



Air / water heat pump in Wattwiller (68), Alsace, France. Installed capacity : 27.3 kW

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+4.4%

the increase of the heat pump market in the EU between 2016 and 2017

HEAT PUMPS BAROMETER

A study carried out by EurObserv'ER.  EurObserv'ER

The European heat pump sector has been able to count on solid heating and cooling application markets for several years. The sales data held by EurObserv'ER shows that more than 3.5 million systems were sold in 2017 in the European Union, which amounts to a 4.4% year-on-year increase. Growth would have been much higher had it not been for the slump in the Italian market, Europe's main market, whose volume is primarily driven by cooling needs.

10.6 Mtoe

the estimate renewable energy provided by heat pumps in the European Union in 2017

34.4 million HPs

total number of heat pumps in operation in 2017



Heat pumps (HPs) are differentiated both by the heat source and the heat sink used. The source where the heat (or energy) is collected, namely the ground, air and water is called the heat source, whereas the delivery point of the heat (or energy) is called the heat sink. The three main heat sinks used are fan-coil units, radiators and underfloor heating. Heat pumps are also distinguished by their application. They can be used

solely for heating purposes, but if they are reversible, they can expel a dwelling's heat to cool it down. Some dual-purpose HPs are also designed to produce hot water, while thermodynamic hot-water heaters only produce hot water. Heat pumps are generally grouped into three main categories by heat source, namely air source (ASHPs), whose heat source is air (outside, exhaust or indoor air), ground source (GSHPs), which

extract heat from the ground and lastly, hydrothermal HPs that draw heat from water (the water table, rivers or lakes). We have amalgamated the hydrothermal and ground source HP statistics for the sake of convenience. Underfloor piping or low- or high-temperature radiators are favoured for heat distribution with GSHPs; they are referred to as HPs for water-borne systems. ASHPs use several distribution methods. Some distribute the heat through water,

and are called air/water HPs, while others have systems that blow out hot air and are known as air/air HPs. Almost all of them operate reversibly, and in countries with hot climates, the cooling function is often the main application. Reversible air/air HPs account for a major share of system sales in the European Union. Their unitary power is generally much lower than water-borne HPs.

THE HP MARKET FOR HEATING IS IN FINE FETTER

If we consider all existing HP technologies on the heating and cooling market, regardless of system rating (from 2 to tens of kW) and their main use, HP sales in the European Union increased by 4.4% in 2017, with more than 3.5 million systems sold, as illustrated in **tables 1 and 2 (pages 5-6)**. Roughly a third of this total is primarily intended to cover heating needs (1.1 million according to the EHPA). The remaining two-thirds tend to be geared to the cooling requirements of the hot climate countries (particularly Italy, Spain, Portugal, and the South of France). This ambivalence in usage raises statistical comparison issues between the various European Union markets, particularly as reversible air/air HPs are used in heating mode in Northern Europe – in Sweden, Denmark and Finland.

Reversible air/air ASHPs still dominate sales in the European market with 3.1 million systems sold in 2017, or roughly 100 000 (3.3%) more units than in 2016. A more detailed analysis by country shows that this market segment is decidedly more positive in most of the main heat pump markets (8.9% in France, 15.4% in Spain, 12.1% in Portugal, 52.1% in Belgium, 65.9% in Denmark, and so on). The modest expansion of the European reversible air/air HP market (3.3% over 2016) can only be ascribed to the Italian market's poor performance (it fell by 7.2% on its 2016 level), which because of its size (45% of the European reversible air/air HP market in 2017) hit the European Union's overall figures. The Italian market has its own specifics as its volume is basically geared to cooling needs. The reason for its contraction may be that it has become saturated

Methodology

The specific case of reversible air/air HPs

Over the past decade, advances in the technology used in thermodynamic systems have blurred the boundaries between reversible air/air HPs which meet the needs for comfort in the summer in addition to the main heating function, and reversible air-conditioning systems, optimized for cooling but that are also capable of supplementing heating in winter. Reversible air/air HP terminology has thus become ambiguous because it includes systems that mainly cater for heating needs and those that cater essentially for cooling needs.

As far as the European Union energy targets are concerned, reversible air/air HPs are included in the statistics, provided the systems meet the requirements of the renewable energy directive. The relevant countries' authorities can choose whether or not to include these systems in their renewable energy target calculations. The current trend is to include many more air-source HPs because increasingly efficient technologies have come onto the market and because of the constant increase in the renewable electricity share of the European electricity system.

The market figures given in this barometer are based on official data when available at the time of the study early in November (including Germany, Austria, Italy, Netherlands and Denmark), and if necessary, on the sector sales figures, collected by EurObserv'ER from the data provided by the collection agencies, the various national heat pump associations and the EHPA market report.

