Germany's first ground-based solar thermal plant went on stream on 17 June 2025 in Dresden. The 140 panels produce 700 MWh of heat per annum in the form of hot water. This emission-free heat is injected locally into the urban heating network.

- 32.1%

The decrease of the solar thermal market in the European Union between 2023 and 2024

SOLAR THERMAL AND CONCENTRATED SOLAR POWER BAROMETER

A study carried out by EurObserv'ER

Slowdown contagion spread to the main European Union solar thermal markets, including the Greek market, said to be its most stalwart, and depressed 2024 sales. The previous year's 21.1% drop in collector surface worsened to 32.1%. In 2024, just under 1.3 million m² of collectors were installed – almost 606 000 m² less than in 2023. Many mainly residential segment-related factors contributed to this 100% European technology's ill fortunes. Examples are the Europe-wide sluggish heating and construction markets, the dilution and suspension of several energy renovation aid policies, not to mention the sector's struggle to compete with the current rush to adopt photovoltaic self-consumption. Announcements of new mega-projects in a number of European countries mean that the very large installation segment is taking shape.

Recent EU concentrated solar thermal projects have been geared to industrial heating needs. Currently, construction work is nearing completion on just two Fresnel type CSP solar plants in Sicily.

59.6 MILLION M²

The cumulated surfaces of solar thermal in operation in the European Union in 2024

2 333.1 MWe

Total CSP capacity in operation in the European Union in 2024

The Groningen solar heating network in the Netherlands (Dorkwerd Solar Thermal Park), was commissioned in May 2025. It has a collector surface of 48 000 m² (24 000 x 2-m² TVP Solar collectors), that equates to the aggregate surface of 12 000 x 4-m² individual solar water heaters (SWH) (for 4 people).

TVP SOLAR

SOLAR THERMAL

TECHNOLOGY THAT IS ROBUST, LOCAL AND MULTISECTORAL

From a physical standpoint, solar thermal is certainly the ultimate way to transfer heat to water without emitting either GHG gases or pollutants. Solar thermal panels also offer the advantage of being particularly robust. Their service lives can be upwards of thirty years, provided that the systems are properly serviced, and that they are made from highly recyclable noble components (copper, aluminium, glass). Solar thermal energy can be applied to many uses in various sectors and can meet the hot water consumption and heating needs of the individual and collective residential sector, district heating networks, and also industry in the broad sense. Moreover, solar thermal systems can be hybridized with other technologies, such as biomass, fossil fuel boilers or heat pumps, significantly boosting system energy efficiency, leading to substantial savings on heating bills. Another solar thermal asset is that it is 100% "Made in Europe" know-how and technology, with myriad players serving all the market segments (residential, collective, industry, district heating, etc.), some of which export worldwide. European solar thermal excellence is an opportunity for Europe to improve trade surpluses by replacing natural gas imports and thus contribute to the energy and economic independence of the EU states. Proactive solar energy policy protects European citizens' purchasing power, with clearer, more stable production over time. European regulation encourages the use of solar heat (see inset) for all these reasons, be it in the residential or service sector, district heating networks or more broadly in industrial processes (agrifood, greenhouse growing, chemicals, etc.).

THE RESIDENTIAL SOLAR THERMAL MARKET SEGMENT LANGUISHES IN THE DOLDRUMS

The solar thermal market sector across the European Union is going through a rough patch despite its environmental benefits and has been in freefall for the past two years, losing about one million m² according to EurObserv'ER, or 21.2% between 2022 and 2023 (sales dropped from 2.4 to 1.9 million m²), followed by a further 32.1% drop between 2023 and 2024 (1.3 million m² sold). Using our methodology, the market data given in tables 1 and 2 include systems that use flat glazed and vacuum tube collectors, intended for the production of hot water or heat for the residential sector, heating networks and industrial process heat. Although statistical monitoring of unglazed collectors often used for pools is less thorough they are also included. The data does not include systems that use concentration mirrors (of the Fresnel, parabolic trough and other types), hybrid PV-T (water or air) collectors and glazed air solar collectors for heating and preheating buildings.

The market is nowhere near its peak of the 2000s, and particularly its record year of 2008 when almost 4.5 million m² of collectors were sold. The main European market segment in decline is the residential segment, be it in individual or multi-occupancy buildings, and primarily applies to forced circulation systems, be they for hot water or heating production (combined systems). These systems are particularly prevalent in ocean (France, Belgium, the Netherlands, Denmark, Ireland) and continental climate countries (Germany, Sweden, the Baltic States, Eastern Europe). They contrast with thermosyphon systems, that fare better and are suitable for Mediterranean (Spanish and Italian coastlines, Greece, Cyprus, Malta) or tropical climes (such as France's overseas territories). Temporary rather than structural factors are responsible for the Greek market's contraction registered in 2024 (following a record year for installations in 2023). Incidentally, sales in Cyprus are rising slightly.

Both temporary and structural factors are responsible for the 2024 solar thermal market decline, like that of 2023. In economic terms, the return of inflation, energy price rises, and rising interest rates conspired to create a climate of uncertainty, discouraging investment in solar thermal. The sector is also hit by the crisis in new build – a segment traditionally buoyed by this technology – that affects many European countries. From a structural stance, solar thermal technology for hot water production, particularly in new residential construction, is losing market shares to competing solutions such as thermodynamic systems (heat pumps and thermodynamic hot water heaters). Combined solar systems (CSS), that pair up with biomass boilers, heat pumps or conventional boilers, are similarly struggling to establish a firm foothold. However, political and financial factors such as the return to budget austerity in many Member States, the reduction or cutbacks in financial aid for energy renovation, challenges to previously voted laws and policies often introduced by new governing coalitions and more generally the discontinuity, interruption and modification of incentive programmes have also fuelled the market decline of the last two years. The more climate-friendly heating solutions, whose markets are still over-reliant on financial incentives, are particularly vulnerable to these elements. This backlash is all the more painful, coming, as it does, after the implementation of a slew of ambitious energy efficiency policies for buildings and the fact that it is happening simultaneously in many European countries.

