

Heat pump market report for Italy

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This paper presents an overview of the Italian heat pump market over the past 10 years. It provides a brief explanation of the statistical methodology used for accounting for air-source heat pumps in order to correctly filter out those units installed as auxiliary systems only. It also analyses the position of the Italian market in a European context, followed by a breakdown by type with relevant remarks. Finally, a brief outline is given of the current potential of the heat pump market, including incentives and barriers to further deployment.

Introduction

Heat pump systems used for space heating and cooling and for domestic hot water production are today increasingly playing a leading role in European policies on energy efficiency, both in buildings and in end-use technologies, as well as in the fight against atmospheric pollution. Such trends are confirmed by more and more encouraging sales trends that are currently pushing towards greater electrification of end uses. Compared with combustion systems, heat pump technologies can offer many advantages in this context – as recently summarized by Fernando Pettorossi, coordinator of the Italian association Assoclimate [1]. These can be divided into environmental benefits, techno-economic benefits and safety benefits.

The first include a reduction in fossil fuel consumption, an increase in the use of renewable sources and an absence of local emissions or particulates in the environment. The second set of benefits comes from using a

unique system in the building for heating, domestic hot water and cooling, with just one electricity bill for all these uses and lower maintenance costs. Finally, no more combustion in the building means no risk of fire or explosion, as well as no need for a chimney.

The Italian heat pump market has great potential for improvement in both qualitative and quantitative terms. It is currently dominated by reversible air-source heat pumps (ASHPs), mainly used for summertime cooling. However, the Italian climate – especially in central to southern areas – could allow the use of ASHPs as the only heating system, for both space heating and domestic hot water production. Opportunities for this would be even greater if the technological development of hybrid heat pumps (i.e., solar HP systems) and low-temperature ASHPs was completed. Moreover, the ASHPs on the market in recent years have meant that as long ago as 2014 Italy had already succeeded in achieving and even surpassing the share of energy from renewable sour-