Renewable energy production varies with the type of HP

It should be pointed out that the various types of HP at the same rating produce different amounts of renewable energy. The governing factors are the energy source (of the country's electricity mix) harnessed to operate the compressor, the heat source used (ground, water, air), their operating mode (heating or cooling), the time used and the surrounding climate conditions. The European Commission published a methodology guide in March 2013 to help countries measure the renewable energy output of their HP bases. It sets out guidelines for calculating the renewable energy share produced from heat pumps for the various technologies as stated in article 5 of the 2009/28/EC directive. The renewable energy taken into account differs with the technology and climate zone (cold, temperate and hot) of the heat pump installation site. For example, the quantity of renewable energy of a reversible air/air HP installed in a hot climate area will be much lower because its seasonal performance factor (SPF) will be lower; its use for heating needs will be much more limited in time while it will be much longer in use for its cooling function.

The Directive also defined corrective or exclusion measures. HP systems with an SPF of less than 2.53 are excluded and not considered to produce renewable energy. Corrective factors that limit the amount of renewable energy produced are also applied to HPs using vitiated air and reversible air/air HPs. The guide specifically cautions that heat pumps installed on air source hot-water heaters only exceptionally achieve seasonal performance factors above the minimum threshold that make them eligible for inclusion as renewable energy producers. Therefore, EurObserv'ER has excluded from this study the specific thermodynamic hot-water heater technology that uses air as its heat source.

following the very high growth (55.4%) recorded in 2016, driven by a scorching summer. The increase in summer comfort needs is now the main reversible air/air HP market driver in France, Spain and Portugal.

While cooling needs are increasing, the air/air HP market geared to heating is also doing well. This market segment, with its products that suit cold climates perfectly is very buoyant in several countries such as Denmark.

Alongside air/air HPs, the extracted air HP market, although limited to a few countries (essentially Sweden, Germany and Finland), is also expanding. It grew by 13.3% or 34 294 units sold in 2017. The ratings of these systems, that recover the energy found in vitiated air

on extraction from buildings, are much lower (2 kW) and ideally suited for very isolated dwellings.

The air/water HP market specifically caters for heating requirements. Sales have been steadily rising since 2013 and even accelerated in 2017. They increased by 18.3% in 2017, equating to more than 300 000 units sold (300 756 identified in 21 EU countries), after increasing by 13% in 2016. Most of the European markets post double-figure growth – France (10%, 81 700 units), Germany (18.8%, 57 638 units), Italy (24.2%, 37 000 units), the UK (17.9%, 18 935 units), Sweden (11.6%, 9 035 units sold in 2017), Finland (also 11.6%, 4 138 units), with a surge in Denmark (61.9%, 6 125 units sold) and the Netherlands (77.6%, 19 858 units sold).

As for the ground-source HP market (which in our study includes hydrothermal HPs), it remained stable (slipping by 0.6%) in 2017 according to EurObserv'ER. However, there is no general market trend in Europe, for it has perked up in the UK, Belgium and the Netherlands, stabilized in France, Austria and Sweden, but is tending to shrink in Finland and Denmark... both countries where ground-source HPs have had a long track record. If we look at all the water-borne HP markets (air-source and ground-source), the increase in the ASHP share is a strong market trend, as shown in **graph 1 (page 7)**. The market share rose to 78.5% in 2017 (21.5% for GSHPs) compared to 75.4% in 2016 (24.6% GSHPs). The comparatively lower price of ASHPs, easier ins-

Tabl. n° 1

Market of aerothermal heat pumps in 2016 and 2017* (number of units sold).

Country	2016				2017			
	Aerothermal HP	of which air-air HP	of which air-water HP	of which exhaust air HP	Aerothermal HP	of which air-air HP	of which air-water HP	of which exhaust air HP
Italy	1 541 200	1 511 400	29 800	0	1 440 000	1 403 000	37 000	0
Spain	792 088	781 116	10 972	0	912 378	901 406	10 972	0
France	446 745	372 270	74 475	0	487 090	405 390	81 700	0
Portugal	129 136	128 611	525	0	144 666	144 141	525	0
Sweden	78 413	55 000	8 099	15 314	81 355	55 000	9 035	17 320
Netherland	69 797	58 618	11 179	0	80 026	60 168	19 858	0
Germany	60 970	0	48 501	12 469	71 138	0	57 638	13 500
Belgium	37 812	32 350	5 462	0	55 528	49 190	6 338	0
Finland	51 672	45 742	3 709	2 221	54 141	47 281	4 138	2 722
Denmark	25 209	21 396	3 784	29	41 793	35 504	6 125	164
United-Kingdom	16 058	0	16 058	0	19 260	0	18 935	325
Poland	8 756	3 546	5 160	50	16 370	8 280	8 080	10
Estonia	15 010	13 700	1 280	30	15 010	13 700	1 280	30
Czech Republic	10 862	0	10 827	35	13 778	0	13 718	60
Austria	12 131	0	12 076	55	13 764	0	13 689	75
Ireland	4 457	0	4 398	59	4 457	0	4 398	59
Slovenia	5 200	0	5 200	0	3 200	0	3 200	0
Slovakia	1 888	158	1 730	0	2 554	306	2 248	0
Lithuania	890	0	890	0	1 498	0	1 474	24
Hungary	180	70	105	5	650	320	325	5
Luxembourg	80	0	80	0	80	0	80	0
Total EU 28	3 308 553	3 023 976	254 310	30 267	3 458 736	3 123 686	300 756	34 294

* Estimate. Note: Datas from Italian, french, spanish and portuguese aerothermal heat pump market are not directly comparable to others, because they include high part of reversible heat pumps whose principal function is cooling.
Source: EurObserv'ER 2018.



tallation and better performance levels underpin this long-term trend.