THE RESIDENTIAL SEGMENT AND THE ISSUE OF IMAGE

For about fifteen years, solar thermal has faced head-on rooftop competition from photovoltaic, whose system costs have fallen dramatically. Photovoltaic self-consumption's popularity has been strengthened by the electricity price hikes suffered in the European Union states. In contrast, solar thermal installation costs have been stable, or enjoyed minimal decreases, because the lack of market thrust precludes economies of scale on the quality materials used in their manufacture (copper and aluminium). Their prices remain high, primarily because of energy price hikes used in collector manufacturing, even if the price of gas that peaked after Russia invaded Ukraine has fallen slightly. The quality of the materials used to manufacture solar thermal installations is manifest given their solidity and

EUROPE PROVIDES A SOLAR THERMAL-FRIENDLY FRAMEWORK

Solar thermal technologies fully meet European solarization and renewable heat consumption regulation requirements, primarily formulated in the European Energy Performance of Buildings (2024/1275 (EU) Directive, known as "EPBD"), recast in 2024. Article 10 of the EPBD Directive stipulates that Member States shall ensure that all new buildings are designed to optimize their solar energy generation potential on the basis of the solar irradiance of the site, enabling the subsequent cost-effective installation of solar technologies. The article goes on to entreat Member States to ensure the deployment of suitable solar energy installations (photovoltaic, solar thermal or PVT hybrid), if technically suitable and economically and functionally feasible, as follows:

- *by 31 December 2026, on all new public and non-residential buildings with useful floor area larger than 250 m²;*
- *on all existing public buildings with useful floor area larger than:*
  - *2 000 m², by 31 December 2027;*
  - *750 m² by 31 December 2028;*
  - *250 m² by 31 December 2030;*
- *by 31 December 2027, on existing non-residential buildings with useful floor area larger than 500 m², where the building undergoes a major renovation or an action that requires an administrative permit for building renovations, works on the roof or the installation of a technical building system;*
- *by 31 December 2029, on all new residential buildings; and*
- *by 31 December 2029, on all new roofed car parks physically adjacent to buildings.*

Solar thermal technology also fully meets the heat requirements of the Renewable Energies Directive (2023/2413 (EU) Directive, known as "RED III"). Thus, Member States shall ensure that the renewable energy share grows in the heating and cooling sector:

- *by 0.8 of a percentage point per annum between 2021 and 2025*
- *by 1.1 percentage points per annum between 2026 and 2030*

With the following sub-sector targets:

- *District heating: average growth of 2.2 points per annum between 2021 and 2030*
- *Buildings: collective target of 49% of renewable energies by 2030*
- *Industry: average growth of 1.6 points per annum between 2021–2025 and 2026–2030*

efficiency in making savings over time. The competition between solar thermal and photovoltaic in the residential market is not based on technology alone, but also on perceived image. Photovoltaic is often perceived as being more versatile and cost-effective. It can supply appliances of all kinds (electric hot water heaters, heat pumps, air-conditioners, domestic appliances, EVs, etc.), whereas solar thermal is associated with hot water production alone. Photovoltaic is also believed to require less maintenance than solar thermal. Yet, some of solar thermal's major assets are largely ignored. In hot water production, its thermal yield is three times higher than that of a photovoltaic panel (it can cover 50–80% of annual needs depending on the region) and a combined solar system (CSS) can reduce heating bills by 40–60%. However, the impulse to think solar thermal is decreasing as common wisdom has it that solar energy is for electricity rather than heat production.

NEW XXL SOLAR DISTRICT HEATING NETWORKS

While the residential systems market segment stalls, the European sector is banking on developing major installations (>1 000 m²), whose growth, be it in the solar district heating (SDH) or industrial heat segment, is increasingly forceful, although it still relies on Member States' individual incentive programmes. Examples are France's Fonds Chaleur, the Netherlands' SDE++ programme, Germany's federal BEW (Bundesförderung für effiziente Wärmenetze) programme, Austria's (Klima- und Energiefondsgesetz) and Denmark's Energiteknologiske Udviklings- og Demonstrationsprogram (EUDP) set up to support the urban heating sector's energy transition. Commissioning these installations, whose collector fields run from several thousand to several tens of thousand m², may swell their national statistics. Given the size of the projects, their implementation times and the as yet small number of projects installed annually, it would be premature to measure the sector's momentum from one year to the next. Yet, the market trend is for growth with increasingly large installations, especially in the SDH segment.
The most active countries installing new installations in this segment are Germany and The Netherlands. Germany's district heating network map has densified. The Solites research institute that has been advising, guiding and documenting solar urban heating projects since 2005, confirms that in 2024 three major solar thermal systems went on stream: a 1 733-m² (1.2 MWth) district


FREEPIK

Table No. 1

Annual installed surfaces in 2023 per type of solar thermal collectors (in m²) and capacity equivalent (in MWth)

Country	Glazed collectors		Unglazed collectors	Total (m²)	Equivalent power (MWth)
	Flat plate collectors	Vacuum collectors			
Greece	461 000			461 000	322.7
Germany	268 000	108 000		376 000	263.2
Italy	244 500			244 500	171.2
France**	205 724			205 724	144.0
Poland	130 800			130 800	91.6
Spain	99 487	6 536	1 840	107 863	75.5
Cyprus	66 740			66 740	46.7
Portugal	51 410	1 590		53 000	37.1
Austria	43 891	1 319	1 038	46 248	32.4
Hungary+	42 000			42 000	29.4
Netherlands	19 870	12 360	2 621	34 851	24.4
Bulgaria+	19 556			19 556	13.7
Czechia	15 333	3 473		18 806	13.2
Romania+	13 500			13 500	9.5
Denmark	13 000			13 000	9.1
Slovakia+	12 800			12 800	9.0
Croatia*	12 473			12 473	8.7
Belgium	7 428	1 946		9 374	6.6
Finland+	6 400			6 400	4.5
Sweden*	4 600			4 600	3.2
Luxembourg	2 755			2 755	1.9
Lithuania+	1 400			1 400	1.0
Latvia+	1 400			1 400	1.0
Slovenia*	1 269			1 269	0.9
Ireland+	1 116			1 116	0.8
Estonia+	1 100			1 100	0.8
Malta+	1 000			1 000	0.7
Total EU	1 748 552	135 224	5 499	1 889 275	1 322.5

*+ EurObserv'ER estimation based on the market trend of recent years (these are not sufficiently accurate to be used for percentual change reference in these markets). * Estimation from Solar heat Europe "Decarbonising heat with solar thermal market. Market outlook 2023-2024). ** Including 90 740 m² in the overseas departments. Note: PVT hybrid systems. CSP systems (Fresnel, Parabolic, Parabolic trough) and air collector systems are not included. Breakdown for glazed collectors between flat plate collectors and vacuum collectors is not always available.* ***Source: EurObserv'ER 2025***

Table No. 2

Annual installed surfaces in 2024 per type of solar thermal collectors (in m²) and capacity equivalent (in MWth)*

