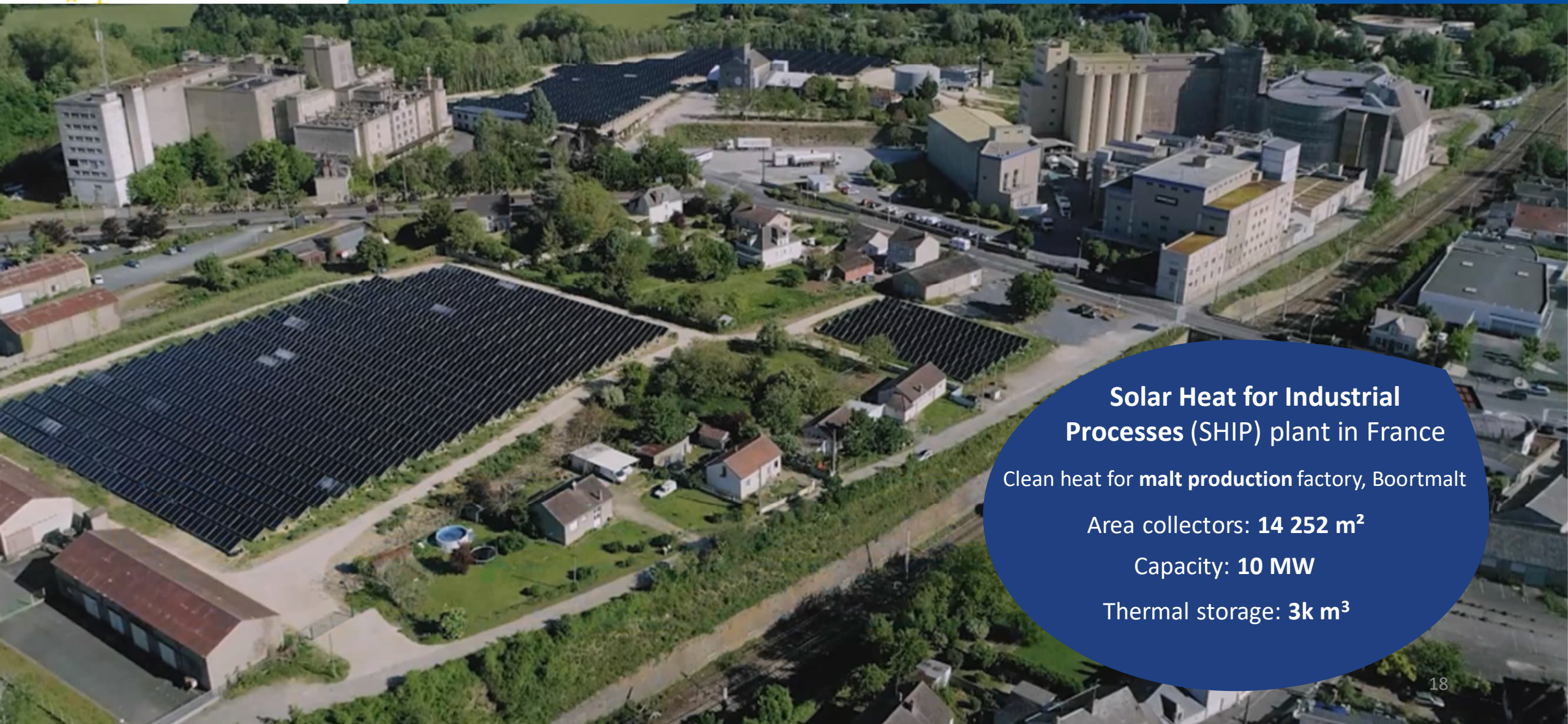
Generation of heat represent 40% of the CO_2 emissions from energy

Heat often accounts for up to 70 percent of the total energy used in industrial production

Energy usage by sector		
Sector	**Electricity**	**Heat**
Textile	15%	85%
Dairy	30%	70%
F&B	25%	75%



SOLAR THERMAL: Solar Heat for Industrial Processes



Solar Heat for Industrial Processes (SHIP) plant in France

Clean heat for **malt production** factory, Boortmalt

Area collectors: **14 252 m²**

Capacity: **10 MW**

Thermal storage: **3k m³**

ABSOLICON FOCUS ON THE WORLD'S LARGEST FOOD AND BEVERAGE COMPANIES

1 Nestle
2 PepsiCo, Inc.
3 JBS
4 Anheuser-Busch InBev
5 Tyson Foods
6 Mars
7 Archer Daniels Midland
8 The Coca-Cola Company
9 Cargill
10 Danone
11 Mondelez International
12 Kraft Heinz Company
13 Smithfield Foods/WH Group
14 Olam International
15 Lactalis
16 Heineken
17 Unilever
18 Suntory
19 General Mills Inc.
20 Asahi Group
44 Carlsberg

+ 1 Feasibility study

CARLSBERG GROUP, GREECE

Ground solar installation

Location	Thessaloniki, Greece
Industry	Brewery
Footprint	1600 m^2
Solar Field	660 m^2
Production	354 MWh/year
Heat	Steam 150 °C