THE EUROPEAN HP BASE STOOD AT 34 MILLION IN 2017

Estimating the HP base currently in service is like tightrope walking, as all depends on the decommissioning assumptions adopted by the individual countries and the availability of statistics supplied by the member states and HP industry associations. EurObserv'ER puts the EU's installed HP base to date at about 34.4 million units (32.9 million ASHPs and 1.5 million GSHPs), distributed as shown in **table 3 (page 8)**. This figure is unrepresentative of heating-only use but is representative of cooling and heating uses. The EHPA puts the European HP base assigned to heating at 10.6 million units. As for the renewable energy output generated by the HPs (all technologies), EurObserv'ER draws on the statistical work carried out by each member state for the Eurostat SHARES project (SHort Assessment of Renewable Energy Sources). The contribution was 9.8 Mtoe in 2016 (9 812.6 ktoe), up from 9.1 Mtoe in 2015 (9 108 ktoe)... a 7.8% increase. Heat pumps should contribute at least 10.6 Mtoe to the European targets) in 2017.

WE HOME IN ON A FEW REPRESENTATIVE MARKETS

France steps up the electrification of its heating needs

The overall indicators of the French HP market 2017 remained positive, and the trend for 2018 also looks promising. According to the annual Observ'ER study, the 2017 ASHP market is about 9%

up on its 2016 level (487 090 units sold in 2017), with 10% growth for air/water HPs (81 700 units sold in 2017) and 9% for air/air HPs (405 390 units sold in 2017). EurObserv'ER suggests three major factors to explain the momentum of the French HP market.

The 2012 thermal regulation computation engine allowance for air/air HPs in new build is generous, which enabled the latter to turn the 2017 construction market recovery to their advantage.

Tabl. n° 2

Market of geothermal (ground source) heat pumps* in 2016 et 2017** (number of units sold)

Country	2016	2017**
Sweden	22 843	22 641
Germany	20 789	20 170
Finland	8 491	7 986
Poland	5 390	5 660
Austria	5 228	5 230
Netherland	4 065	4 806
France	3 095	3 100
United-Kingdom	1 920	2 358
Denmark	2 248	2 143
Belgium	1 600	1 963
Estonia	1 750	1 750
Czech Republic	1 521	1 561
Italy	857	860
Lithuania	770	633
Slovenia	700	598
Ireland	371	291
Hungary	800	220
Slovakia	242	168
Luxembourg	116	116
Spain	77	95
Portugal	25	52
Bulgaria	n.c.	n.c.
Total EU 28	82 898	82 401

* Hydrothermal heat pumps included. ** Estimate. Source: EurObserv'ER 2018.

Consumers' awareness of ASHPs is also increasing, prompting them to approach specialist installers on their own initiative. The relatively minor price changes have also had a hand in the market's good performance. Furthermore, the ASHP offer has adjusted to changes in needs as manufacturers have developed and marketed lower-rated systems especially for new constructions built to meet RT 2012. The economic context eased on previous years in 2017, which made household investment decisions easier to make. The sales performance of air/air HPs was also boosted by a particularly hot summer. The GSHP market finally appears to have reached its nadir. According to Observ'ER, sales stabilized in 2017 at about 3 100 units (3 095 units in 2016), putting an end to the unabated decline since 2008 (when 21 725 units were sold). Growth prospects look good for 2018. According to interim market data (on 1 September) provided by HP Clim&Info, the air/air HP market's sharp rise continues through 2018, with more than 16% growth on last year. A new sales record

was set with 415 804 outdoor units sold over the first eight months of the year. The report gives credit for this momentum to the hot summer, which proves that the French air/air HP market is very closely tied to cooling needs. It also confirms that air/water HP sales are holding up very well, increasing by 16% from January to August 2018 over the same period in 2017, i.e. 56 658 units. This market has returned to growth through the combination of a healthier economy and government aids. The only cloud on the horizon likely to cause it to falter is the new build pace which has cooled off since 2017. High-temperature (55-65°C) and very high-temperature (>65°C) HPs are enjoying even higher growth rates, at 21% and 54% respectively according to HP Clim&Info, which suggests that the renovation market could bounce back, partly following the heating oil price increase. The GSHP market also recovered over the first eight months of the year with 5% growth. It shows signs of being sustainable over time but needs to be closely followed. Caution should be exercised

in this market which has suffered many setbacks.

