



**Solar Heat
Europe**
ESTIF

Solar Heat Markets in Europe

Trends and Market Statistics 2019
Summary (December 2020)



Cumulative capacity
in operation:

37 GW_{th}



Installed
capacity in 2019:

1.59 GW_{th}



Annual energy
generation (estimated):

26.3 TWh_{th}



Sector turnover
(estimated)

1.96 EUR billion



Numbers of jobs
(estimated):

20 150



Estimated Annual CO₂
emissions savings:

7 Mt CO₂



Total number of solar thermal
systems in operation:

10.4 million



Estimated energy
storage capacity:

185 GWh

(connected with solar thermal systems)

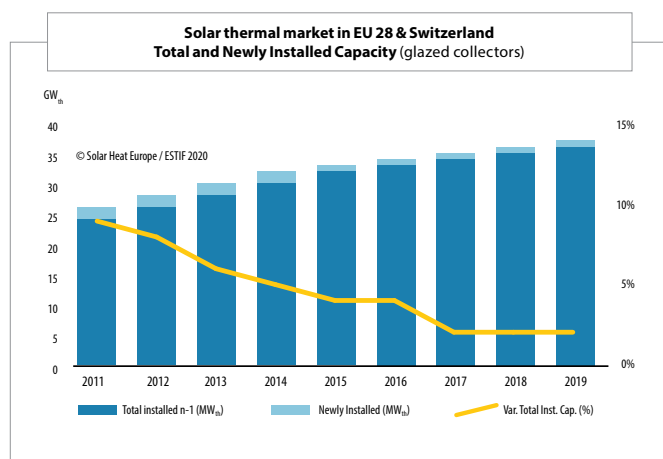
The sun keeps on shining: Solar Heating and Cooling market grows again

In 2019, the total installed solar thermal capacity in Europe grew by 2.5%, reaching 37 GW_{th}. This sector has been growing continuously for over 4 decades. This continuous growth means that there are over 10 million solar thermal systems installed in Europe, generating a total of 26.3 TWh_{th}. Based on annual energy generation, solar thermal (for heating and cooling) is the 5th main renewable energy source in Europe. Annual sales have also grown for the second year in a row, with newly installed capacity reaching almost 1.6 GW_{th}. This represents an increase of 3.4% over the previous year, higher than the growth registered in 2018 (2.4%). The total solar thermal energy storage capacity available amounts to 185 GWh_{th}.

Solar heating and cooling market in 2019

A continuous increase in total installed capacity

Solar thermal energy has been manufactured and installed in Europe since the 1970's. Over these four decades, the cumulated installed capacity has been continuously increasing. At the end of 2019, the total installed capacity has reached 37 GW_{th}, corresponding to a total area of 52.9 million square meters. Among the top ten European markets, the highest increase in cumulative capacity was observed in Denmark and Poland, with around 10% growth. The case of Austria, one of the largest and more mature markets in Europe, stands out by being one of the few cases where there has been a decrease on the cumulative capacity (-1.3%). The largest European market, Germany experienced growth of 0.5%, indicating a situation close to a balance between the size of new installations and decommissioned systems.



More jobs, less CO₂ emissions

The energy generated annually by solar heating and cooling systems is now estimated at 26.3 TWh_{th}. This represents the equivalent to 7 MtCO₂ savings per year, up from 6.8 MtCO₂ in the previous year. The country with the largest capacity in operation is Germany, with 13.5 GW_{th} installed (19.4 million m²), followed by Greece and Italy, both with approximately 3.4 GW_{th} (4.8 million m²) each. On a per capita basis, the perpetual European champion is Cyprus with 0.67 kW_{th} (0.96 m²), followed by Greece and Austria, respectively with 0.32 kW_{th} (0.45 m²) and 0.31 kW_{th} (0.44 m²) of cumulative capacity in operation per inhabitant. The total thermal energy storage capacity in operation is deemed to represent at least 185 GWh_{th}, up 5 GWh_{th} from the previous year. The total number of jobs in the sector has increased to 20 000 and the sector's estimated turnover has increased to 1.96 billion Euros.