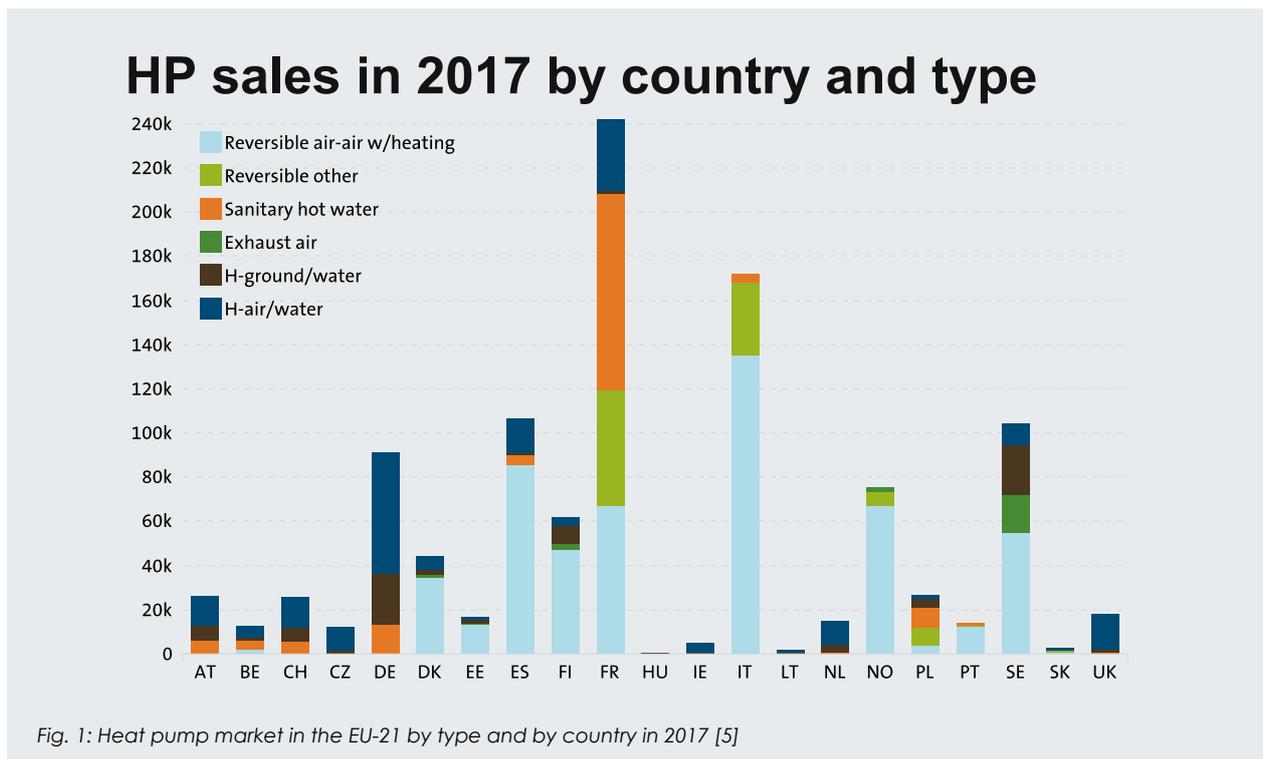
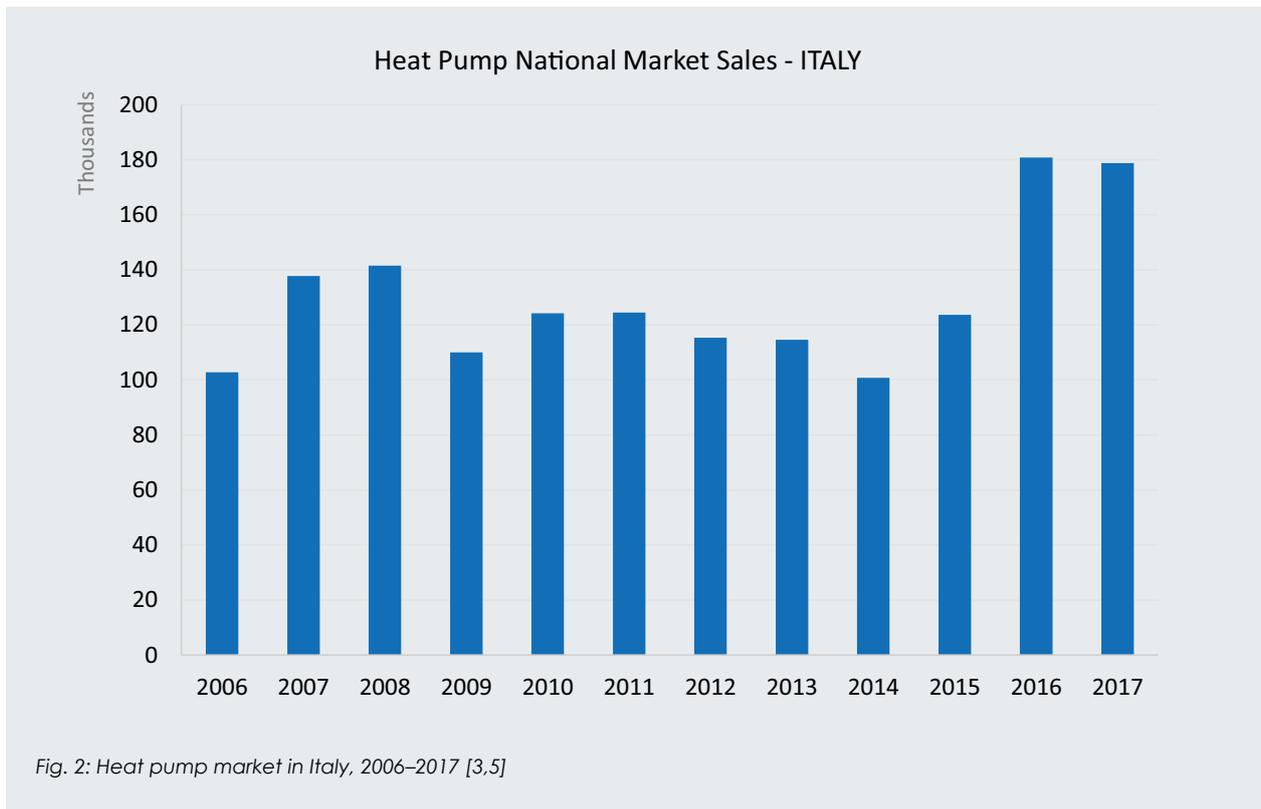


