SOLARUPDATE

VOL. 75 | JULY 2022

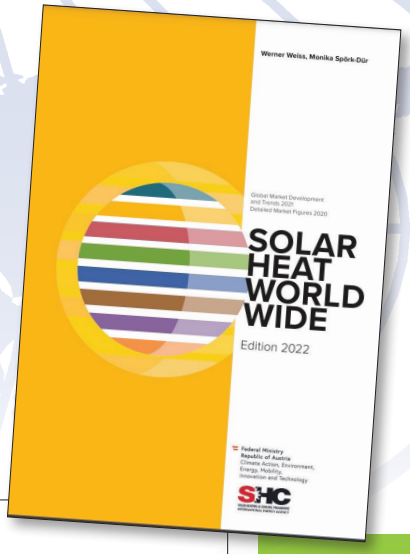
Newsletter of the International Energy Agency Solar Heating and Cooling Programme

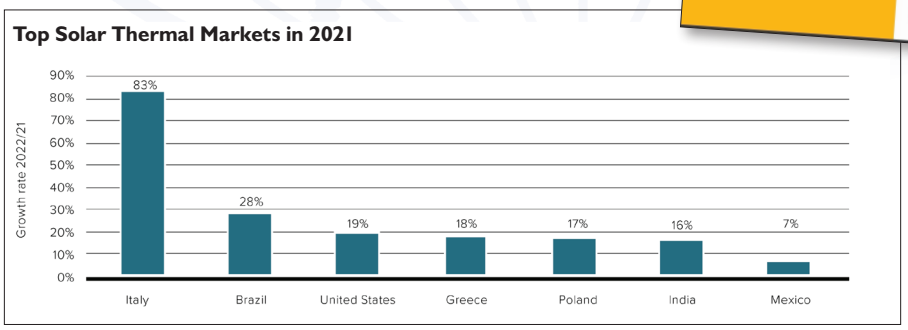
#SolarHeat
#SolarThermal
#SolarProcessHeat
#SolarCooling
#SolarDistrictHeating

In This Issue

Solar Thermal Market Records Year of Growth

Our flagship report, Solar Heat Worldwide 2022 is the most comprehensive evaluation of solar heating and cooling markets with data from 70 countries. The 2022 report has a new design to better highlight all the data but covers the same categories – 2021 market development and trends, 2020 global markets, country statistics, distribution by system types and applications, and contributions to the energy supply and CO_2 reductions. The full report and key findings are available for free on the IEA SHC website.





▲ **Solar heat markets with the highest growth rates in 2021.**

2021 was a bright year for solar thermal – the market grew by 3% after seven years of a downward market. Generating 425 TWh_{th} of green heat saves 45.7 million tons of oil and avoids 147.5 million tons of CO_2. And with 109 million systems in operation, the cumulated solar thermal capacity was 522 GW_{th} or 746 million square meters of collector area.

Below are a few highlights from the 2022 report.

National Policies and Rising Fossil Fuel Prices Drive Demand

Positive trends were observed in several solar heat markets. Italy, for example, experienced a phenomenal 83% growth last year, driven by increased construction activities combined with a new tax reduction scheme, the "Superbonus" for energy-efficient buildings. Likewise, demand in Brazil (+29%) and the United States (+19%) rose as people spent more time at home during the pandemic and invested in solar pool heating solutions. Sales for commercial clients in Brazil also increased due to growth in the construction sector and rising electricity prices caused by power shortages.

Below are the top three countries for different market segments.