Germany sets a new installation record

The German market differs in that its government does not include air/air HPs in its renewable energy target calculations on the grounds that they do not meet the renewable energy directive criteria on its soil, despite the increasing share of renewable energy in the German electricity system. Current monitoring by AGEE-Stat, the organization responsible for renewable energy accounting, only covers water-borne HPs, namely ASHPs or GSHPs and HPs recovering heat from extracted air. AGEE-Stat data shows that in 2017, ASHPs (air/water HPs) were the main driving force behind the growth of the German market. A total of 57 638 units were installed in 2017, up from 48 501 in 2016, which equates to 18.8% growth. The German market for water-borne HPs is booming, as it has surged by 44.7% in the space of two years (39 831 units sold in 2015), while their mean rating is

slightly lower, as the combined capacity of air/water HPs sold in 2017 is put at 611 412 kW (or 10.6 kW per system) compared to 524 407 kW in 2016 (or 10.8 kW per system). AGEE-Stat points out that its air/water HP statistics also include HPs that use gas as their auxiliary energy, totalling some 2 638 units sold in 2017, slightly fewer than the 2 720 sold in 2016. Sales in the extracted air HP segment also increased but at a slower pace, with 13 500 units sold in 2017 compared to 12 469 in 2016 (8.3% growth). The unit rating of these systems is much lower at 2 kW (i.e. 27 000 kW in 2017) making them suitable for much lower heating needs. According to AGEE-Stat, GSHPs have been

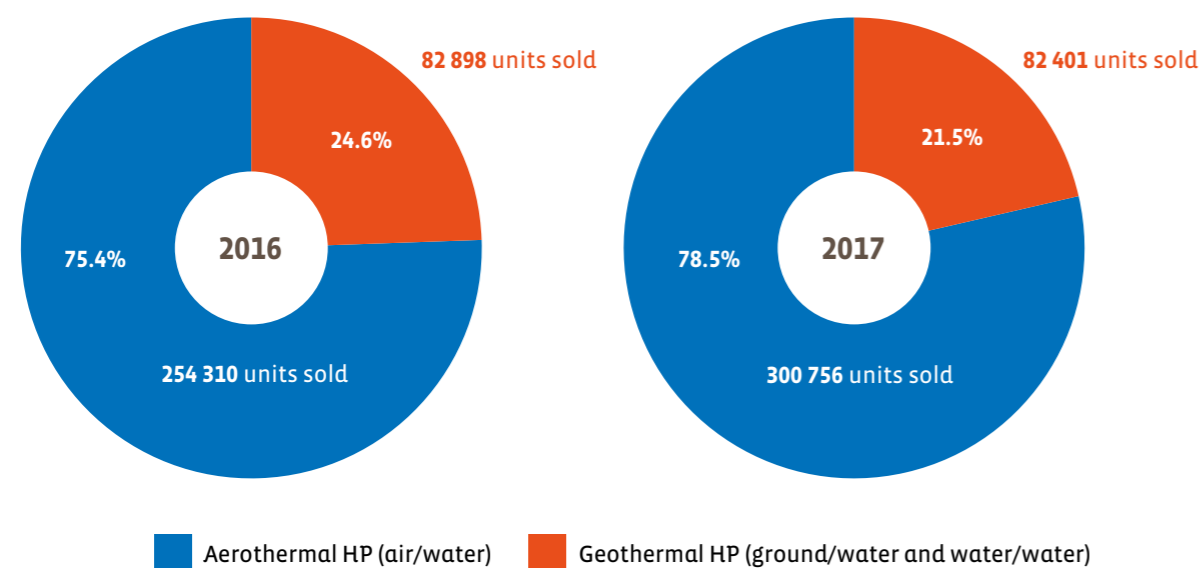
less popular. The sales figures contracted slightly in 2017 when 20 170 units were sold (including 2 170 hydrothermal HPs) compared to 20 789 in 2016 (including 2 238 hydrothermal HPs), with the result that in 2017, this segment failed to consolidate the recovery it recorded in 2016 (17 000 GSHP sold in 2015). Now the official figures are at odds with those of the German HP industry association (BWP - Bundesverband Wärmepumpe), published early this year, which claimed that the geothermal HP market grew by 11% over 2016, with roughly 23 000 units sold. The BWP welcomes the German HP market surge in 2017 which set a new record,

breaking that of 2016. At the start of the year, the BWP expected sales figures to flatten out. The association sees the MAP (Marktanreizprogramm) market incentive programme and EnVE (Energieeffizienzverordnung) thermal regulation that defines the energy efficiency level in new build and redevelopment projects as market-friendly. However, it expects the new-build sector to lose steam, which should curb growth. The German market is also hampered by relatively low heating fuel and gas prices that hold back the penetration of HP systems. Thus, the BWP urges the political



Graph n° 1

Market share between geothermal⁽¹⁾ and air-water heat pumps with hydronic system⁽²⁾ in 2016 and 2017*



¹⁾ hydrothermal HP included. ²⁾ An hydronic heat pump system uses water or another liquid as a heat transfer fluid in heating and cooling systems (with radiators or a heating floor). *Estimate - Source: EuroObserv'ER 2018.