Solar heat up to 160 °C

Absolicon Solar Collector AB

ASAHI GROUP, ITALY

Ground solar installation

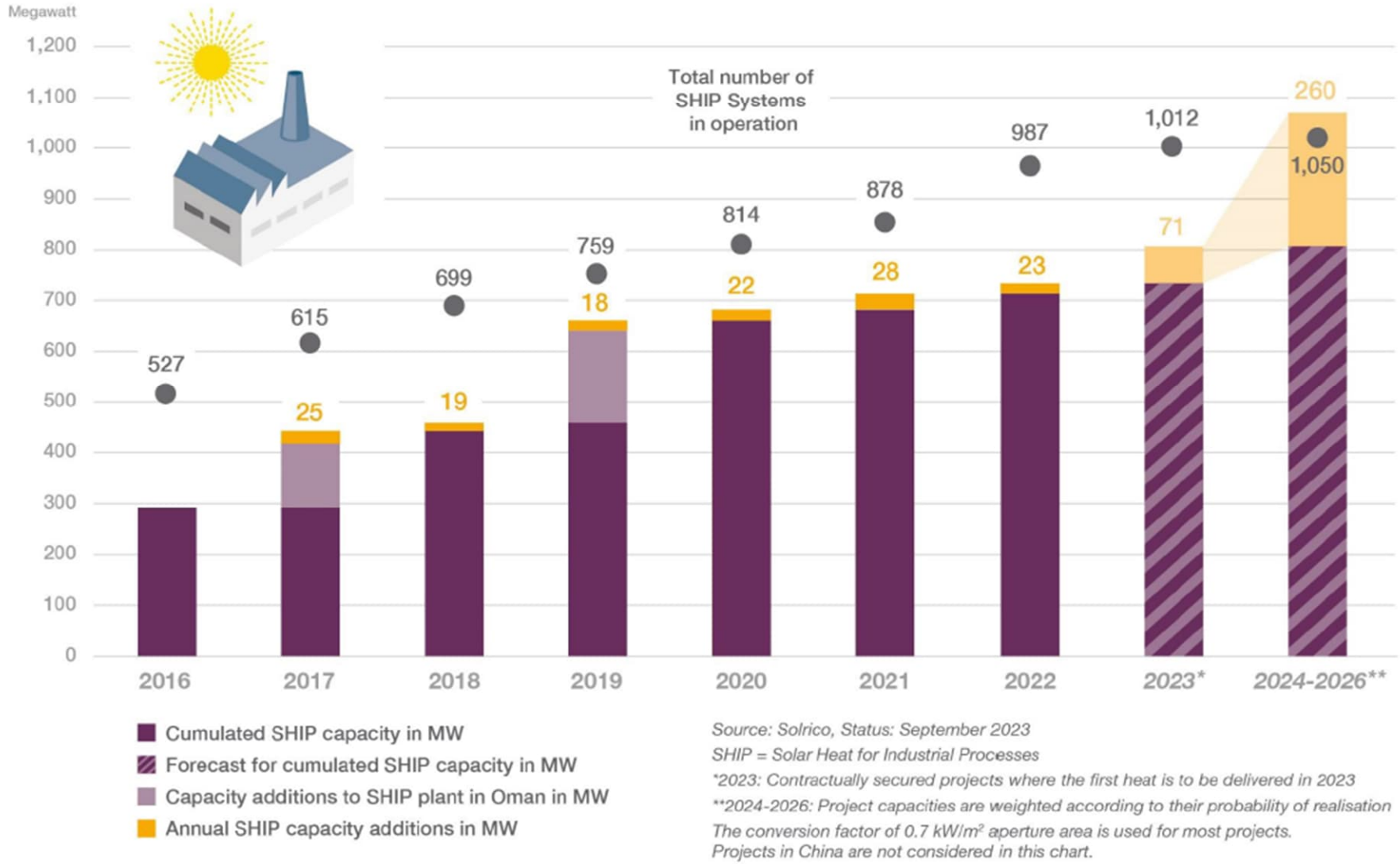
Location	Bari, Italy
Industry	Brewery
Footprint	1600 m^2
Solar Field	660 m^2
Production	354 MWh/year
Heat	Steam 150 °C Hot Water 85 °C

460 kW Absolicon T160 Solar Collector field

Solar Central

2 MWh energy storage

Solar Industrial Heat Outlook



Source: Solrico, Status: September 2023

SHIP = Solar Heat for Industrial Processes

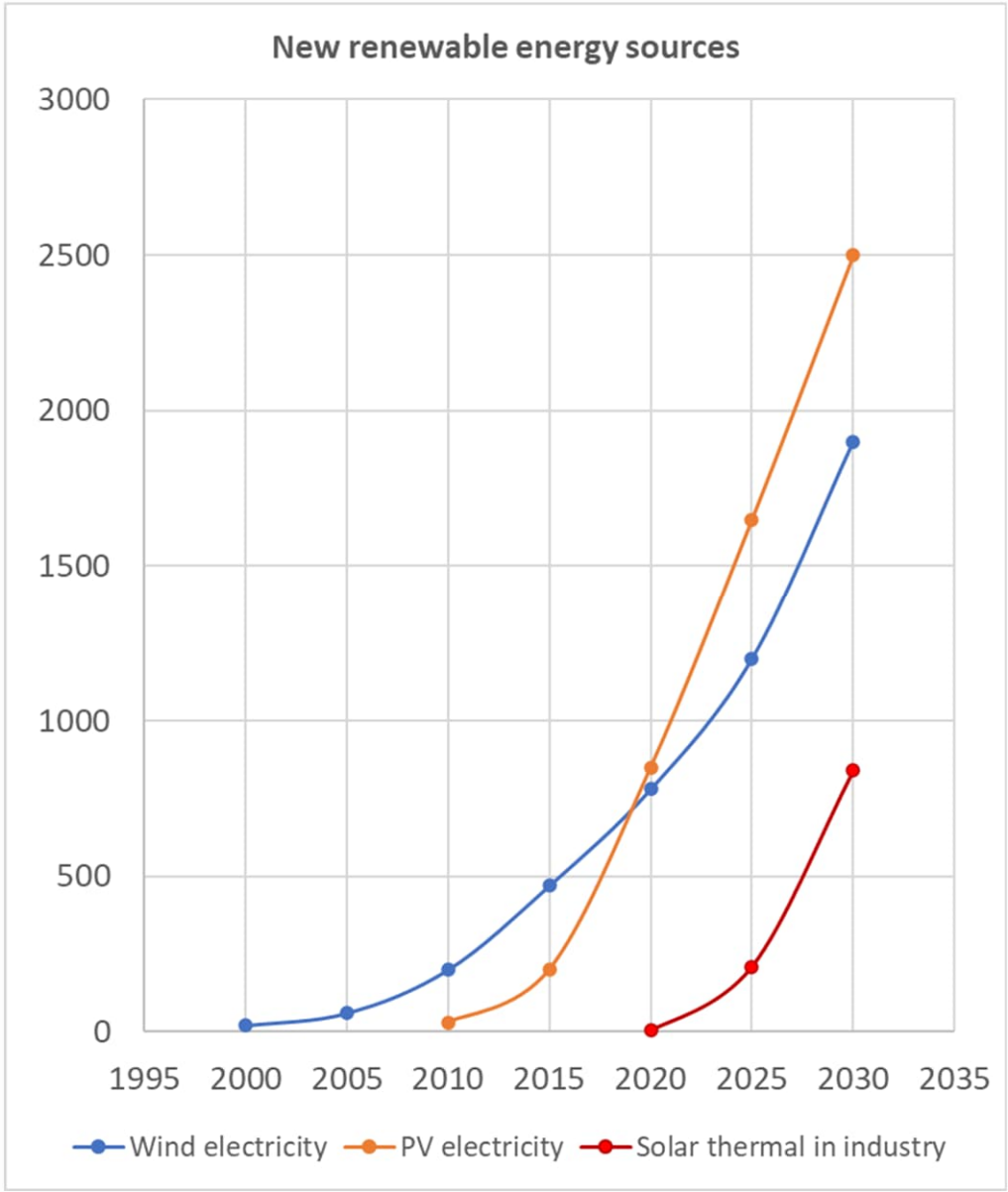
**2023: Contractually secured projects where the first heat is to be delivered in 2023*

***2024-2026: Project capacities are weighted according to their probability of realisation*

The conversion factor of 0.7 kW/m² aperture area is used for most projects.
Projects in China are not considered in this chart.