Annual sales increasing again

After growth of 2.4% in 2018, the solar heating and cooling market has increased again in 2019. Annual sales have reached 1.6 GW_{th}, corresponding to over 2.27 million m² of collectors installed and an increase of 3.4% on the previous year. From the top European markets, those showing the largest growth were Denmark, with an increase of 174% - totalling 137 MW_{th} (196 000 m²) - and the Netherlands, with a 44% increase (35 MW_{th} / 50 000 m²). Among Southern European countries, the main market, Greece, has grown 10%, corresponding to annual sales of 253 MW_{th} (361 000 m²). In the largest European market, Germany, sales have contracted by 11%, totalling 358 MW_{th} (511 000 m²).

Different segments, distinct evolutions



The main market segment for solar thermal in Europe continues to be domestic hot water systems. This segment has shown resilience in different markets, in particular in Southern European countries. The one with the largest growth in 2019 was Cyprus, with an increase of 24% on annual sales, up to 49 MW_{th} (70 000 m²) and an increase of 5% in cumulative capacity, totalling 585 MW_{th}. Cyprus is also the European country with the largest installed capacity per capita, very close to 1 m² of solar collectors per inhabitant (0.97 m²). Besides Cyprus and Greece (mentioned above), Portugal (9%) and Spain (1%) also increased their annual sales in 2019.



Combi-systems use solar heat for both space and water heating. This type of system is on average 4 to 6 times larger than a domestic hot water system. This segment has been predominant, in terms of total annual sales, in central European countries, such as Germany, Austria and Switzerland. These countries have faced a downward trend in recent years and in 2019 this decrease amounted to 9% in Austria and 31% in Switzerland.



New additions among solar district heating (SDH) plants represented over 10% of the total solar heating and cooling market in 2019. This is not the first time it reaches such relevance, having done so already in 2015 and 2016. The main difference is that the market is now more distributed among different countries. While Denmark was still the country with the largest number of new projects and with most capacity added, Germany is experiencing an increase in the number of such projects. New German systems, while growing in size, are still significantly smaller than those in Denmark, where 15 new projects in 2019 averaged almost 10 MW_{th}. It is interesting to note that a new solar district heating system has been also been developed in Latvia, with over 15 MW_{th} of capacity. This single system alone, in a country without a tradition of using solar thermal, represented an increase of 1.5 times of the cumulative capacity in this market.



The segment of Solar Heat for Industrial Processes (SHIP) is still considerably smaller than the ones referred above. However it is the one growing the most, doing so in a broader number of countries. While newly installed capacity in 2019 was likely below 20 MW_{th} (for systems larger than 35 kW_{th}), there are systems reaching considerable sizes. A solar thermal system in a paper mill in France (4 100 m²) has broken a 20 year old record for a SHIP system (an industrial cooling system in Greece, still in operation, with 2 000 m²). However the record has been short-lived as, by the end of 2019, a system of 9 300 m², supplying a greenhouse, has come into operation in the Netherlands. This trend is expected to continue in the future, with larger projects already being planned or implemented.

European companies lead the way

Solar thermal is one of the most cost-effective solutions for generating sustainable energy, with competitive life-cycle costs that can also help in reducing energy poverty. Remarkably, European companies are leading in terms of innovation in this industry, namely in large systems, such as district heating or solar heat for industrial processes. It is a well-established pan-European industry, essentially driven by SMEs, that creates local added value by generating jobs in manufacturing, distribution, commercialization, and maintenance. Solar heating and cooling allows us to reduce dependency on fossil fuels and from centralized energy supply, granting consumers the ability to produce their own heat, be it for residential, commercial, or industrial applications.

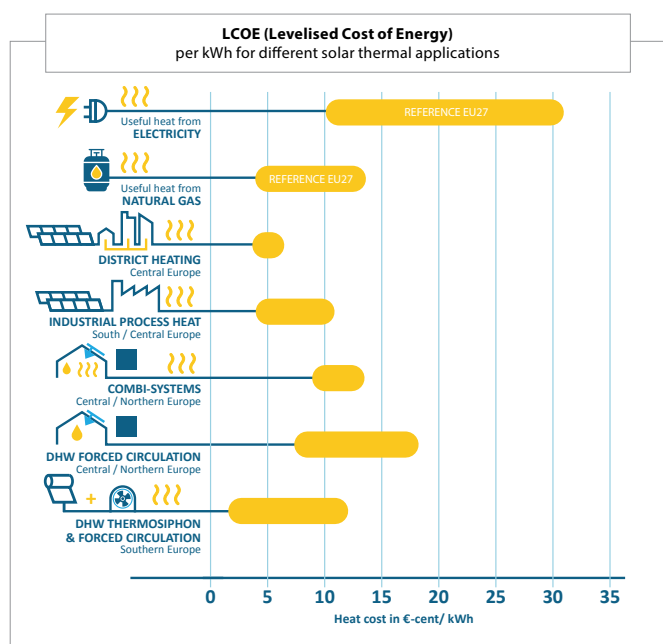
One of the most competitive renewable energy sources