Tabl. n° 3

Total number of heat pumps in operation in 2016 and 2017*

Country	2016			2017		
	Aerothermal HP	Geothermal HP	Total heat pumps	Aerothermal HP	Geothermal HP	Total heat pumps
Italy	19 045 000	14 220	19 059 220	19 520 000	14 200	19 534 200
France	5 085 653	151 770	5 237 423	5 572 743	154 870	5 727 613
Spain	2 289 432	1 293	2 290 725	3 201 810	1 388	3 203 198
Sweden	1 057 666	514 038	1 571 704	1 136 341	525 678	1 662 019
Germany	551 958	339 946	891 904	616 569	358 181	974 750
Finland	629 480	102 995	732 475	683 621	110 981	794 602
Portugal	384 080	857	384 937	528 746	909	529 655
Netherland	316 899	50 943	367 842	393 922	54 846	448 768
Denmark	272 470	60 691	333 161	290 254	61 204	351 458
Bulgaria	214 971	4 272	219 243	214 971	4 272	219 243
Austria	79 065	99 547	178 612	92 808	103 120	195 928
United-Kingdom	130 852	29 183	160 035	150 112	31 541	181 653
Belgium	91 938	9 374	101 312	147 466	11 337	158 803
Estonia	116 717	12 375	129 092	131 727	14 125	145 852
Poland	45 361	41 995	87 356	61 731	47 655	109 386
Czech Republic	54 975	23 149	78 124	68 753	24 710	93 463
Slovenia	24 900	10 050	34 950	27 900	10 648	38 548
Ireland	13 484	3 824	17 308	17 941	4 115	22 056
Slovakia	8 495	3 315	11 810	11 049	3 483	14 532
Lithuania	2 760	4 463	7 223	4 258	5 096	9 354
Hungary	5 400	1 310	6 710	6 050	1 530	7 580
Luxembourg	1 309	555	1 864	1 389	671	2 060
Total EU 28	30 422 864	1 480 165	31 903 029	32 880 160	1 544 560	34 424 720

* Estimate. ** Note: Datas from Italian, French, Spanish and Portuguese aerothermal heat pump market are not directly comparable to others, because they include the heat pumps whose principal function is cooling. Source: EuroObserv'ER 2018.



ANDREAS KRUKMEYER / STEIBEL ELTRON

decision makers to lower taxes on RES electricity to improve the competitiveness of HPs so that the country can reduce its fossil fuel consumption for heating needs.

Ambivalence in the Swedish market

In 2017, heat pump sales for heating increased in the Swedish market. Data released by SKVP (the Swedish Refrigeration and Heat Pump Association) shows that the air/water HP market expanded by 14.9% rising from 8 099 to 9 305 units sold, while extracted air HP sales increased by 13.1% from 15 314 to 17 320. However, there is a snag, and it is no light matter, that threatens to derail the GSHP market. The city of Stockholm's July 2017 decision to issue no more drilling permits for heating purposes hit sales volumes in the fourth quarter of the year (which dropped by 11% from their 2016 Q4 level). Behind this administrative decision, is a conflict of interest between heating needs and other public needs (e.g.: laying pipes, underground railway lines, constructing future infrastructures). It hit annual GSHP sales figures, which fell by 0.9%, from 22 843 to 22 641 units. The authorities reviewed the drilling prohibition issue early in November 2017 and resumed issuing permits pending implementation of a clearer urban planning policy.

Despite the decision, Sweden's HP market is looking healthy and the outlook for growth is promising for 2018. The interim data for the first six months of 2018 show that the air/water HP market has grown by about 17%, the extracted air HP segment which is particularly susceptible to the health of the new-build market is 6% up and the GSHP market is 7% up. The SKVP chairman says that "the sector is in fine form and the market signals we have seen for a while are holding steady. The property sector's interest in moving on from district heating technology to HP technology means that we expect 2018 to deliver good results". The association does not directly monitor reversible air/air HP sales. The extent of this market is approximated and estimated by the EHPA at 55 000 units in 2017, which equates to a similar sales volume to that of 2016.