Solar thermal - the third wave of RE

- **Renewable electricity production** started with **wind power** in Denmark (Vestas) and **solar cells** in Germany (SunPower)
- Now it is a mature **$800 billion market**, expected to grow to $2 trillion in 2030 at a CAGR of 8.5%
- **Renewable heat production** with **solar thermal** is the "third wave" of renewable energy
- According to IRENA roadmap, installations grow from 5 million m2 of solar collectors today to 1 200 million m2 (850 GW) (CAGR of 70%) and a **$50 billion market** in 2030



Data from IRENA 1,5 C Roadmap

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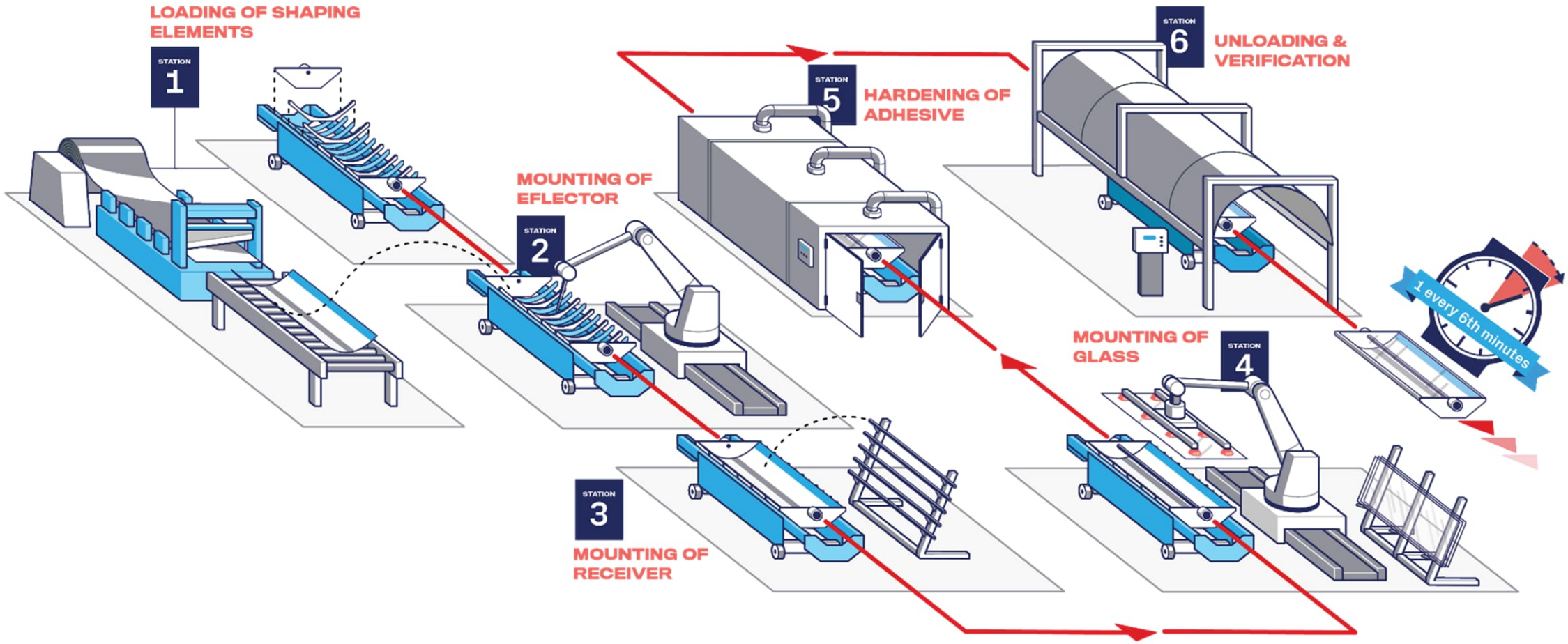
SOLAR THERMAL: Solar Heat for Industrial Processes