Solar Heating and Cooling is often forgotten in the analysis of costs of Renewable Energy Sources (RES). The main reason is that such assessments focus primarily on renewable power generation, leaving out renewable heat solutions. Furthermore, in some of the few analysis that do show solar heat, solar thermal solutions are bundled into one category, therefore displaying a very broad range of costs.

In order to have a good overview of the costs of energy provided by solar thermal systems it is essential to subdivide by system types and even per region. Solar thermal provides energy at the lowest costs among all RES. For instance, for domestic hot water, a small, low-cost thermosiphon system (2.8 kWh_{th}) with diurnal thermal storage (12.7 kWh_{th}) can provide domestic hot water in a Mediterranean country for less than 2 €-cents per kWh. On the other hand, a large solar district heating system (35 MW_{th}) with seasonal thermal storage (142 MWh_{th}) in Denmark reaches an energy generation cost below 3.5 €-cents per kWh.

There are obviously solar thermal systems that produce green energy at higher costs. These energy costs, based on a levelised cost of heat, depend on various factors, such as the percentage of total energy demand covered by solar heat, the thermal energy storage capacity, the size of the system, the climatic conditions (level of solar irradiation) or the economic lifetime of the system. Hence, a larger system tends to have a lower cost than smaller ones and a system in Southern Europe will provide more energy than a similar system in a Northern country.

Still, solar thermal systems can compete with direct electrical heating solutions and some solutions can even compete with gas, even without considering costs associated to externalities from those sources, such as CO₂ emissions or other. As such, solar thermal can apply a substantially more important role in the energy transition, in particular if a level playing field is put in place in the heating and cooling market, evidencing the advantages of solar thermal and other renewable heat solutions in comparison with incumbent fossil-fuel based technologies.



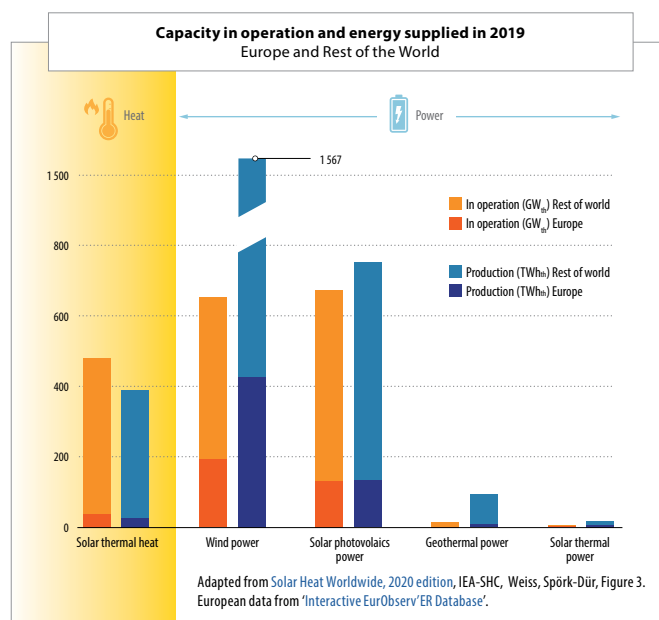
Among the top 5 most deployed renewables, both in Europe and globally

Solar thermal for heating and cooling is one of the main renewable energy sources (RES) in Europe and globally, in terms of cumulated capacity and annual energy generation.