continued on page 2

SHC Members

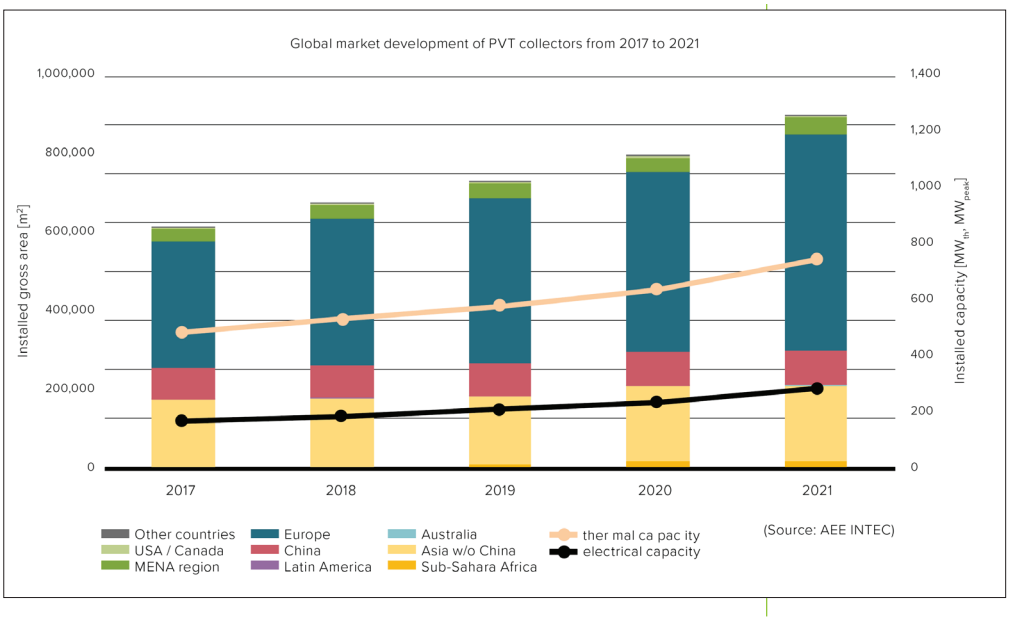
AUSTRALIA
AUSTRIA
BELGIUM
CANADA
CCREEE
CHINA
DENMARK
EACREEE
ECI
ECREEE
EUROPEAN COMMISSION
FRANCE
GERMANY
ISES
ITALY
NETHERLANDS
NORWAY
PORTUGAL
RCREEE
SACREEE
SICREEE
SLOVAKIA
SOUTH AFRICA
SPAIN
SWEDEN
SWITZERLAND
TURKEY
UNITED KINGDOM

Leading Markets for Solar Thermal Solutions

Three top markets		1	2	3
Solar district heating New additions **2021** [MW_{th}]		China	France	Denmark
Solar industrial heat New additions **2021** [MW_{th}]		China	France	Mexico
PVT systems Total in operation **2021** [MW_{th} / MW_{peak}]		France	South Korea	China
Solar air heating systems Total in operation at the end of **2020** [MW_{th}]		Canada	Australia	Japan
Swimming pool heating Total in operation **2020** [MW_{th}]		USA	Brazil	Australia

Photos: GRENoneTEC, TVP Solar; AST Eis- und Solartechnik GmbH, DualSun, SolarWall Conserval Engineering Inc.

PV-Thermal Market on the Rise



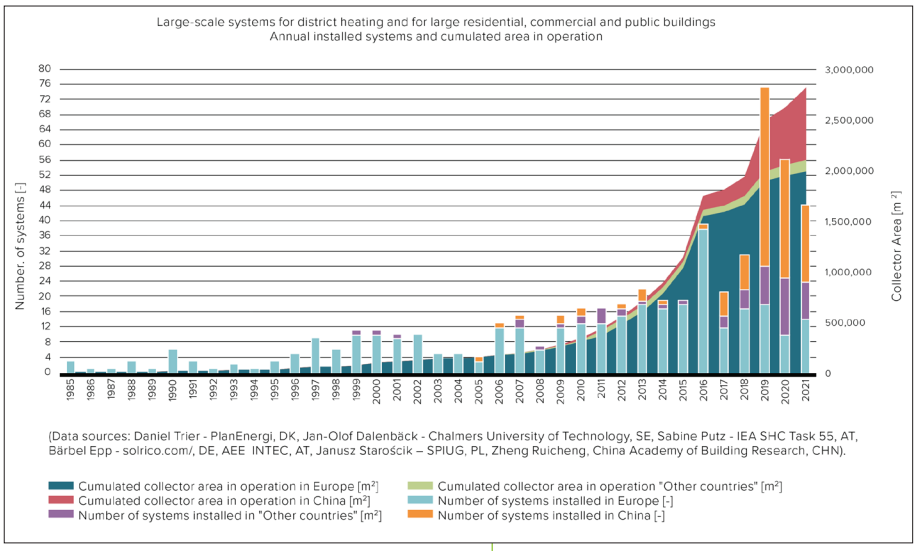
Cumulated PVT capacity for the years 2017 to 2021.

continued on page 3

A highlight of this year's report is the section on PV-Thermal systems (PVT) – generating both solar heat and solar electricity. Thirty-eight manufacturers worldwide provided detailed sales data giving a country-specific view of PVT deployment. France is the leading market with air-based PVT collectors used for heating. However, unglazed PVT collectors gained popularity as a heat source for brine heat pumps in residential and commercial buildings in the other leading countries, South Korea and China.

Today, 1.4 million m^2 of PVT collector area is in operation. In 2021, the global PVT capacity in operation grew 13% after steady 9% growth between 2017 and 2020.

Large-Scale Solar Heating Market Shifts To China



▲ **Large-scale systems worldwide – annual achievements and cumulated collector area in operation in 2021.**

Europe has dominated the market for large-scale solar thermal plants connected to a local or district heating grid or installed on large residential, commercial, or public buildings since the early 1980s, but there has been an enormous shift. In 2021, China accounted for 75% of the market, with 20 systems installed, totaling a collector area of about 151,000 m^2. France followed with 3 systems, totaling 10,600 m^2 collector area, and Denmark 1 system with 8,013 m^2 collector area.