Saudi factory to mass-produce Glasspoint's solar steam technology

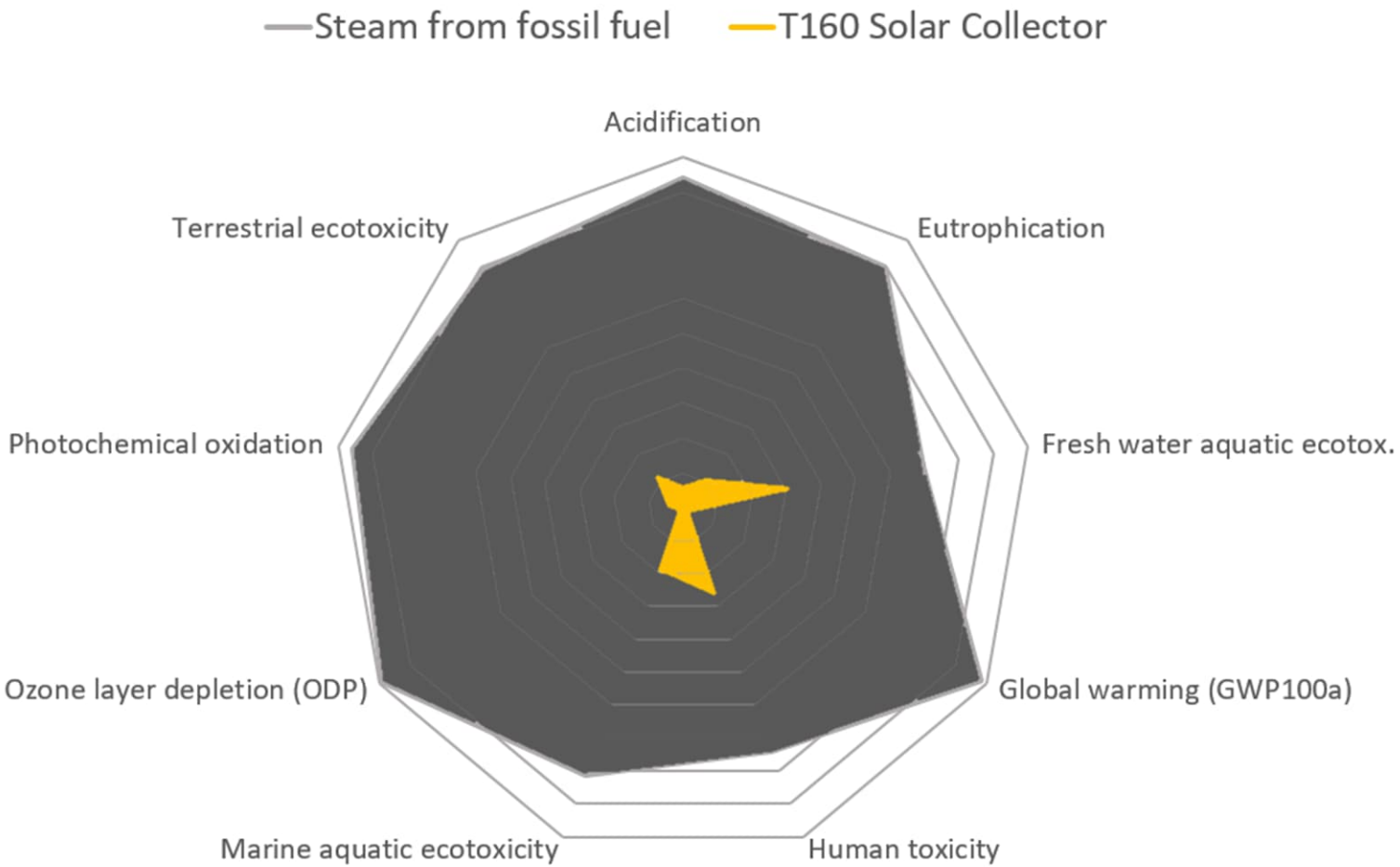
One of the earliest recognitions of GlassPoint's innovation in concentrated solar thermal was the SolarPACES Technology Innovation Award 2016 for its innovative trough CST enclosed inside glasshouses for generating steam directly for EOR. Now a Saudi factory will make GlassPoint's lightweight trough solar collectors, and the firm has now expanded its market focus to include the many industries that use steam.

THE PRODUCTION LINE IS DESIGNED FOR COST-EFFECTIVE HIGH-VOLUME INDUSTRIAL PRODUCTION



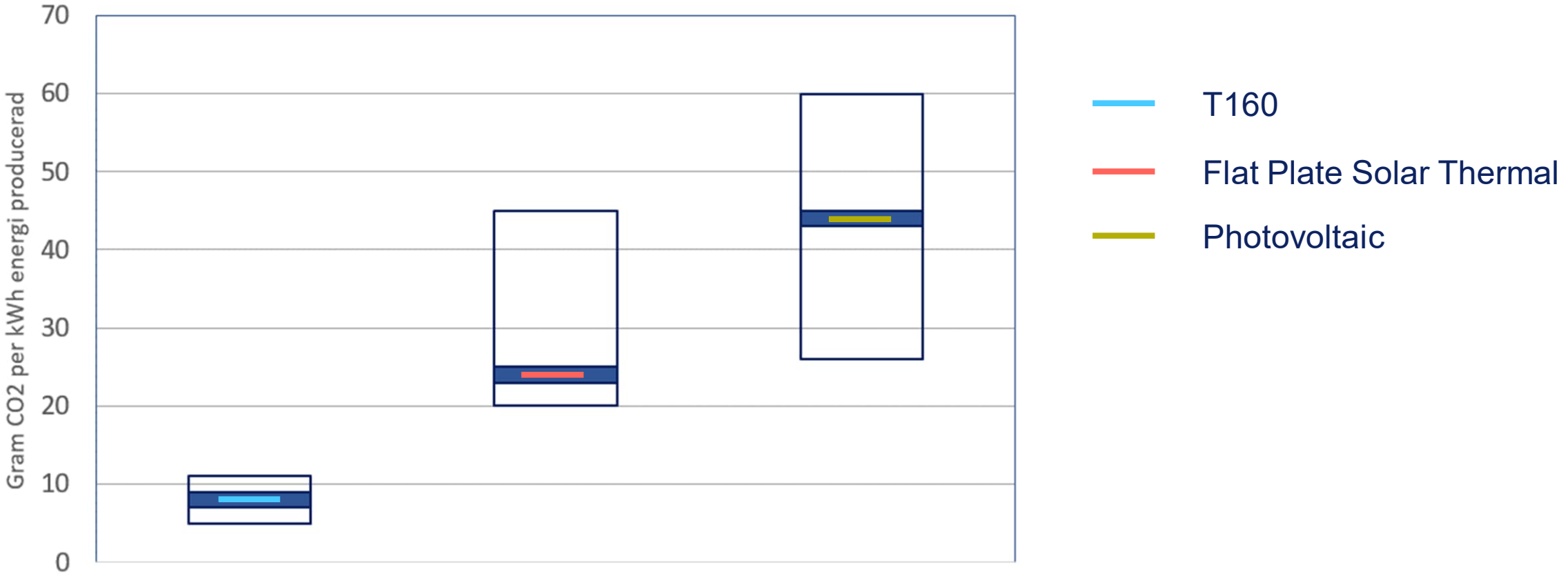
CLIMATE IMPACT COMPARED TO STEAM FROM FOSSIL FUEL

Low climate impact



ABSOLICONS T160 HAS A LOW CARBON FOOTPRINT

CO2 emissions from different renewable energy sources with LCA



MASSIVE SUBSIDIES FOR NEW FACTORIES

Inflation Reduction Act (IRA) - aim to reduce greenhouse gas emissions by **40%** over the next ten years.

IRA is a 10-year, $369 billion Energy Security and Climate Change program

Program 48C offer **$10 billion for new factories** making equipment (**producing solar collectors**) at 30 percent credit rate

Additional **30 percent tax credit** for energy projects (**installing solar collectors**) on industries

Net Zero Investment Act (NZIA) - want to make a **55%** reduction possible by 2030

- **Europe does not have the factories** to produce the equipment needed to make the transition
- EU wants to **fund new production plants** with a focus on eight net-zero technologies, one being PV and **solar thermal technologies**.
- EU working paper conclude: "There is also a large EU market for industrial process heat in the range 150 to 400 °C, a part of which can be addressed by **concentrated solar heat systems**."

SOLAR THERMAL: In total 500 GW by 2035

190 GW SOLAR HEAT IN BUILDINGS

10 million houses already have solar thermal systems. Adopt best practices from Cyprus and Austria.
IEA NZE expects 1,2 billion homes to have solar heat in 2050.