Bioenergy is by far the most relevant renewable energy source both for power and/or heat production¹. The power generation from bioenergy sources (biomass, biogas or biofuels) was estimated globally at 686 TWh². This is an inferior quantity to the overall generation from hydropower (4 149 TWh) or wind power (1 263 TWh), the second and third most relevant RES. Though, it has to be taken into account that bioenergy is mainly used for heating and for that purpose its contribution reaches 13.9 EJ³ (4 450 TWh). Therefore the overall generation from bioenergy, for both power and heating exceeds 5 000 TWh.

In this RES ranking, right after these three energy sources, we find two solar technologies: solar photovoltaics and solar thermal for heating and cooling. The power generation from solar photovoltaics in 2018 was estimated at 751 TWh globally and 132 TWh in Europe⁴. This is the technology that has shown the fastest growth in recent years.

Finally, the fifth most relevant renewable energy source, both in Europe and globally, is solar thermal heating and cooling. The total installed capacity amounted to 442 GW_{th} in 2018⁵, corresponding to an energy generation of 363 TWh_{th}. In Europe, there are 37 GW_{th} of cumulative capacity for solar thermal energy, generating 26 TWh_{th} in 2018.



¹ There are variations in the values presented depending on the source though the overall relevance of each technology is not affected.

² Data: IRENA, 2018 - <https://www.irena.org/Statistics>.

³ Data: REN21 for 2018 - www.ren21.net/gsr-2020

⁴ Data: EurObserv'ER, 2018 - www.eurobserv-er.org/online-database

⁵ Data: IEA-SHC, Solar Heat Worldwide, 2018 - <https://www.iea-shc.org/solar-heat-worldwide>

Solar Heat Europe Members



Market size in terms of Solar Thermal Capacity (KW_{th}) and in terms of Collector Area (m²)

	Market (=Newly Installed) Glazed Collectors					In Operation ² Glazed Collectors			
	2018	2019		Annual Evolution of the Market		2018	2019		Annual Evolution of the Total Installed Capacity
	m ²	m ²	kW _{th} ¹	%		m ²	m ²	kW _{th}	%
Austria	98 230	90 350	63 245	-8.0%		3 980 077	3 929 279	2 750 495	-1.3%
Belgium	29 900	27 800	19 460	-7.0%		645 517	671 035	469 724	4.0%
Bulgaria *	23 948	23 950	16 765	0.0%		137 397	158 347	110 843	15.2%
Croatia	20 642	20 027	14 019	-		235 685	254 146	177 902	7.8%
Cyprus	56 552	69 945	48 962	23.7%		796 292	836 237	585 366	5.0%
Czech Republic +	24 000	22 800	15 960	-5.0%		600 251	616 699	431 689	2.7%
Denmark	71 779	196 306	137 414	173.5%		1 674 246	1 845 373	1 291 761	10.2%
Estonia *	1 500	1 425	998	-		17 520	18 925	13 248	-
Finland *	3 600	3 420	2 394	-		56 523	58 943	41 260	-
France ³	49 500	42 500	29 750	-14.1%		2 681 676	2 720 676	1 904 473	1.5%
Germany	573 500	511 000	357 700	-10.9%		19 298 500	19 389 500	13 572 650	0.5%
Greece	328 500	361 350	252 945	10.0%		4 689 700	4 866 050	3 406 235	3.8%
Hungary +	17 000	16 150	11 305	-		320 034	336 184	235 329	-
Ireland +	13 041	12 389	8 672	-5.0%		396 931	408 320	285 824	2.9%
Italy	179 400	151 600	106 120	-15.5%		4 677 114	4 793 214	3 355 250	2.5%
Latvia +	1 600	23 150	16 205	-		15 432	38 532	26 972	-
Lithuania *	2 000	2 000	1 400	-		18 700	20 650	14 455	-
Luxembourg +	3 418	3 247	2 273	-5.0%		65 363	67 810	47 467	3.7%
Malta +	608	578	404	-5.0%		54 826	54 404	38 083	-0.8%
Netherlands	40 835	70 391	49 274	72.4%		594 449	636 719	445 703	7.1%
Poland	310 000	287 190	201 033	-7.4%		2 558 413	2 841 603	1 989 122	11.1%
Portugal	55 000	59 850	41 895	8.8%		1 106 552	1 161 902	813 331	5.0%
Romania *	16 800	15 960	11 172	-		204 350	218 910	153 237	-
Slovakia +	9 600	9 120	6 384	-5.0%		171 200	176 120	123 284	2.9%
Slovenia *	1 550	1 473	1 031	-		134 900	133 373	93 361	-
Spain	201 664	204 250	142 975	1.3%		3 848 603	4 031 271	2 821 890	4.7%
Sweden	1 922	1 826	1 278	-5.0%		312 756	305 080	213 556	-2.5%
Switzerland	58 507	40 500	28 350	-30.8%		1 514 905	1 529 397	1 070 578	1.0%
United Kingdom	8 134	6 340	4 438	-22.1%		740 541	737 701	516 391	-0.4%
EU28 + Switzerland	2 202 730	2 276 886	1 593 820	3.4%		51 548 451	52 856 398	36 999 478	2.5%