PRODUCT IMPROVEMENTS OPEN UP NEW MARKETS

The renovation market shows it has potential

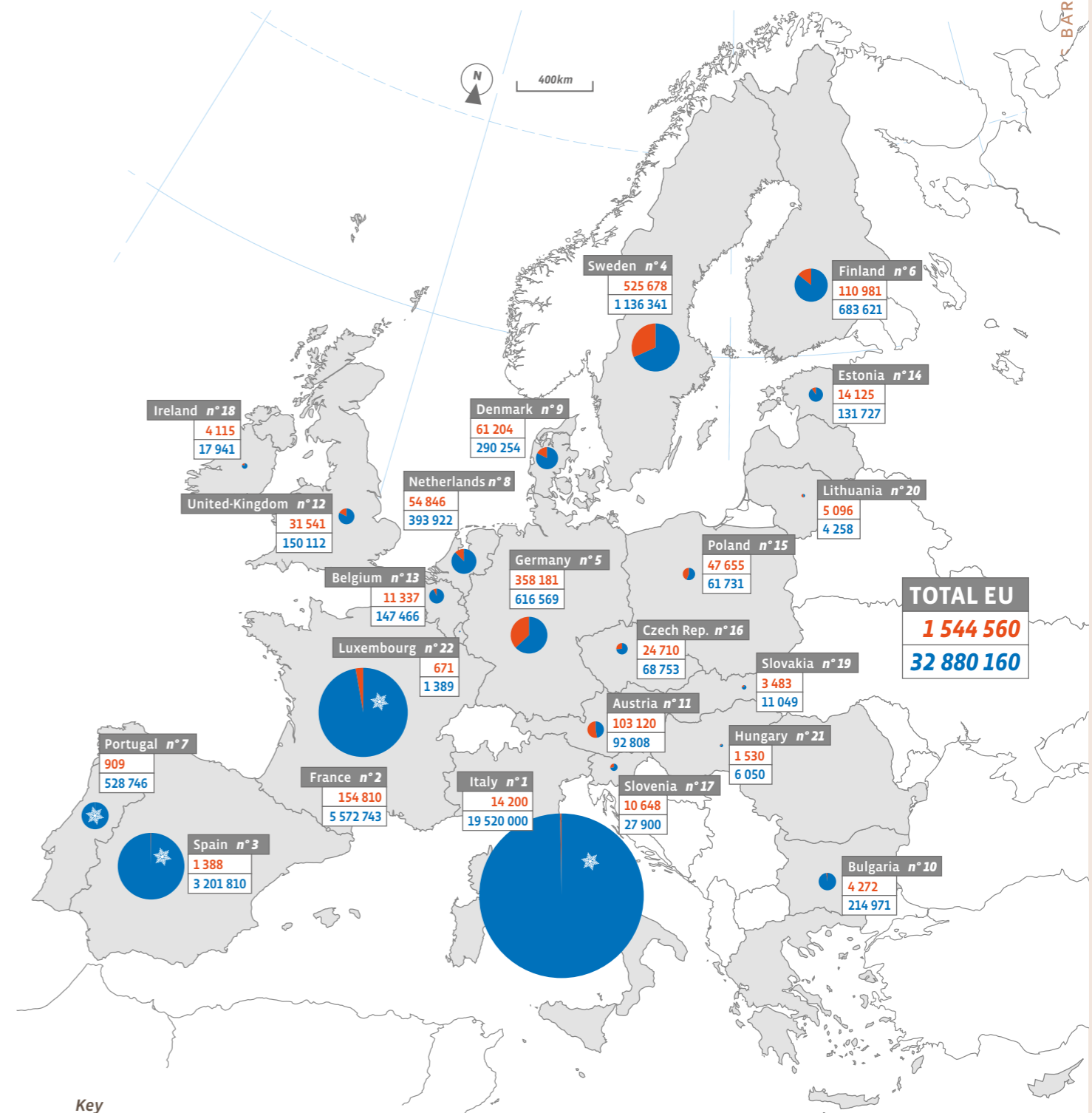
Traditionally HPs have penetrated the construction market more than the renovation market. New houses are better insulated, which enables HPs to take on heating these buildings in their stride. According to the EHPA, the HP penetration rate in individual homes is

96%, 91% and 87% in Norway, Sweden and Finland. In other countries such as France and Austria the rate is closer to 35%, which makes them major markets. However, it is the renovation market that is kindling the industry's interest as it seems more attractive in the long term. This is because it represents 80% of the existing housing stock and the former technological challenges faced by HPs have been removed. Heat pumps can now supply temperatures upwards of 65°C, i.e., they can meet the greater energy needs of older housing stock. Thus, HPs are now serious contenders to supplant the traditional heating solutions of gas, heating fuel or even biomass.

This market is interesting on a number of counts. For the moment the HP market share in renovation is only 10% in Sweden, and less than that in France, Austria and Germany, hence the growth potential is significant. Furthermore, as buildings undergoing renovation are high energy-consuming, the HPs installed in them will have higher capacities than those installed in new build. The resulting sales figure will be higher for working in renovation than in new build. Technical solutions have been developed to couple heat pumps to traditional boilers, which means that HPs



Aerothermal and geothermal heat pump park in operation in European in 2017* (installed units)



Key

- Geothermal heat pumps
 - Aerothermal heat pumps
 - ★ Datas from italian, french, spanish and portuguese aerothermal heat pump market are not directly comparable to others, because they include the heat pumps whose principal function is cooling.
- 14 200 Total number of aerothermal heat pumps in function in the country
19 520 000 Total number of geothermal heat pumps in function in the country

* Estimate. Source: Eurobserv'er 2018.

can be installed in older property that has higher capacity demands than new build.

Refrigerant fluids are a major research and development challenge

The European Union published the F-Gas Regulation in 2006 as part of its climate warming curbing effort. The regulation governs the use of refrigerant fluids that are often major greenhouse gases and it is regularly strengthened. The latest version is F-Gas No. 517/2014 that targets a number of hydrofluorocarbon (HFC) refrigerants used in heat pumps. This regulation provides for phasing out some gases from 2015–2030 and an 80% reduction in global greenhouse gas emissions from fluorinated refrigerants. This proactive

policy calls on heat pump manufacturers to adapt by changing the fluids used, which entails significant research and development efforts. Subsequently, the sector's players have devoted their resources for the last three years into making changes to their products to meet European Union demands.