Fig. 1: Heat pump market in the EU-21 by type and by country in 2017 [5]



ces planned by the National Action Plan for Renewable Energy (PAN) for the year 2020 [2].

Statistical issues

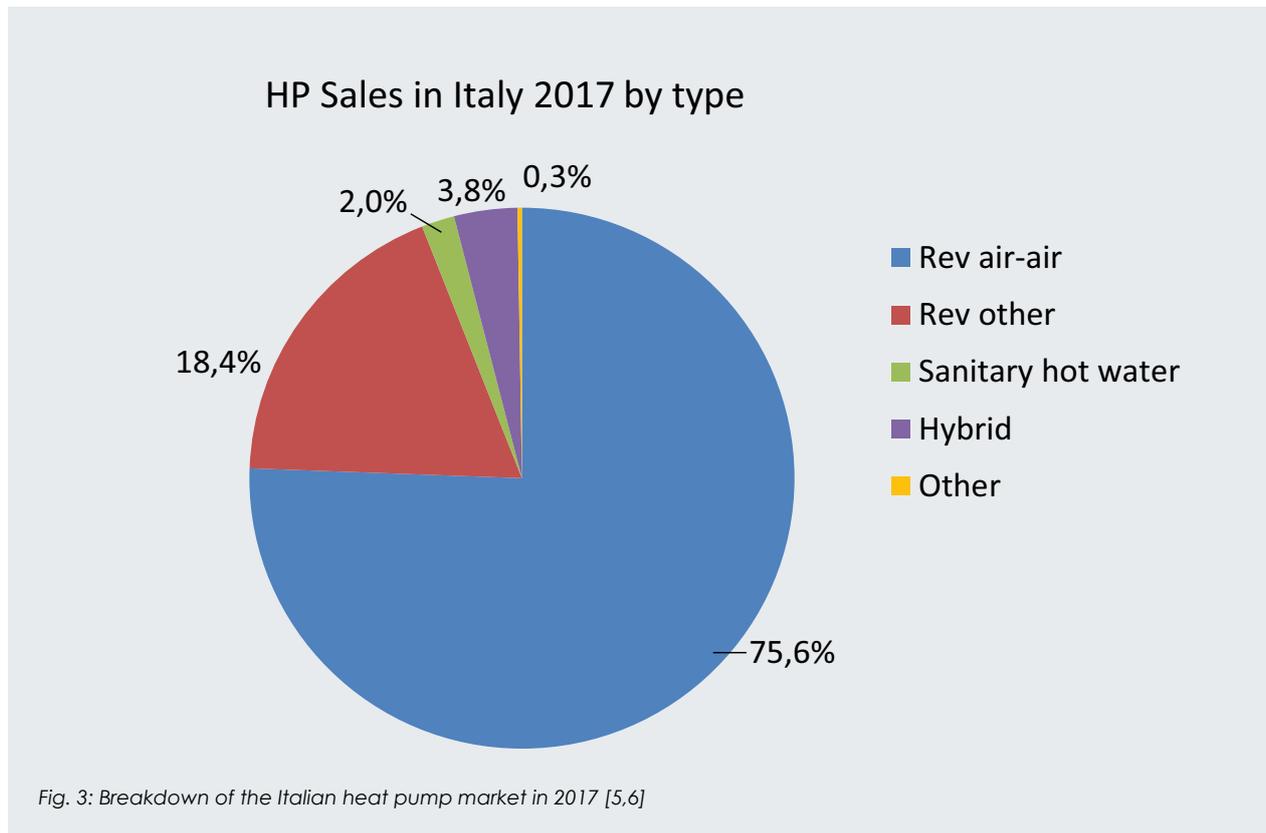
In the case of heat pumps used for space heating, some clarification is needed concerning the accounting methods used for reversible ASHPs. In Italy, Technical Annex VIII to Ministerial Decree DM 14 January 2012 lays down the methodology to be used when reporting heat pump use in the system used for national energy statistics. The achievement of national targets, measured as the RES share for heating and cooling of final energy consumption, fulfils the requirements of Legislative Decree D.Lgs.28/2011, which adopts EU Directive 2009/28/EC on the promotion of the use of energy from renewable sources. Annex VIII is based on a technical study of the Italian market that experts deem to be representative for the rest of the Mediterranean region as well.