Solar Heat Europe/ESTIF would like to thank the solar thermal associations and other national sources for providing the data for these statistics, in particular: AEE Intec; Asociación Solar de la Industria Térmica (ASIT); Association pour Techniques Thermiques de Belgique (ATTB/Belsolar); Assotermica; Bundesverband Solarwirtschaft (BSW-Solar); Cyprus Union of Solar Thermal Industrialists (EBHEK); Energy Institute Hrvoje Požar; Greek Solar Industry Association (EBHE); Holland Solar; Polish Association of Manufacturers and Importers of Heating Appliances (SPIUG); Solar Key/Planenergi; Solar Trade Association (STA); Svensk solenergi/Chalmers University of Technology; Swissolar; Syndicat des professionnels de l'énergie solaire (ENERPLAN).

Figures for countries marked with an * are Solar Heat Europe/ESTIF estimations and, therefore, these are not sufficiently accurate to be used for percentual change reference in these markets. For some of the cases, the total sales or distribution between collector type combines historical data and information received regarding the market evolution. In the case of countries marked with an +, the 2019 figures are based on the EurObserv'ER "Solar thermal and CSP Barometer" (2020).

- 1) The relation between collector area and capacity is $1\text{m}^2 = 0.7\text{kW}_{th}$ (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 2010 the overseas departments amounted to 49 MW_{th} (70 000 m²).

Solar Thermal Markets in Europe

Data for 2019

Key



EU28+

2.5% ▲
36 999 MW_{th}
72.4 kW_{th}

Country name

Annual evolution 2019/2018 (cumulative capacity)

Cumulative installed capacity in operation (MW_{th})

kW_{th} per 1000 capita

> 250 kW_{th}

50-250 kW_{th}

25-50 kW_{th}

15-25 kW_{th}

< 15 kW_{th}

Ireland

2.9% ▲
286 MW_{th}
58.3 kW_{th}



UK

-0.4% ▼
516 MW_{th}
7.7 kW_{th}

Belgium

4% ▲
470 MW_{th}
41.0 kW_{th}

Netherlands

7.1% ▲
446 MW_{th}
25.8 kW_{th}

Germany

0.5% ▲
13 573 MW_{th}
163.5 kW_{th}

Luxembourg

3.7% ▲
47 MW_{th}
77.3 kW_{th}

France

1.5% ▲
1 904 MW_{th}
28.4 kW_{th}

Switzerland

1% ▲
1 071 MW_{th}
125.3 kW_{th}

Austria

-1.3% ▼
2 750 MW_{th}
310.5 kW_{th}

Czech Rep.