At the start of the millennium, the refrigerant fluid used in heat pumps was R22, which contributed to depleting the ozone layer. The manufacture of appliances that operate using R22 was proscribed in 2004 and the supply of R22 completely curtailed from 2015 onwards. The manufacturers turned to R-410A, a less polluting third-generation refrigerant to replace it. The GWP (Global Warming Potential) indicator is used to measure the impact of these fluids on

climate warming, and R-410A has a GWP of 2088, i.e. 1 kg of R-410A released into the atmosphere equates to 2088 kg of CO₂. However, R-410A will have to be replaced to meet the F-Gas regulation requirements. So, in the last few years the manufacturers have turned to R32 for both air/air and air/water HPs. This HFC fluid has a GWP of 675 and is considered to have little environmental impact. The manufacturers are ready to launch on the market HPs that use this refrigerant after several years of R&D work. Other solutions are also being marketed or are involving the manufacturers. They include CO₂, which logically has a GWP of 1, propane, with its GWP of 20 and Hydro-Fluoro-Olefine (HFO) fluids, said to be fourth-generation fluids that also have very low GWP rates. However, there is no

ideal solution, because fluids with lower GWP rates can present other health or flammability hazards, for example. So, the European heat pump industry is readying itself for a world where different refrigerants will be used. This will lead to further training for installers and maintenance technicians so that they can work on all appliances. Also, these gases must be recovered for recycling, regenerating or destruction when the appliances reach the end of their service lives. One HP can thus save on CO₂ emissions during its life compared to fossil fuel-based heating methods or direct use of electricity.

Consolidations occurring in the HP sector

Heat pump manufacturers often hail from the heating appliance business, with HPs only accounting for part of their turnover. These groups field dif-

ferent HP brands to address specific markets, as shown in **table 4 (page 11)**. Thus, the BDR Thermea Group – a name unfamiliar to the general public – uses the De Dietrich, Sofath, Oertli, Chappée and Remeha brands.

The last few years have witnessed several consolidations between the major HP companies, which have enabled these mainly Central European companies to strengthen their hand in Denmark, Finland, Norway and Sweden. For instance, in 2016 and 2017, the Nibe Group bought up many assets of the UK-based Ener-tech Group, including the highest value brand CTC, based at Ljungby in Sweden (Nibe itself is based at Markaryd). The CTC product range includes ground source and air/water heat pumps. Stiebel Eltron announced in the 2nd quarter of 2017 that it was acquiring Thermia Heat Pumps, a brand that was previously owned by the Danfoss Group.

Thermia was the third biggest heat pump supplier to the Scandinavian market, with annual sales of nearly 68 million euros. The acquisition fleshes out Stiebel Eltron's scope of action which primarily covered the German and neighbouring country markets and turns it into a major electrical heating player.

THE ROUTE IS NOW MAPPED OUT THROUGH TO 2030

The next few years' HP market growth prospects look very promising, as shown in **graph 2 (page 13)**. Major trends point to an upswing in this technology with regulatory and political signals that endorse further electrification of heating needs.

The technological progress made over

Tabl. n° 4

Companies *representative Heat Pump Companies in the European Union.

Company	Brand	Country
BDR Thermea	De Dietrich	France
	Sofath	France
	Chappée	France
	Remeha	Pays-Bas
	Oertli Thermique	France
	Brotje	Allemagne
Bosch Thermotechnology	Bosch	Allemagne
	Buderus	Allemagne
Daikin Industries	Daikin Europe	Belgique
	Rotex	Allemagne
Atlantic	Atlantic	France
Nibe	Nibe Energy System	Suède
	CTC	Suède
	Technibel	France
	KNV	Autriche
Vaillant Group	Vaillant	Allemagne
	Saunier Duval	France
Viessmann Group	Viessmann	Allemagne
Stiebel Eltron	Thermia	Allemagne
	Stiebel Eltron	Allemagne
Waterkotte	Waterkotte	Allemagne

*Non exhaustive list. Source: EurObserv'ER 2018.





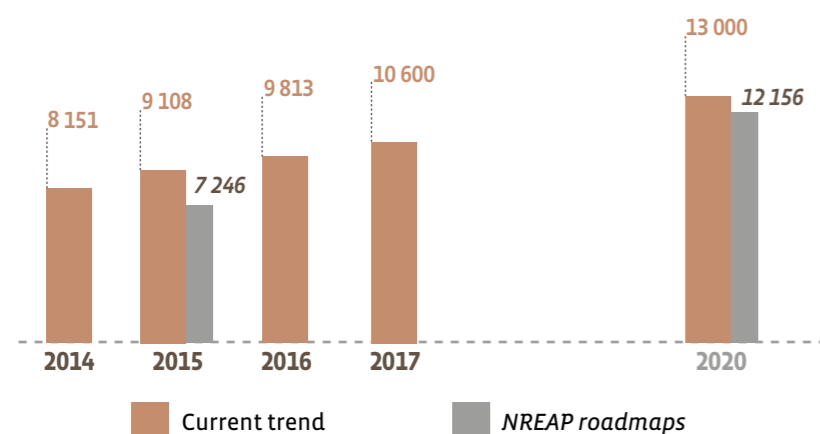
VALUANT GROUP

the last decade has opened up new growth opportunities. High-temperature HPs can now operate efficiently when outdoor temperatures drop to sub-zero levels. As a result, they can now be used in many more buildings and are ready to launch a head-on attack on the renovation market. The heat pump market benefits from

the effective implementation of new thermal regulations in buildings that introduce minimum energy performance thresholds or that make the use of a renewable energy heating system compulsory. Adoption of the Energy Performance of Building Directive (EPBD) into national law in 2010 is finally producing quantifiable results in this market.