Country	Glazed collectors		Unglazed collectors	Total (m²)	Equivalent power (MWth)
	Flat plate collectors	Vacuum collectors			
Greece	343 500			343 500	240.5
Germany	161 500	55 000		216 500	151.6
Italy	156 500			156 500	109.6
France*	119 545			119 545	83.7
Spain	68 699	5 003	1 080	74 782	52.3
Poland	74 556			74 556	52.2
Cyprus	68 124			68 124	47.7
Austria	44 161	924	802	45 887	32.1
Portugal	43 650	1 350		45 000	31.5
Hongary+	33 600			33 600	23.5
Netherlands	8 265	9 674	2 621	20 560	14.4
Czechia	12 510	3 336		15 846	11.1
Bulgaria+	15 600			15 600	10.9
Romania+	10 800			10 800	7.6
Slovakia+	10 240			10 240	7.2
Croatia+	9 978			9 978	7.0
Finland+	5 120			5 120	3.6
Belgium	2 973	812		3 785	2.6
Sweden+	3 680			3 680	2.6
Luxembourg	2 197			2 197	1.5
Denmark	1 495			1 495	1.0
Lithuania+	1 120			1 120	0.8
Latvia+	1 120			1 120	0.8
Slovenia+	1 015			1 015	0.7
Malta+	1 000			1 000	0.7
Ireland+	893			893	0.6
Estonia+	880			880	0.6
Total EU	1 202 721	76 099	4 503	1 283 323	898.3

*+ EurObserv'ER estimation based on the market trend of recent years (these are not sufficiently accurate to be used for percentual change reference in these markets). * Estimation . ** including 54 000 m² in the overseas departements. Note: PVT hybrid systems. CSP systems (Fresnel. Parabolic. Parabolic trough) and air collector systems are not included. Breakdown for glazed collectors between flat plate collectors and vacuum collectors is not always available.*
Source: EurObserv'ER 2025

heating network in Häusern, and a 2 045-m² (1.4 MWth) solar heat network at Ammerbuch-Breitenholz, both in Baden Wurttemberg, and a third network, 6 086 m² (4.5 MWth) at Sondershausen, Thuringia. Thus, by March 2025, Germany boasted 61 SDH networks totalling 121 megawatts of capacity in service. The institute points out that a further 16 systems amounting to an additional 193 108 m² of collector surface have been awarded permits and are currently under construction. Once they go on stream by 2026, these solar thermal systems should supply 135 megawatts of solar energy which is double the total solar thermal capacity installed in 2024. New large-scale systems that will be commissioned at Leipzig (65 000 m², 45.5 MWth), Bad Rappenau (28 871 m², 20.2 MWth), Stralsund (24 361 m², 17.1 MWth), Steyerberg (13 700 m², 9.6 MWth) and Tübingen (12 172 m², 8.5 MWth) can largely take the credit for this feat. The Stralsund SDH network, the country's third largest heating network, recently went on stream with its total collector surface of 24 361 m² (4 824 units)... the size of about five football pitches. Once fully operational, the plant's annual heat output will exceed 11 GWh, thus covering over 10% of the city network's urban heating needs. This project, carried out by Viessmann Deutschland GmbH on behalf of Stralsund public services, has been running since May 2025. The project, which received 21 million euros in investment from the Stralsund municipal electricity company (SWS), is just one initiative that aims to increase the renewable energy share of the city's heat supply with a set goal of 36% of renewable energy in the urban heating network. The Director-General of SWS, Anselm Drescher, stated that the plant would make the company less dependent on the natural gas and oil markets. Its urban heating customers will benefit in the long term, because solar energy could make up for the rise in CO_2 prices. Looking at the technical details, the solar field is coupled to a cogeneration plant combined with a heat pump, as well as a heat storage system. Construction of the Leipzig heating network (65 000 m², Ritter XL collectors), which will be Germany's biggest, started in March 2024. It should be up and running by early 2026. The Ritter XL press release published in April 2023, stated that solar would cover about 20% of Leipzig's daily heating needs in summer, while solar heat will meet 2% of the network's annual heating needs.

Table No. 3

Cumulated capacity of solar thermal collectors installed in the European Union in 2023 and 2024** (in m² and in MWth)*

Country	2023 m²	2023 MWth	2024 m²	2024 MWth
Germany	22 409 890	15 686.9	22 157 290	15 510.1
Greece	5 742 000	4 019.4	5 870 500	4 109.4
Italy	5 135 714	3 595.0	5 194 476	3 636.1
Spain	4 525 423	3 167.8	4 610 423	3 227.3
Austria	4 468 682	3 128.1	4 362 423	3 053.7
France	4 282 452	2 997.7	4 289 850	3 002.9
Poland	3 067 862	2 147.5	3 117 418	2 182.2
Denmark	2 072 096	1 450.5	2 044 964	1 431.5
Portugal	1 598 055	1 118.6	1 643 054	1 150.1
Cyprus	1 156 360	809.5	1 194 230	836.0
Belgium	760 100	532.1	749 185	524.4
Netherlands	667 528	467.3	654 210	457.9
Czechia	630 248	441.2	646 094	452.3
Bulgaria	535 253	374.7	550 853	385.6
Hungary	460 000	322.0	490 900	343.6
Ireland	347 023	242.9	345 922	242.1
Sweden	377 000	263.9	335 629	234.9
Croatia	322 000	225.4	331 978	232.4
Slovakia	279 000	195.3	283 740	198.6
Romania	249 109	174.4	259 909	181.9
Slovenia	204 168	142.9	202 883	142.0
Finland	88 000	61.6	91 490	64.0
Luxembourg	75 850	53.1	78 047	54.6
Malta	41 817	29.3	38 602	27.0
Estonia	30 550	21.4	31 180	21.8
Lithuania	22 672	15.9	23 292	16.3
Latvia	21 672	15.2	22 292	15.6
Total EU 27	59 570 524	41 699.4	59 620 834	41 734.6

** All technologies included unglazed collectors. ** Estimation. Note: Some countries like France, Austria and Spain include PVT hybrid systems in their cumulated capacity of solar thermal collectors.* ***Source: EurObserv'ER 2025***

PARADIGMA

According to Solar Heat Europe, 80% of hot water and heating requirements in the residential and service sectors could be covered by solar thermal (compared to only 1.5% today).