110 GW SOLAR DISTRICT HEATING (SDH)

Over 6000 cities in Europe burn fuel or waste. 266 cities already use solar heat in their district heating.
Solar heat and seasonal storage can supply 100% of the energy. Same space as local golf courses.

200 GW SOLAR HEAT FOR INDUSTRIAL PROCESSES (SHIP)

Industry are installing large solar heat systems to achieve their objectives.
IEA NZE expects solar heat to cover 11% of the industrial heat demand in 2050 at global level.

100 GW SAVINGS WITH ENERGY STORAGES and DIGITALISATION

180 GWh of solar thermal energy storage installed. Combining energy-saving with thermal storage will save 90 TWh. Seasonal heat storages are 200 times cheaper than battery technology.

The Solar Heat Europe team

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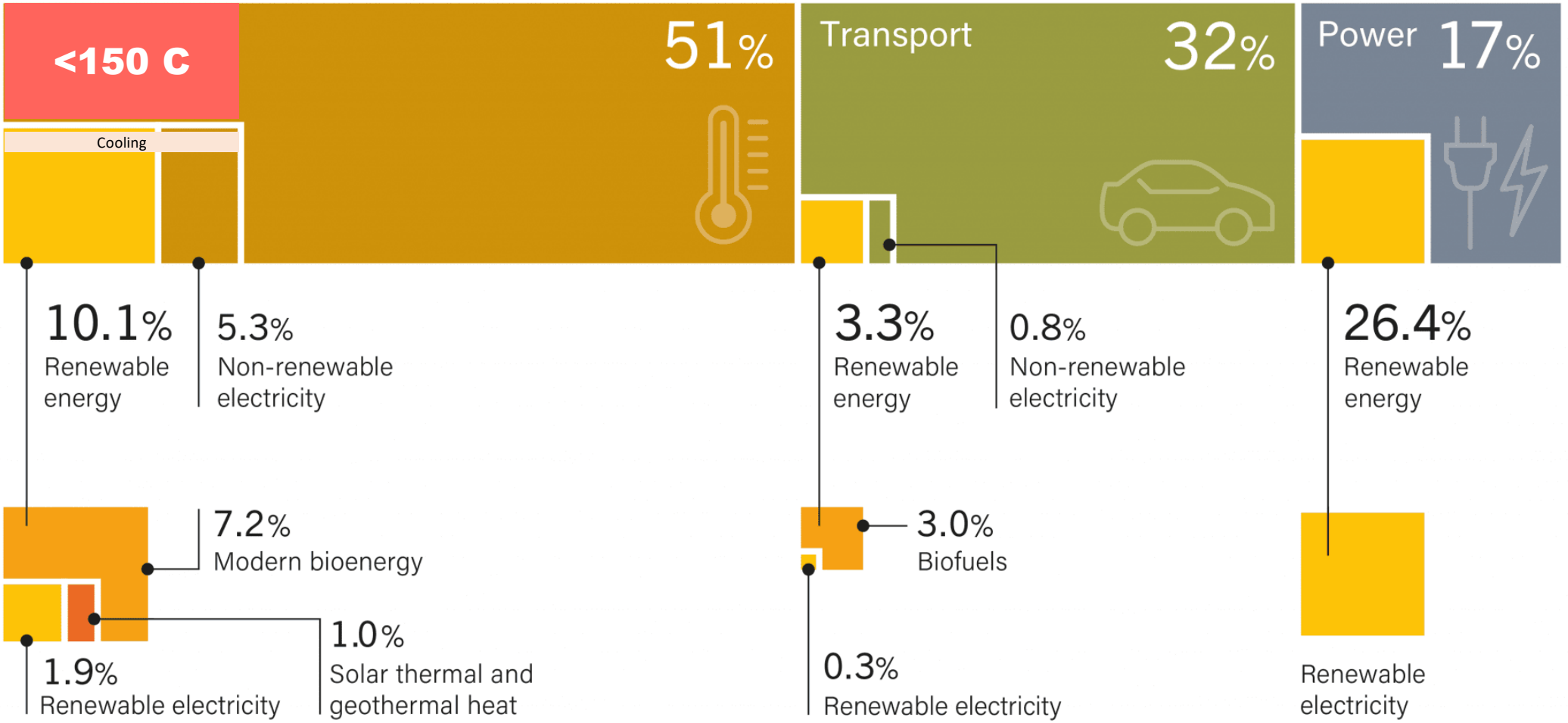
Head of Operations