Graph n° 2

Actual trend of renewable energy from heat pumps compared with the National renewable energy action plans NREAP (in ktoe)



Source: EurObserv'ER 2018.

The HP market is also heartened by the renewable energy directive whose roll-out in the renovation sector is helped in many countries by financial aid or tax credit. Countries that produce low-carbon electricity (France, Sweden, Finland etc.), indirectly encourage the electrification of heating needs via HPs by green taxation that aims to progressively tax energies that emit high amounts of CO₂, putting oil-fired boilers in the firing line in particular.

In general, HP market development is dependent on the change in the competitive advantage of electricity in relation to the prices of fossil energies, gas and heating oil. It is the ratio of the electricity price divided by the gas or heating oil price that determine the competitiveness of heat pump running costs.

Heat pumps can also take advantage of a winning combination with the surge in individual or collective photovoltaic self-consumption. The possibility of producing one's own electricity at a lower cost than purchasing it from the grid is starting to influence the heating and domestic hot-water production market. The development of photovoltaic self-consumption also favours the reversible ASHP market, as solar power production peaks are directly related to summer comfort needs.

Another key factor is that the increase in sales volumes has a hand in reducing system costs through economies of scale and making installer networks denser and increasing the number of qualified installers.

The European Parliament finally adopted the text of the forthcoming renewable energy directive on Tuesday 13 November and ratified the binding European Union-wide renewable energy target of 32% by 2030 as expected. At the same time, a suggested 32.5% energy efficiency target was set for the forthcoming European Energy Efficiency Directive. These two targets will be reviewed by 2023 but can only be revised upwards. Once the European Council has formally approved the agreement, the new rules will be published in the Official Journal and will come into effect 20 days later. The future renewable energy directive will redefine some of the follow-up indicators for the HP sector. Henceforth, it separates recoverable renewable

energy into two categories. Firstly, ambient energy, which is natural thermal energy and the energy accumulated in the environment that can be stored in the ambient air (excluding extracted air), surface water or waste water. The category thus brings ASHP and hydrothermal renewable energy production together. Secondly, geothermal energy which is the energy stored as heat under the surface of solid earth.

Another point to bear in mind is that the future directive indicates that by 31 December 2021 at the latest, the Commission must establish a new method for calculating the amount of renewable energy used for cooling and in cooling networks, in line with article 32, and revise annex VII of the directive that defines the method for calculating renewable energy produced by HPs. This new method will include minimum seasonal performance factors for reversible heat pumps.

Another article of interest in the future renewable energy directive will directly affect the heat pump sector's deve-

lopment. Article 23 specifies that each member state must monitor the annual increase in the renewable energy share in its heating and cooling sectors to facilitate the renewable energy penetration of these uses. The mean annual guide value taken up is 1.3 percentage points calculated for the following periods: 2021-2025 and 2026-2030, starting from the actual 2020 level, expressed as the national share of final energy consumption. The article prescribes an increase limited to a guideline 1.1 percentage points for member states which do not use their excess heat and lost cold. Excess heat is the heat incidentally generated and left unrecovered by a process, i.e. it is not the main purpose of the process. Excess heat can be reused directly (or following concentration and/or storage) to improve a process (such as pre-heating gas), for space heating or heating objects, or even to chill (via an evaporator or other system) or produce electricity.

All in all, the new European legislation that has been adopted sends a very posi-

tive signal to all manufacturers working in the renewable energy field. The route is now mapped out through to 2030. It is up to the heat pump sector to achieve the renewable energy ambitions the European Union has set for it. □

Sources T₁ and T₂: Italy (Ministry of Economic Development), France (Observ'ER), Sweden (SKVP), Finland (Sulpu), Germany (AGEE Stat), Netherlands (Statistics Netherlands), Denmark (Danish Energy Agency), Austria (BMVIT), Josef Stefan Institut (Slovenia), University of Miskolc (Hungary), Luxembourg (STATEC), EHPA.



The next barometer will cover solid biomass.



This project is funded by the European Union under contract n° ENER/C2/2016-487/SI2.742173

This barometer was prepared by Observ'ER in the scope of the EurObserv'ER project, which groups together Observ'ER (FR), ECN (NL), RENAC (DE), Frankfurt School of Finance and Management (DE), Fraunhofer ISI (DE) and Statistics Netherlands (NL). The information and views set out in this publication are those of the author(s) and do not necessarily reflect the official opinion of the Commission. The Commission does not guarantee the accuracy of the data included in this study. Neither the Commission nor any person acting on the Commission's behalf may be held responsible for the use which may be made of the information contained therein.