Where the share of cooling-only air-to-air units cannot be determined, as in the Italian case, only a small fraction of the air-to-air units (about 9.5 %) are included in the statistics and the calculation. More specifically, to reduce any risk of over-estimation in the national RES contribution statistics, reversible air-to-air systems with a capacity of less than 17 kW – usually known as “monosplit” and “multisplit” systems – were accounted for at a level of initially 9.5 % of global sales, subsequently revised to 10.2 % as of 2012, since only this fraction is intended to be used as the main heating system.

The same principle is expressed in European Commission Decision 2013/114, where it is remarked that reversible heat pumps in warm and, to some extent, average

climates are often installed for the purpose of cooling the indoor environment, even though they are also used to provide heating during the winter. Since the cooling demand in the summer is higher than the heating demand in the winter, the rated capacity reflects the cooling demand rather than the need for heating. As the installed capacity is used as an indicator of heating demand, it implies that the statistics on installed capacity will not reflect the capacity installed for heating purposes. Therefore a conservative reduction to 10 % is adopted for a warm climate, in terms of annual equivalent heat pump hours (HHP) – which are the assumed annual number of hours a heat pump has to provide heat at rated capacity. Indeed, in support of this, the EU Decision mentions the same Italian study.

The statistical methodologies described above are reflected in heat pump sales statistics. For instance, the European Heat Pump Association (EHPA) – which represents the majority of the European heat pump industry – follows the approach set out in the EU Directive, as previously detailed. Its sales data may therefore differ significantly from other sources, which include all equipment that is in any way comparable to a heat pump regardless of its main use (cooling mode, back-up heating mode, heating as unique system, etc.). In this regard, a comparison has been made between data from the EHPA and the Heat Pump Barometer EurObservER [3] (a European monitoring project which measures the progress made by renewable energies in many sectors in the EU), with the 9.5 % correction applied to the air-to-air share. Good agreement was achieved between the two sources, so the EHPA reference will be adopted in the following.



The Italian heat pump market

In a European context, the Italian heat pump market is one of the largest: in the last 10 years it has been always the second largest market, with a share of between 13 % and 18 %. Figure 1 [5] shows the most recent (2017) composition by country (EU-21) and by type according to the EHPA. It is worth noting that, as expected, the market in Italy is composed largely of reversible air-sourced applications.

Over the last 10 years average annual sales of heat pumps in Italy were around 130,000, peaking in the last two years up to about 180,000 units. In 2015 and 2016 overall sales increased by 23 % and 46 % respectively compared with the previous year, as shown in Figure 2 [3,5]. The market was boosted by the introduction in 2014 of a special tariff that was available only to residential consumers using a heat pump as their main heating system, and also by other incentive mechanisms, although this tariff is not currently applicable to new applications. The increase in those years is also attributable to the weather conditions in recent summers.

The breakdown of heat pump sales in Italy shows a great prevalence of air-to-air split systems, as Figure 3 shows for the 2017 market, for the reasons detailed previously. In terms of the primary energy source, air covers almost all the market and accounts for around 97 %, followed by ground with almost 3 % and a negligible contribution by water [7]. Among heat pumps categorised as Reversible other in Figure 3, most are of the air/water type – i.e., with air as the source and water as the heat sink. Their sales volumes have almost tripled in the past 10 years (Figure 4), being close to 33,000 in 2017 [5,6] with an average yearly increase of more than 27 %

between 2014 and 2017. It is worth bearing in mind that currently their market share is a quarter of the figure for air-to-air machines. As well as the matter of cost, such a low share of global heat pump sales may also be due to the practical infeasibility of retrofitting a space heating system without replacing radiators, which account for more than 90 % of current domestic equipment in households.