2.7% ▲
432 MW_{th}
40.5 kW_{th}

Slovenia

-1.1% ▼
93 MW_{th}
44.9 kW_{th}

Croatia

7.8% ▲
178 MW_{th}
43.6 kW_{th}

Italy

2.5% ▲
3 355 MW_{th}
55.6 kW_{th}

Portugal

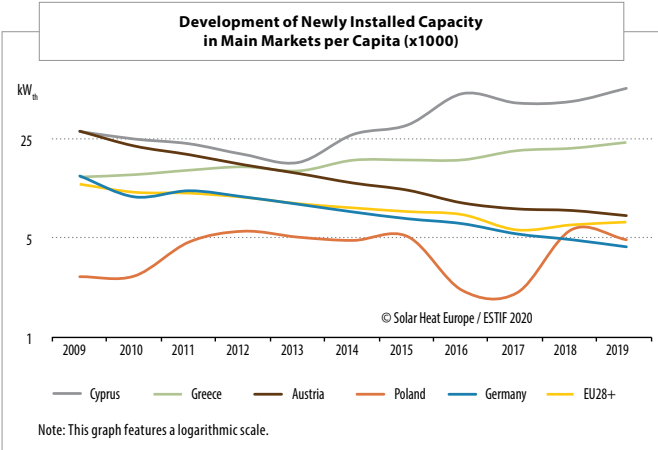
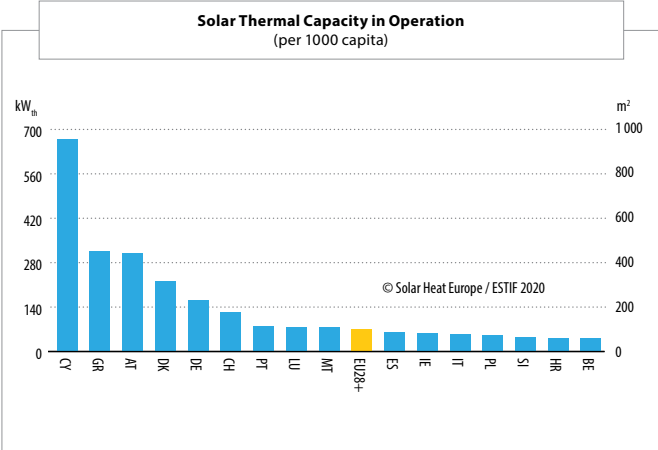
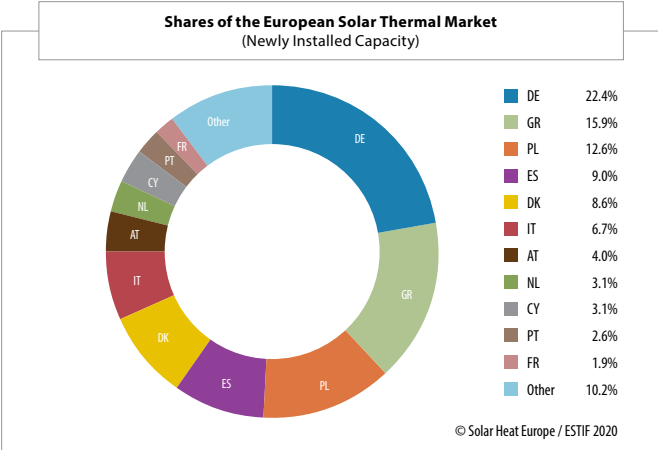
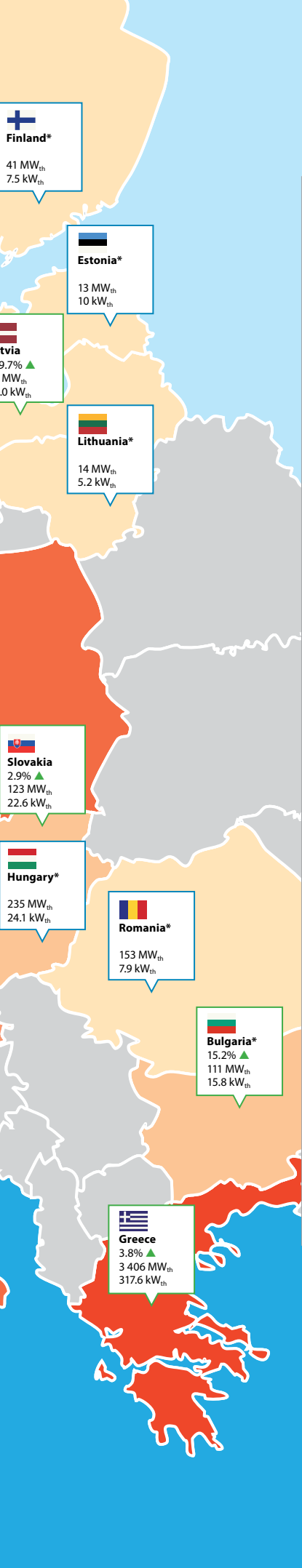
5.0% ▲
813 MW_{th}
79.1 kW_{th}

Spain

4.7% ▲
2 822 MW_{th}
60.1 kW_{th}

Malta

-0.8% ▼
38 MW_{th}
77.2 kW_{th}



2020 Barometer