Elsewhere in Europe, another major SDH project was commissioned recently, in May 2025. It is the Groningen solar heating network in the Netherlands (Dorkwerd Solar Thermal Park), which has a collector surface of 48 000 m² (24 000 x 2-m² TVP Solar collectors), that equates to the aggregate surface of 12 000 x 4-m² individual solar water heaters (SWH) (for 4 people). That is double the Netherlands' 2024 installation figure, which Statistics Netherlands put at 20 560 m². The Groningen SDH network will supply heat to the equivalent of 2 600 households. Solar heat storage will be both daily and seasonal. Solar hot water will be temporarily stored in a 6 000-m³ reservoir in the solar field to manage daily heat demand. The collector field also has an inter-seasonal storage system with a reservoir buried at a depth of 175 metres that can store up to 230 million litres of hot water. The facility enables it to store summer calories and restore them during the winter heating season. The project's cost-effectiveness has been guaranteed by the SDE++ programme that awards a premium calculated as the difference between the gas price and an 85 EUR/MWh cap payable over a 15-year period. The project has also received money from the national growth fund (Nationaal Groeifonds) which awarded a 22 million euro grant, a national contribution that is only paid out when a project contributes to the durability of Dutch prosperity and serves as an example to other municipalities and project leaders. Additionally, Groningen province and municipality provided another 4 million euro grant for the seasonal storage system construction, as Groningen aims to be carbon neutral by 2035. Austria should also re-enter the fray with many (27) large-scale solar thermal projects currently being assessed that are eligible for energy and climate funding. The biggest project, whose feasibility study was supported by the Fund, is a 267 million euro project – the Weitendorf SDH network project, 20 km south of Graz, which will link 400 000 m² of solar thermal collectors with a biomass plant and a gigantic heat storage unit in a disused basalt mine. It could produce a quarter of the Graz urban heating network's heat requirement at the earliest in 2026.

Only a handful of very large-scale projects were announced in the industrial heat segment in 2024 – most of them in the agriculture and greenhouse growing sector. No major solar thermal installations were commissioned in France in 2024. A few should figure in the 2025 statistics, including an organic vegetable greenhouse, the Vermeils greenhouse project (5 500 m² of Savosolar collectors), and another project led by the French company, NewHeat, to sell heat to a greenhouse grower. The industry's players claim that France has a significant number of applications under consideration. However, final investment decisions have been postponed because of constraints arising from the French "Zero Net Artificialization" (ZAN) law. The core issue is that solar thermal projects often commandeer

areas of land, which conflicts with land artificialization reduction aims. While ground-based solar photovoltaic farms are not considered to artificialize land, the opposite applies to ground-based solar thermal farms. Thus, as municipalities wait for waivers or a change in the legislation and tend to prefer to set aside artificialization "quotas" for housing and priority economic activities, solar thermal projects get pushed to the back burner. In 2024, the Heineken brewery and CSIN (Société Solatom Indertec) led the largest industrial solar thermal project. The biggest Fresnel type CSP plant (6 000 m² of flat mirrors) for industrial usage went on stream at Quart de Poblet (4.2 MWth), near Valencia. This solar thermal plant that was built in a record eight months, should slash annual CO_2 emissions by about 1 300 tonnes. Since the project started up at the end of 2024, the Valencia brewery has been running on 42% renewable energy (both thermal and electrical). Heineken España's has been 100% renewably powered since 2020.

NEWS FROM AROUND THE MAIN SOLAR THERMAL COUNTRIES

The German market continues to unravel

In 2024, Germany's solar thermal market was struggling, like its national heating appliance market. According to AGEE-Stat data, only 216 500 m² of solar thermal collectors (161 500 m² flat glazed and 55 000 m² vacuum tube collectors) were installed, which signifies a 42.4% YoY fall, and up to 69.5% on the 2022 installation figure.

The Federal Heating Industry Association (BDH) reports that sales of heat generators dropped (across all technologies: gas, oil, biomass, HP), by 46% between 2023 and 2024 (from 1.3 million to 712 500 heating appliances), which severely hit heating components such as solar thermal systems, heat pumps and ventilation systems with heat recovery. The low new build level compounded this trend. Markus Staudt, Director-General of the BDH quoted in the report says that "The current context is unsuitable for stimulating the modernization market. The next federal government must take urgent measures to return the heating market to a sustainable growth trajectory".

The decline is primarily due to the change in administration of the financing programme for efficient buildings, that at the start of 2024 passed from the Federal Office for Economic Affairs and Export Control (BAFA) to the KfW Bank. The handover caused temporary disruption to grant application handling, leading to consumer uncertainty and a drop in new installations. The market was badly hit, although requests resumed at the end of February for family homes and the end of May for rental properties. The 2024 installation level did not increase the solar thermal surface in operation in Germany, instead, it contracted from 22.41 million to 22.16 million m² after AGEE-Stat decommissioned 469 100 m² of collectors. At the same time solar thermal heat contributions slipped from 784.3 to 756.1 ktoe. Incidentally, the outgoing government's Building Energy Act (Gebäudeenergiegesetz), that came into force in January 2024, is likely to be challenged by the new "energy-climate" policy of the German government coalition formed between the Christian-Democratic Union (CDU), the Christian Social Union (CSU) in Bavaria and the Social Democrats (SPD). This decision results from the coalition agreement published on 9 April 2025 which aimed to repeal the heating chapter of this act. Germany's Building Energy Act (GEG) stipulates in its general rule that from January 2024, all new housing units must be equipped with heating systems that use 65% of renewable energy. Examples of heating systems that meet the 65%