A positive trend can be seen for hybrid systems which combine a gas boiler and a traditional heat pump (smaller than usual) in a unique integrated system that guarantees best performance relative to climatic conditions. Although this is a recent technology, the increase in its spread is promising, with sales doubling in 2017 compared with 2015. Otherwise, domestic hot water production by means of a heat pump is still not a widespread technology, presumably for cost reasons: currently, a heat pump for domestic hot water production can be as much as eight times more expensive than a traditional electric boiler, depending on size and specific features. Finally, the market for ground-source heat pumps has been largely flat over the last 10 years, with average annual sales of less than 1,000 units [4] – despite the fact that Italy is in the top 10 countries in the world when it comes to exploiting geothermal heat for electricity and is one of the top in the EU for direct heat consumption from geothermal energy.

Potential and barriers

The sales rate per 1,000 households is a typical index used to measure the market penetration of a technology and its as yet unexpressed potential. In Italy, this index was almost 7 in 2017 [5] – a value comparable with a small group of mostly nearby countries. Compa-

red to the countries of Northern Europe, however, it is 4–5 times lower, suggesting good potential for growth. The main barriers include energy prices, policy measures and incentives, and developments in the building sector, both in the construction of new buildings and in building renovations. In the last three years the Italian electricity-to-gas price ratio (the ratio between the price of electricity and the price for 1 kWh of useful heating energy delivered by natural gas) fluctuated between 2.3 and 3.3, with an average value of around 3 [8]. It should be recalled that a heat pump system has a comparative cost advantage over competing technologies whenever the seasonal performance factor (SPF) is higher than the energy price ratio.

In recent years Italy has increased incentives using three different mechanisms. One is what are known as “white certificates”, which provide a grant proportional to the energy saving, depending on the final use (heating, cooling, DHW) and sector (industrial, civil). Another incentive, available only to private individuals, guarantees a tax rebate (up to 65 % of the investment) for replacing an old heating system or electric heater for DHW. Finally, the newest mechanism is called “Conto termico 2.0” (Thermal Account 2.0) and is aimed at public administrations, small enterprises, and private individuals, providing a cash grant for the installation of heat pumps that replace an old heating system. Heat pump installation meets the requirements for all three mechanisms described above, so the choice of the most appropriate will depend on the specific intervention.

A further barrier that has not yet been mentioned is lack of knowledge in the supply chain; for instance, the installer may not know the advantages of the technolo-

gy or may not promote it adequately. Indeed, the technology requires an initial investment cost that is not negligible and which should be carefully explained to end-users so that they are aware of all the functionalities of a heat pump that can be exploited. When used for space heating and cooling and for domestic hot water production, heat pumps are the most efficient method from a primary energy standpoint – and their payback period can be cut to just a few years.

Conclusions

The Italian heat pump market is currently one of the most important in Europe, having grown from nothing 10 years ago to some 180,000 units sold last year. Potentially, further deployment can be expected since the penetration index is considerably lower than in the best-performing countries. After some years of relatively stable sales volumes, the Italian heat pump market recently experienced a substantial upturn – with annual increases of 23 % and 46 % respectively in 2015 and 2016. The leading sector remains air-to-air reversible domestic applications, which historically caught on as summer cooling machines, particular in view of Italy’s warm climatic conditions in recent years. A promising trend can be seen for systems that are not air-to-air machines, with sales volumes having tripled over the last 10 years. Nevertheless, the current market share of these heat pumps is too small, essentially due to their high investment costs – even though the incentive rules introduced by the government have played a relevant role. In addition, the market could be boosted by players in the supply chain; particularly installers, who should act to increase end-users’ awareness – so that they fully understand the benefits of choosing heat pumps, both in terms of environmental compliance and economic sustainability.



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