Alexandra Sutu
Communications & Events Manager

500 GW solar thermal installed in 2035
2000 GW installed in 2050

Renewable Share of Total Final Energy Consumption, by Final Energy Use, 2017

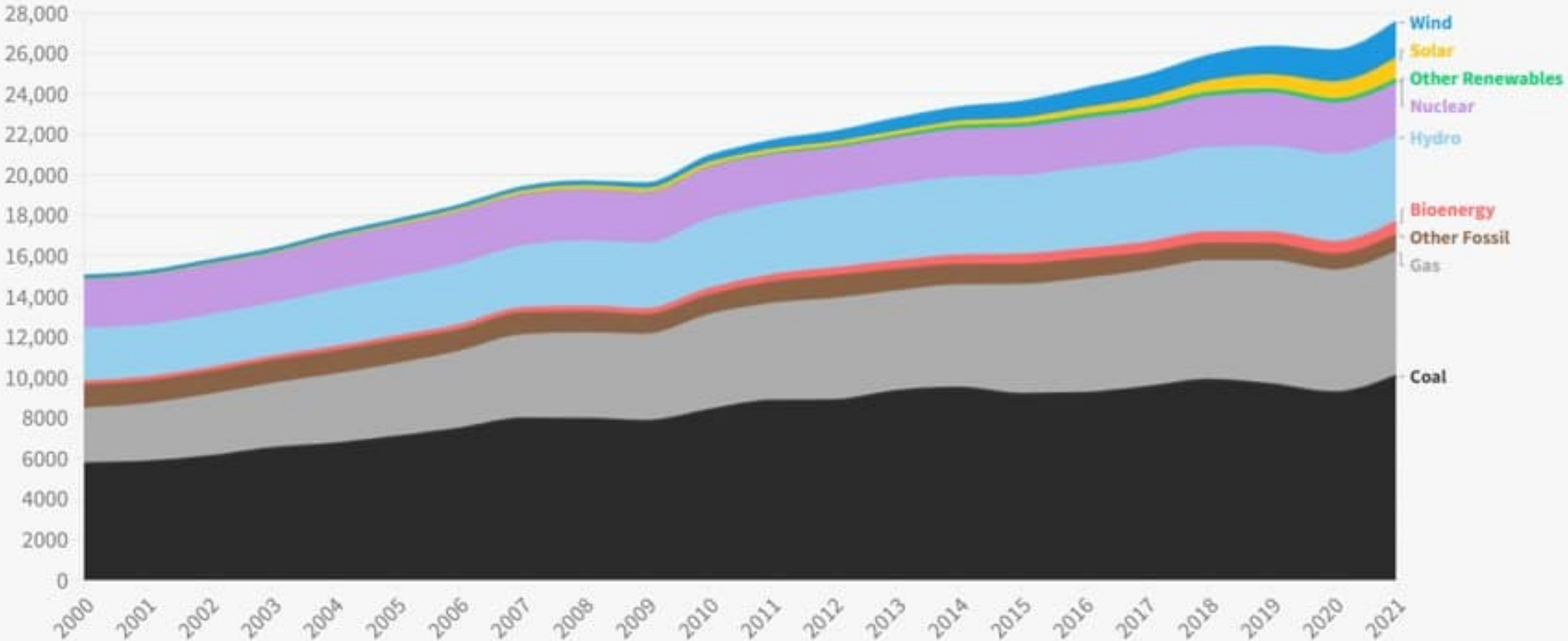


Note: Data should not be compared with previous years because of revisions due to improved or adjusted methodology.

Source: Based on IEA data.