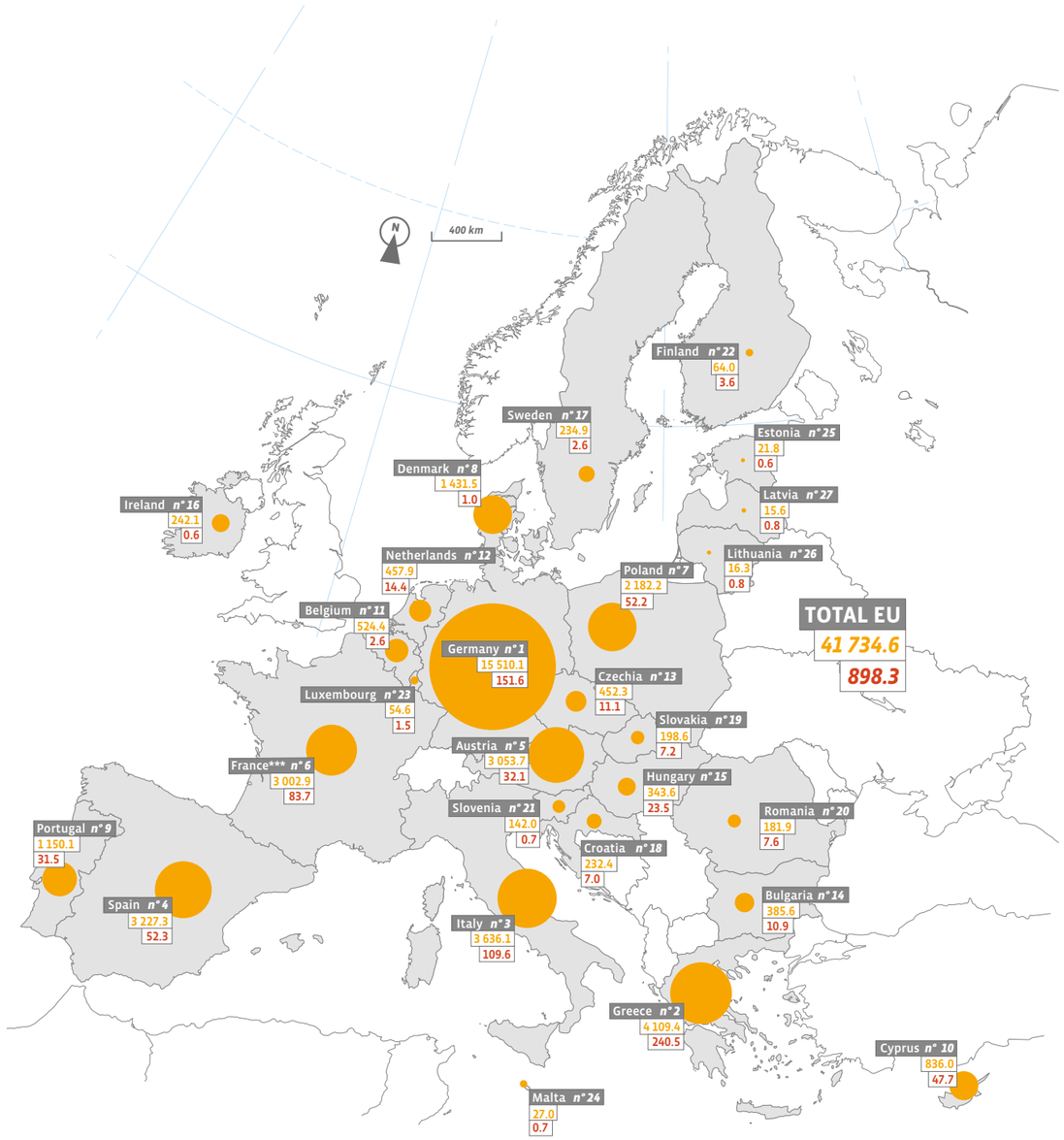
Table No. 4

Solar thermal capacities in operation per capita (m²/inhab. and kWh/inhab.) in 2024***

Country	m²/inhab.	kWth/inhab.
Cyprus	1.236	0.865
Greece	0.564	0.395
Austria	0.476	0.333
Denmark	0.343	0.240
Germany	0.265	0.186
Portugal	0.154	0.108
Luxembourg	0.116	0.081
Slovenia	0.096	0.067
Spain	0.095	0.066
Italy	0.088	0.062
Croatia	0.086	0.060
Bulgaria	0.085	0.060
Poland	0.085	0.060
Malta	0.069	0.048
Ireland	0.065	0.045
Belgium	0.063	0.044
France***	0.063	0.044
Czechia	0.059	0.041
Slovakia	0.052	0.037
Hungary	0.051	0.036
Netherlands	0.036	0.026
Sweden	0.032	0.022
Estonia	0.023	0.016
Finland	0.016	0.011
Romania	0.014	0.010
Latvia	0.012	0.008
Lithuania	0.008	0.006
Total EU	0.133	0.093

** All technologies included unglazed collectors. ** Estimation. *** Overseas departments included.*
Source: EurObserv'ER 2025

Solar thermal capacity* installed in the European Union at the end of 2024 (MWth)**



Key

41 734.6 — *Total solar thermal capacity installed at the end of 2024 (MWth)*

898.3 — *Solar thermal capacity installed during the year 2024 (MWth).*

** All technologies included unglazed collectors. **Estimation. *** Overseas departments included for France*
Source: EurObserv'ER 2025

DEUTSCHES ZENTRUM FÜR LUFT

According to AGEE-Stat data, only 216 500 m² of solar thermal collectors (161 500 m² flat glazed and 55 000 m² vacuum tube collectors) were installed in Germany, which signifies a 42.4% YoY fall on the 2022 installation figure.

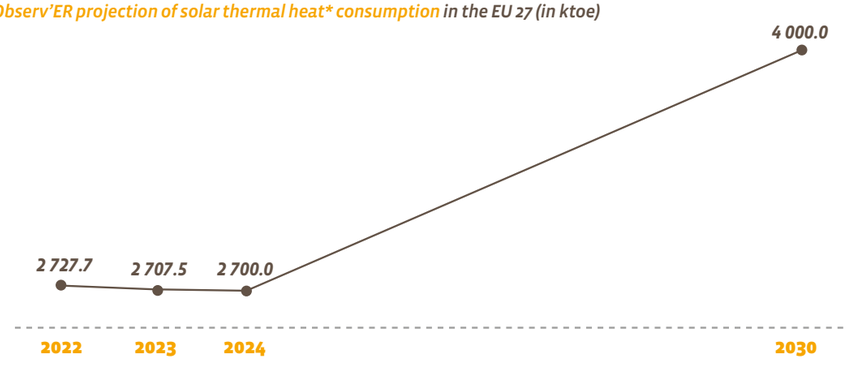
quota include heating networks, heat pumps, solar thermal energy, hybrid heating systems (such as a heat pump coupled with gas or solar thermal coupled with gas), biomass heating and cogeneration systems. To start with, this obligation only applies to new constructions located in designated development zones. For existing buildings and new constructions outside these zones, implementation is contingent on the drafting of municipal heating plans, with deadlines set for 30 June 2026 for large cities and 30 June 2028 for other municipalities (fewer than 100 000 inhabitants). Exemptions are provided for renovation work, in the event of gas and fuel oil boiler breakdowns. Repairs are still authorized, and there is no obligation to change fuel. The outgoing government hoped to fast-forward the transition to renewable energies for space heating. The coalition claims that the new version of the act should be "more open to technologies, more flexible and simpler". The coalition agreement includes public aid for installing a climate-friendly heating system, but the level of new subsidies has yet to be defined.

With less aid the Italian market is tumbling

In Italy, presentation of data from the Assotermica statistical surveys for 2024 shed light on the difficulties encountered by renewable energy technologies, including solar thermal. Solar thermal panel sales (glazed flat collectors including thermosyphon systems) dropped by 36.3%, from 244 500 to 156 500 m², between 2023 and 2024. According to Federico Musazzi, the Director of Assiclima/Assotermica, lower incentives and the generally keen competition between technologies in the construction industry are the main factors behind these results.
The falloff can be partly attributed to the reduction in the Superbonus tax incentives. Italy's Finance Act 2024 effectively introduced stringent restrictions that limited its scope of application and reduced the available rates. From 1 January 2024 onwards, the State abolished the Superbonus for individual homes. In 2024, the Superbonus was reduced to 70%, with the added restriction of being reserved for condominium owners and no longer for family homes — in 2025 the rate was lowered further to 65%. As for solar thermal, Giovanni Fontana, sector manager and head of Assotermica's D5 Solare Termico group, points out that "Solar thermal often competes with solar photovoltaic, leading to a reduction in the number of installation firms. Solar thermal is a green, recyclable technology, but it is penalized by the lack of roof space and is often displaced by photovoltaic. Solar technology is widely mentioned in the EPBD Directive, and we hope that Italy will at last recognize its significant contribution towards decarbonation and the energy transition underway."