Solar district heating (SDH) systems are the largest subsector of the large-scale solar heating market. By the end of 2021, 299 SDH systems (> 350 kW_{th}, 500 m^2) were operating with a 1.6 GW_{th} capacity. Denmark dominates this sector with 125 installed systems and 1.1 GW_{th} capacity due to its past favorable policies and funding that lasted until 2020. Seeing the technology's potential for decarbonizing the heat sector in neighborhoods and cities, other countries are taking the lead. In 2021, China and France overtook Denmark and reached the top ranked positions in new solar district heating capacity.

"With 21 GW of new capacity installed in 2021, the solar thermal sector has again proven that it is a significant player in the move towards climate neutrality. Our flagship publication Solar Heat Worldwide shows the wide range of customers that can profit from zero-carbon heat produced onsite."

TOMAS OLEJNICZAK
Chair of the IEA SHC Programme

continued on page 4

QUICK STATS

Capacity

- 522 GW_{th} (746 million m^2 collectors) global solar thermal capacity in 2021
- 425 TWh solar thermal heat supplied in 2021
- Top countries
  - Installed capacity in 2020 – China, Turkey, US, Germany, Brazil in 2020
  - Installed capacity per 1,000 inhabitants in 2020 – Barbados, Cyprus, Israel, Austria, Greece

Market Growth

- 3% growth in 2021
- Market leaders in 2021 – Italy 83%, Brazil 28%, US 19%, Greece 18%, Poland 17%, India 16%, and Mexico 7%

New Installations

- 21 GW_{th} / 31 million m^2 collector area in 2021
  Once again, led by China with 18 GW_{th} or 83% of new market growth.
- By application in 2020 – 51% large DHW systems (multi-family housing, tourism, and public sector), 35% DHW (single-family housing), 6% solar combisystems (single- and multi-family housing), 6% swimming pool heating, and 2% other (solar district heating, solar process heat, solar cooling)

Environment

- 45.7 million tons of oil savings in 2021
- 147.5 million tons of CO_2 avoided in 2021
  CO_2 savings are 4 times the annual CO_2 emissions of Switzerland.

To learn more, download the free report here.

In terms of plant size, Denmark is home to 3 of the 5 largest systems, leading with a 156,694 m^2 system with 110 MW_{th} installed capacity, followed by China's 93,000 m^2 system with 65 MW_{th} installed capacity.

In terms of the number of systems, after Denmark's 125 systems, China follows with 41 systems with 279.3 MW_{th} installed capacity, followed by Germany (45 systems with 81.5 MW_{th} installed capacity), Sweden (24 systems, 23.9 MW_{th} installed capacity), and Austria (22 systems, 34 MW_{th} installed capacity).

Large-scale solar systems for the residential, public and commercial sectors can be found on many types of buildings, including hospitals, hotels, and sports centers. The number of systems is increasing in Latin America (Mexico and Brazil), the MENA region (Jordan, Kuwait, UAE), and Asia outside of China (Cambodia, India, Thailand). By the end of 2021, 230 systems with a capacity of 324 MW_{th} were supplying green heat. China is the market leader with 84 systems with 223 MW_{th} capacity, followed by Turkey (18 systems, 14.2 MW_{th}) and Latin America (16 systems, 12 MW_{th}). In Europe, the three market leaders are Greece (44 systems, 10.7 MW_{th}), France (14 systems, 10.4 MW_{th}), and Austria (410 systems, 7 MW_{th}).

Multi-MW solar industrial heat plants (SHIP) demand is increasing worldwide as industrial companies search for a CO_2-free heat supply. The largest plants for solar heat for industrial processes (SHIP) are a 300 MW plant in an oil field in Oman, followed by a 37 MW system in Australia for a tomato producer, and a 28 MW system for a copper mine in Chile.

The number of SHIP plants increased to at least 975 documented plants with an overall installed collector area of 1.23 million m^2. Mexico leads in the number of SHIP systems installed due to their cost-competitiveness with fossil fuels, particularly liquefied petroleum gas.

Solar thermal technologies are suitable for supplying heat to many processes, such as drying, boiling, sterilizing, or bleaching with temperature needs up to 400 °C. This is important, considering that industry is among the most challenging economic sectors to decarbonize, given the long investment cycles for new energy infrastructure.

Market Trends

In 2022 the market trends to keep an eye on are the continued dominance of the Chinese market, particularly domestic hot water systems and MW solar systems, solar heat for industrial processes (SHIP), PV-Thermal applications, solar cooling applications with capacities over 350 kW, and building integrated solar air heating systems.