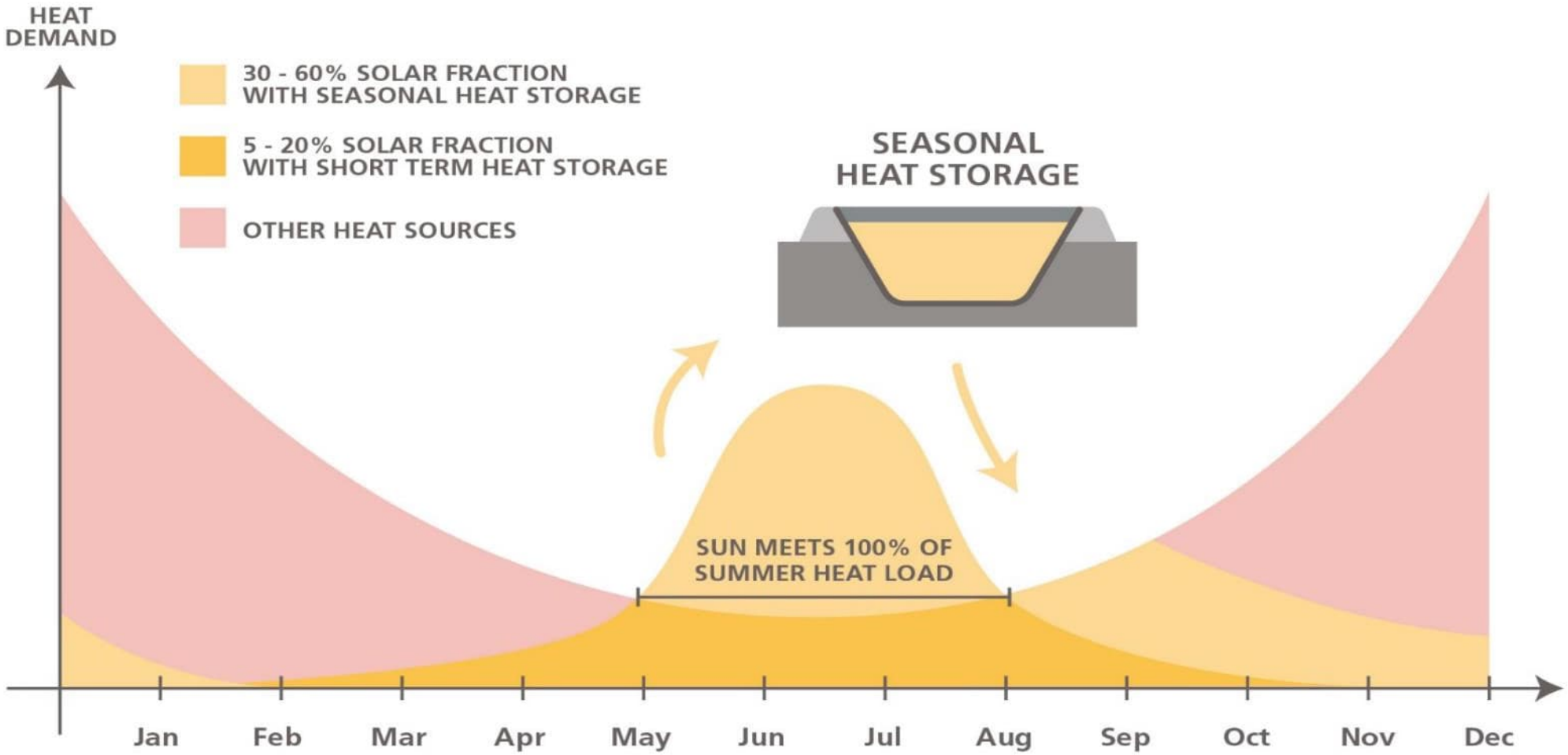
Global electricity generation

Terawatt hours

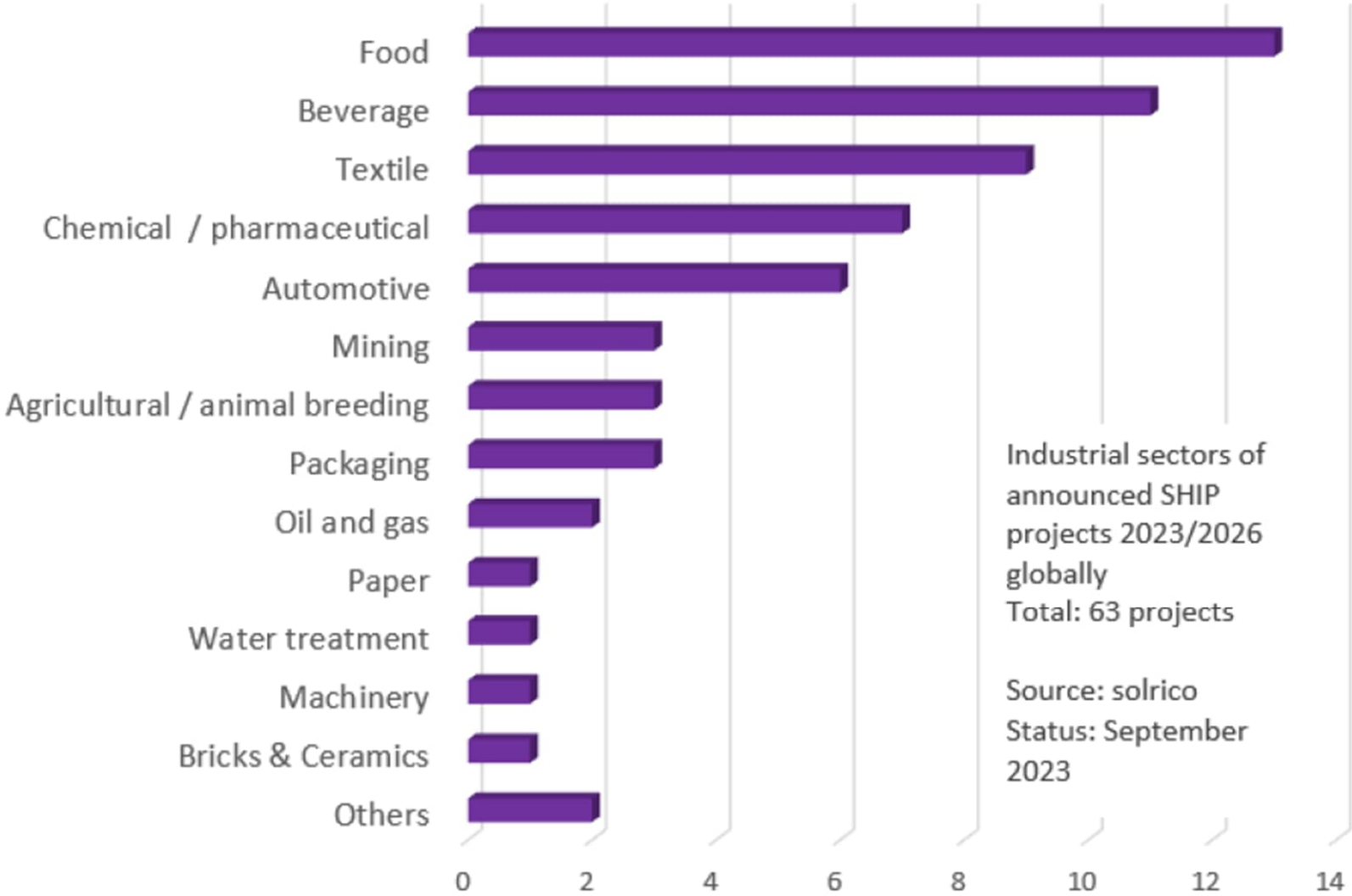


Source: Ember's Global Electricity Review 2022

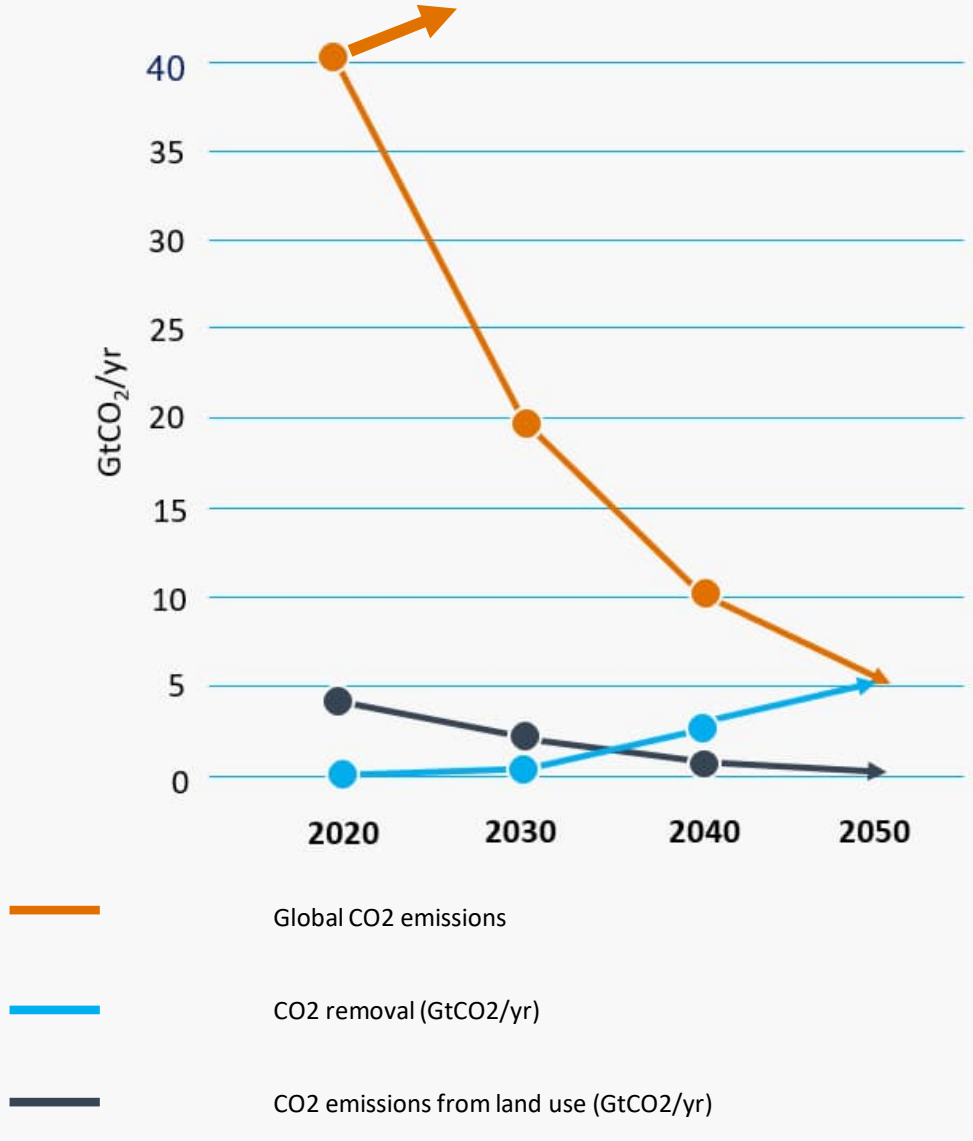
TOFTLUND SOLAR DISTRICT HEATING



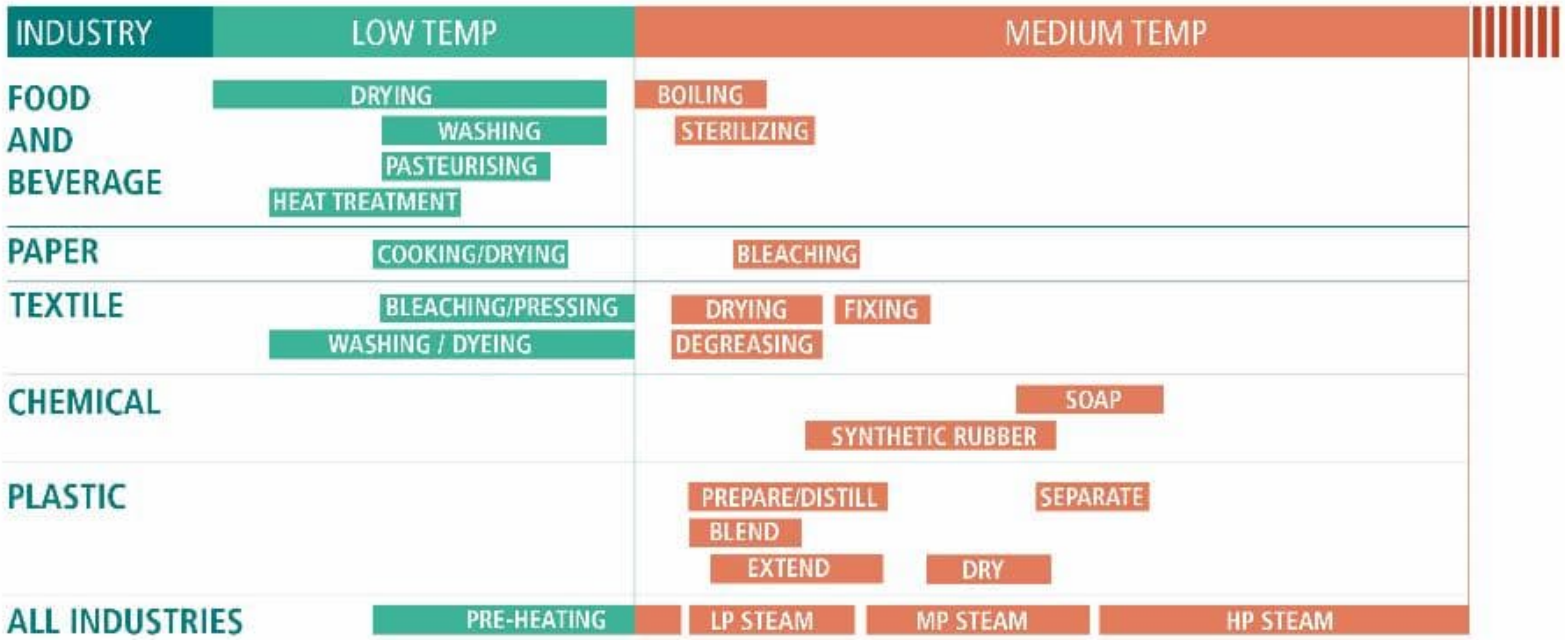
A wide range of industrial clients trust solar industrial heat solutions globally



IPCC ROADMAP FOR 1,5°C "CARBON LAW"