Graph. No. 1

EurObserv'ER projection of solar thermal heat consumption in the EU 27 (in ktoe)*



Final energy consumption and gross heat production in the transformation sector.* ***Source: EurObserv'ER 2025*

Solar self-consumption leans towards photovoltaic in Spain

Unfortunately, in 2024, Spain's solar thermal market trend matched that of the other major European markets, and plummeted. ASIT data quantified sales of flat glazed collectors at 47 410 m², "prefabricated" thermosyphon systems at 21 289 m², vacuum tube collectors at 5 003 m² and unglazed plastic collectors at 1 080 m², resulting in a total market figure of 74 782 m², which amounts to a 30.7% YoY fall. If we add sales of air collectors (5 218 m²) and hybrid, PVT collectors (5 000 m²), the figure increases to 38% YoY fall, for a total of 85 000 m² in 2024, compared to 137 500 m² in 2023. As the new build sector is performing well, this slump gives particular cause for concern. During 2024, construction on over 127 000 dwellings was started in Spain, namely, 16.7% more than the previous year and almost 98 000 were completed, which is 11.7% more than in 2023. Nonetheless, ASIT hopes that growth will return in 2025, through the increase in dwelling construction and IDEA (Institute for the Diversification and Saving of Energy) and regional government aids as part of the Feder 2021–2027 programme. Incidentally, the CAE [Certificados de Ahorro Energético] (Energy Saving Certificates) incentive will be gradually extended to solar thermal for the industrial, residential and service sectors. Spain's solar thermal market difficulties can also be explained by the success of solar photovoltaic self-consumption, a segment that has benefitted from the sharp rise in electricity prices, regulatory facilities and a drop in system prices. The perception is that photovoltaic has become more versatile and competitive. It can supply all types of appliance (water heaters, air-conditioners, household appliances, etc.), not just hot water. It is also easier to install with lower maintenance costs. PVT hybrid systems are also seen by professionals as a potential alternative in Spain, with scope for self-consumption of the electricity and hot water produced.

Table No. 5

Representative European manufacturers of solar thermal systems and collectors

Company	Country	Business units
GreenOneTec	Austria	- Flat plate collectors OEM - Large area collectors up to 13.6 m² - Thermosiphon solar system - Large scale solar thermal project
Dimas	Greece	- Flat plate collectors OEM - Thermosiphon tanks OEM - Absorbers OEM - Thermosiphon solar system
Bosch Thermotechnik	Germany	- Forced circulation solar system (Flat plate collector)
Papaemmanouel	Greece	- Thermosiphon solar system and forced circulation system
ThermoSolar	Germany	- Forced circulation solar system (flat plate collector)
Viessmann	Germany	- Forced circulation solar system (flat plate and vacuum tube collectors) - Large area vacuum tube collectors up to 10.3 m²
Delpaso Solar	Spain	- Forced circulation solar system (Flat plate collector)
BDR Thermea	Spain	- Forced circulation and thermosiphon solar system (Flat plate collector)
Rioglass	Spain	- Design and manufacturing of key optical components for CSP - Green enery solution (heat supply for industrial process, rooftop PV, supply of green amonia and hydrogen)
Ritter XL Solar	Germany	- Large area flat plate collectors - Turnkey solar thermal plant (SDH, Industry)

Source: EurObserv'ER 2025

Tabl. No. 6

Concentrated solar power plant in operation in the European Union at the end of 2024*

Project	Technology	Capacity (MWe)	Commisionning date
SPAIN			
Planta Solar 10	Central receiver	10	2007
Andasol-1	Parabolic trough	50	2008
Planta Solar 20	Central receiver	20	2009
Ibersol Ciudad Real (Puertollano)	Parabolic trough	50	2009
Puerto Errado 1 (prototype)	Linear Fresnel	1.4	2009
Alvarado I La Risca	Parabolic trough	50	2009
Andasol-2	Parabolic trough	50	2009
Extresol-1	Parabolic trough	50	2009
Extresol-2	Parabolic trough	50	2010
Solnova 1	Parabolic trough	50	2010
Solnova 3	Parabolic trough	50	2010
Solnova 4	Parabolic trough	50	2010
La Florida	Parabolic trough	50	2010
Majadas	Parabolic trough	50	2010
La Dehesa	Parabolic trough	50	2010
Palma del Río II	Parabolic trough	50	2010
Manchasol 1	Parabolic trough	50	2010
Manchasol 2	Parabolic trough	50	2011
Gemasolar	Central receiver	20	2011
Palma del Río I	Parabolic trough	50	2011
Lebrija 1	Parabolic trough	50	2011
Andasol-3	Parabolic trough	50	2011
Helioenergy 1	Parabolic trough	50	2011
Astexol II	Parabolic trough	50	2011
Arcosol-50	Parabolic trough	50	2011
Termesol-50	Parabolic trough	50	2011
Aste 1A	Parabolic trough	50	2012
Aste 1B	Parabolic trough	50	2012
Helioenergy 2	Parabolic trough	50	2012
Puerto Errado II	Linear Fresnel	30	2012
Solacor 1	Parabolic trough	50	2012
Solacor 2	Parabolic trough	50	2012
Helios 1	Parabolic trough	50	2012
Moron	Parabolic trough	50	2012
Solaben 3	Parabolic trough	50	2012
Guzman	Parabolic trough	50	2012
La Africana	Parabolic trough	50	2012
Olivenza 1	Parabolic trough	50	2012
Helios 2	Parabolic trough	50	2012
Orellana	Parabolic trough	50	2012
Extresol-3	Parabolic trough	50	2012
Solaben 2	Parabolic trough	50	2012
Termosolar Borges	Parabolic trough + HB	22.5	2012
Termosol 1	Parabolic trough	50	2013
Termosol 2	Parabolic trough	50	2013
Solaben 1	Parabolic trough	50	2013
Casablanca	Parabolic trough	50	2013
Enerstar	Parabolic trough	50	2013
Solaben 6	Parabolic trough	50	2013
Arenales	Parabolic trough	50	2013
Total Spain		2 303.9	
FRANCE			
La Seyne sur mer (prototype)	Linear Fresnel	0.5	2010
Augustin Fresnel 1 (prototype)	Linear Fresnel	0.25	2011
SUN CNIM (Ello project)	Linear Fresnel	9	2019
Total France		9.75	
ITALY			
Archimede (prototype)	Parabolic trough	5	2010
Archimede-Chiyoda Molten Salt Test Loop	Parabolic trough	0.35	2013
Freesun	Linear Fresnel	1	2013
Zasoli	Linear Fresnel + HB	0.2	2014
Rende	Linear Fresnel + HB	1	2014
Ottana	Linear Fresnel	0.6	2017
Solinpare CSP- Partanna	Linear Fresnel	4.26	2022
Total Italy		12.41	
DENMARK			
Aalborg-Brønderslev CSP project	Hybrid, Parabolic Trough	5.5	2016
Total Denmark		5.5	
GERMANY			
Jülich	Central receiver	1.5	2010
Total Germany		1.5	
Total European Union		2 333.1	

*HB (Hybrid Biomass). *Pilots and prototypes included.* ***Source: EurObserv'ER 2025***

The Polish solar market reaches its natural demand level

Poland suffered a brutal drop in solar thermal panel sales. According to SpiUG (Association of Manufacturers and Importers of Heating Appliances) data, taken from the heating appliance sales report for Q4 2024, annual collector sales by area fell 43% YoY.