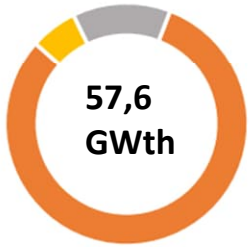


Solar Heat for Industrial Process (SHIP)

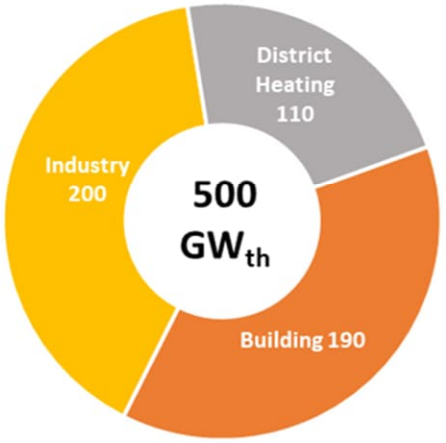


(Comprehensive list accessible via ship-plants.info)

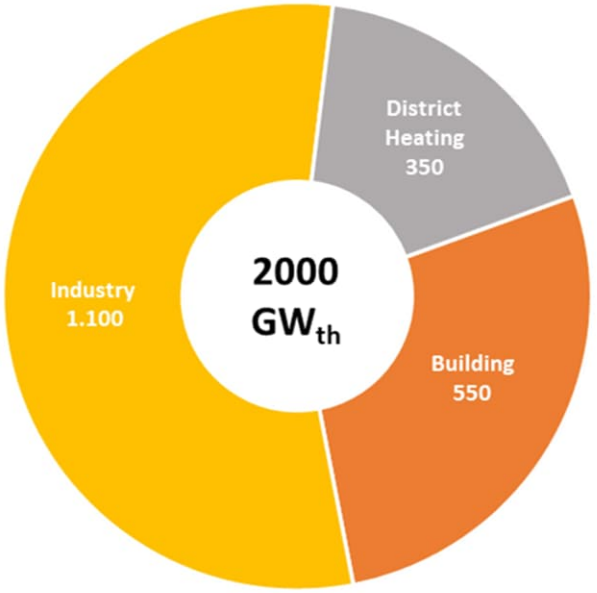
Market Outlook- Europe



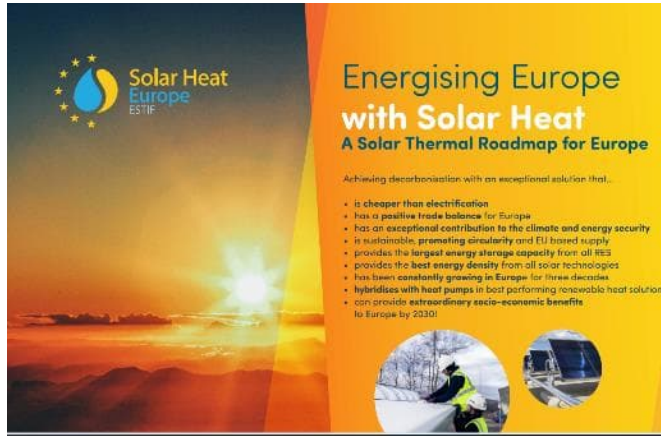
2025



2035



2050



[Energising-Europe-Solar-Heat-STroadmap2030.pdf (solariseheat.eu)]

Three different organisation promoting solar energy