Nevertheless, the association is more optimistic about the future because the drop in sales in the fourth quarter 2024 was only 13% YoY and signals the start of recovery. SpiUG considers that the current solar thermal market downturn is at odds with field intelligence, that points to a surge in solar collector installation requests for domestic hot water production and heating.

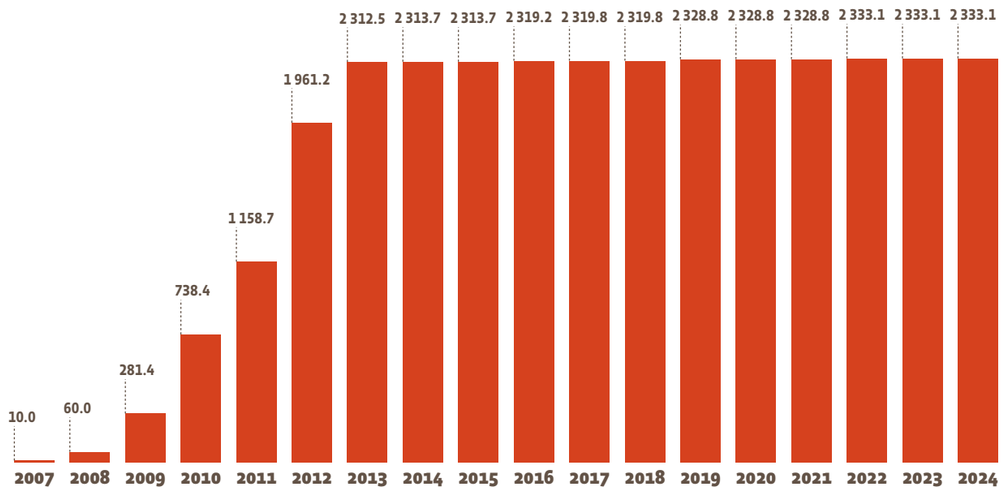
It is hard to give a quantifiable explanation for this drop other than the fall in the number of subsidized projects because of the depletion of financial allocations. Thus, the solar thermal market's behaviour reflects its organic operation, unrelated to subsidies, which marks a return to a degree of seasonality in sales. In previous years, many municipal projects, including solar thermal collector installations, were financed by the European Union, which led to stable sales from one quarter to the next. However, the association reckons that the solar thermal situation improved in 2024, with renewed interest from consumers. Despite falling sales, SpiUG notes a clear increase in requests for information, primarily for domestic hot water production and support with heating. SpiUG emphasizes that solar thermal installations, that offer full self-consumption, are less vulnerable to subsidy policy changes than photovoltaic or heat pump technologies. One persistent damper on market development is the dearth of properly trained installers, many of whom worked in the sector 15 years ago and have left, either through retirement or the closure of their companies. This has dealt both sales and distribution a harsh blow. The association reckons that if the market is to be relaunched sustainably, a national subsidy programme, accessible to all, would be particularly useful. It does not suggest offering excessive support, but enough to allow long-term profitability without upsetting the market. Incidentally, solar thermal technology is increasingly brought up in discussions about modernizing large buildings, industrial heat production and bolstering heating systems.

The French solar thermal market backslides

Having hit rock bottom in 2020, the French solar thermal market seemed to be inching its way back to recovery on more solid foundations, backed by the implementation of the MaPrimeRénov' subsidy mechanism. However, in 2024, it slid back with a vengeance. The Observ'ER annual survey of solar system manufacturers and resellers, shows that the mainland market contracted by 42% YoY to 65 546 m² (including the individual SWH and CSS market, self-storage systems, and the multi-occupancy market). As for the French overseas territory market, the as yet provisional results

Graph. No. 2

European Union concentrated solar power capacity trend (MW)



Source: EurObserv'ER 2025

KYOTHERM

The CSP plant on Heineken's Quart de Poblet site, Valencia, started up on 28 February 2024. Its 4 MWth of capacity enables it to produce 3 500 MWh of solar steam annually for the site's needs, which covers 10% of the brewery's steam consumption.

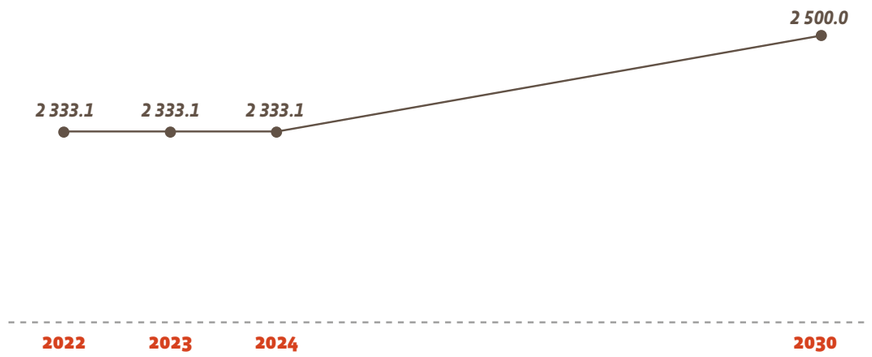
suggest a drop of at least 39%, namely, an area of about 54 000 m². The solar thermal market has been weakened not only by the deteriorating economic environment (new build market crisis, lower purchasing power holding back renovation decisions), but also by uncertainties surrounding the MaPrimeRénov' mechanism. The industry players say that the support system's new complexity and instability have played a part in disorganizing the climate engineering market, leading to plummeting sales of renewable systems, including solar thermal. These uncertainties are the result of successive changes that occurred in January 2024, in particular the restriction of subsidies to "single renovation operations", that were reinstated in May 2024, all within an unstable political climate. Uniclima data shows that individual solar hot water heater sales slumped the most, whereas combined solar system sales (heating + domestic hot water) held up better and even rose to the top in terms of installed collector area. The industry claims that the market also suffered from malpractices. Rogue operators wanting to maximize the premiums payable through energy economy certificates (EECs) resorted to selling non-compliant or over-dimensioned installations. One proposal to combat these abuses is to introduce a compulsory minimum collector area for CSS. Unfortunately, the uncertainties surrounding this aid programme persisted through to 2025, resulting in the decision to suspend accepting MaPrimeRénov' applications this summer, from 23 June to 15 September, to reassess the mechanism, manage the rise in application numbers, shorten handling times and combat fraud.

THE EU'S TOTAL SOLAR THERMAL COLLECTOR AREA EDGES TOWARDS STABILIZATION

EurObserv'ER reckons that by the end of 2024, the total EU solar thermal collector area should stand at 59.6 million m², which at 0.1% represents almost zero growth on the 2023 level. This assessment covers the three main solar thermal technologies (flat glazed collectors, vacuum tube collectors and unglazed collectors) and includes the decommissioning hypotheses defined by each Member State. EurObserv'ER

Graph. No. 3

EurObserv'ER projection of the evolution of CSP capacity installed in the EU 27 (in GW)



Source: EurObserv'ER 2025

points out that several countries, such as France, include PVT hybrid collectors in their statistics for the total solar thermal base in service. Austria, for its part, considers all solar thermal installations over 25 years old to be out of service. In the absence of precise national data, EurObserv'ER adds the annual collector sales figure to the Eurostat figure at the end of 2023, then writes off any glazed collector installations that are over 20 years old. Although the real service life of collectors can be longer, EurObserv'ER considers that maintenance faults or changes of owners can shorten their working life.

Decommissioned installation volumes from projects dating back to the start of the millennium, now approach current annual installation volumes (the EU's 2024 market amounted to about 1.8 million m²) and so sustain this stagnation.

The decommissioning rate should rise in the next few years because of the exceptionally high installation levels witnessed between 2005 and 2011 (installations peaked in 2008 when nigh on 4.5 million m² of collectors were installed). In time, doubt will be sown on how solar heat's contribution to EU climate targets can be maintained if there is no market upturn.

THE EU BOASTED 2 333.1 MW OF CSP ELECTRICAL CAPACITY AT THE END OF 2024

EurObserv'ER confirms that five European Union countries have CSP (Concentrated Solar Power) production capacity dedicated to generating electricity, with combined capacity of 2 333.1 MW at the end of 2024 (comparable with the 2023 and 2022 amounts). Global capacity in service and under construction is put at 7 675 MW, according to the updated thermodynamic solar power plant database on the csp.guru website. Most of the EU's CSP capacity is based in Spain (2 304 MW), with more modest bases in Italy (12.4 MW), France (9.8 MW), Denmark (5.5 MW) and Germany (1.5 MW). Red Eléctrica de España (REE) states that the net electricity output from Spain's CSP plants fell from 4 696 GWh in 2023 to 4 127 GWh in 2024, i.e., a 12.1% drop, which must be ascribed to regulatory constraints rather than technical issues. As it stands, CSP plants do not have priority access to Spain's power grid, and when the grid became saturated, some had to reduce output. Construction work is nearing completion on just two Fresnel type CSP solar plants in Sicily, both of which are undertakings of the Italian industrial group, Fata. They are the 4-MW SOLINPAR Stromboli project in Trapani, Trapani province, whose construction kicked off in 2020, and the 4-MW BILANCIA project, in Mezzo Juso, Palermo province, whose construction kicked off in 2022. The BILANCIA project, being installed on behalf of Bilancia PV SRL, will use a blend of molten salts both as the heat carrier and as the thermal energy storage medium, equivalent to 16 hours of uninterrupted operation at full load. The plant will cover a total area of about 145 000 m², with about 84 000 m² of mirrors. This is the Fata group's third Fresnel CSP solar plant project, following the 4.26-MW Partanna project (Trapani province), commissioned in 2022, and the above-mentioned SOLINPAR Stromboli project. Commissioning of the two new CSPs will take Italy's CSP capacity to 20.4 MW, and that of the European Union to 2 341.1 MW.

REALITY CHECK

Solar heat, like renewable heat in general, is undoubtedly one of the levers available for implementing the European Union's energy transition, supplementing the "decarbonized" electrification of heat requirements. EurObserv'ER feels that the heat electrification policy, primarily using thermodynamic systems, is vital if the EU is to achieve its climate targets. But this paradigm shift will take time and require considerable investments in grid infrastructures and production capacities. Yet, the transformations required to decarbonize heating and cooling requirements are so colossal that electrification alone is no match for the task. Even if energy efficiency and insulation efforts will reduce space heating requirements, the need for domestic hot water will remain stable. Thus, reducing the burden of electrification by developing solar heat, the ultimate in environmental friendliness, makes plain sense.

The paradox is that the EU's solar thermal development potential has been barely tapped. According to Solar Heat Europe, 80% of hot water and heating requirements in the residential and service sectors could be covered by solar thermal (compared to only 1.5% today). Only 260 out of a total of Europe's 19 000 district heating grids were coupled to solar thermal in 2024 (including some 250 in the EU). As for industry, solar thermal could theoretically cover 50% of needs. While there is boundless potential, the European sector, given its industrial and implementation capacities, reckoned that last year it could still achieve 140 GWth installed in Europe within 5 years, which is more than three times current capacity.

EurObserv'ER feels that this target will be hard to attain, given the current market's low performance and the gradual decommissioning of installations dating back to the mid-noughties. Such a step-change cannot occur without the awareness and much stronger pressure from civil society on policy makers to implement the European Green Deal in practice. The Paris accords aimed to limit climate warming to 1.5°C of the pre-industrial level. Ten years down the line, we now know that it will not be achieved. Warming has already reached 1.36°C and the threshold will probably be exceeded in the next few years. That is the main conclusion of a report by sixty or so researchers, including Valérie Masson-Delmotte, a paleo climatologist and Research Director at the CEA. In her view, the wake-up call has already sounded. Current efforts will not do. The scientists' message is clear. We can still act effectively, but we need to be lucid, responsible and pragmatic. Every tenth of a degree counts. □

Sources: AGEE-Stat, BDEH, BSW (Germany), EBHE (Greece), Ministry for the Ecological Transition (Spain), ASIT (Spain), ENS (Denmark), Assotermica-Anima (Italy), DGEG (Portugal), Observ'ER (France), SPIUG (Poland), AEE Intec (Austria), Climafed (Belgium), Statistics Netherlands, OEB (Chypre), Ministry of Industry and Trade (Czechia), STATEC (Luxembourg), Solar Heat Europe, EurObserv'ER, csp-guru.

The next barometer will be about geothermal energy.

Funded by the European Commission

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