

## Technical systems

Disclaimer: The graphs below show data available in the EU Building Stock Observatory: a country not represented only means data was not available for this specific country.

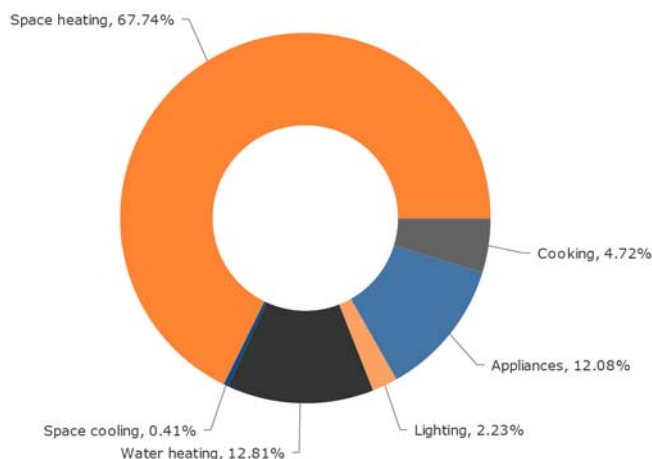
### Introduction

Of all the energy consumed in buildings, most is used for space heating, hot water production and cooling. In Europe's residential building stock, 71% of all energy is used for space heating alone. This energy consumption is the result of two elements: (i) heat demand, which can be influenced by insulation measures, and (ii) technical systems. The EPBD (Directive 2010/31/EU), has a holistic approach to building related energy demand. It (in Article 4 and Article 6) asks Member States to implement overall energy performance requirements. The Eco-design legislation establishes minimum mandatory requirements for appliances and energy-using products, including domestic heating and cooling appliances. In 2013 Eco-design requirements were set for space and combination heaters (813/2013 and 811/2013; LOT 1), and for water heaters and hot water storage tanks (814/2013 and 812/2013). Energy efficiency standards are also in place for air conditioning appliances, local air coolers and comfort fans (206/2012 and 626/2011).

### European residential energy use

**Figure 1: European residential energy use, according to functions (2013)**

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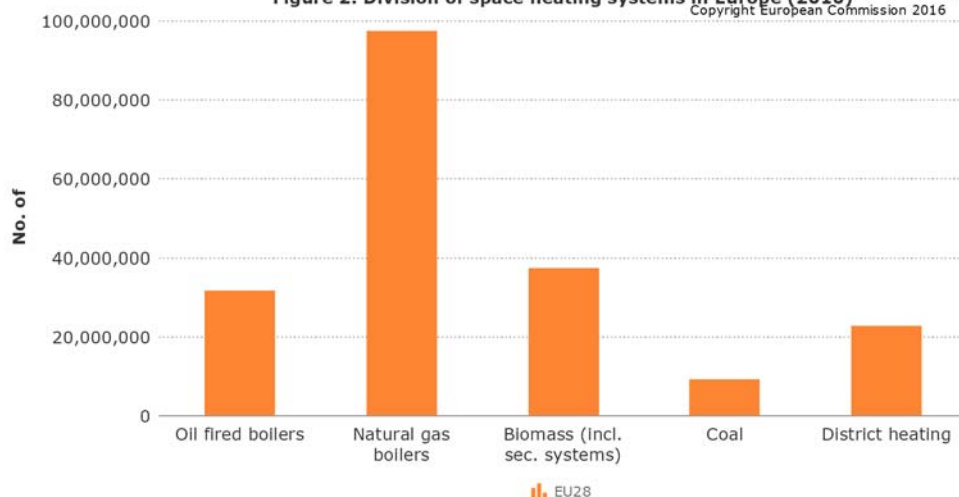
Sources: Calculation - Estimation [Notes](#)

### Space heating is heterogenous among European countries

There are about 244 million dwellings in Europe of which 221 million are heated with individual space systems. About ten million dwellings are heated with collective systems. Figure 2 shows the proportion of the different types of boilers. Most dwellings are heated with natural gas boilers. Many homes have biomass systems, but very often these systems are used as secondary systems. There are 23 million heat pumps in Europe. Most of them, 22 million, are aerial heat pumps that (19 million) are often reversible. This means that they can be used for both heating and cooling. In practice most of these systems are mostly used for cooling. The one million ground attached heat pumps are mostly used for space heating. When you look at the energy consumption, natural gas is the primary energy source for space heating.

**Figure 2: Division of space heating systems in Europe (2010)**

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Sources: JRC-IDEES [Notes](#)

Although there are countries in which large scale district heating is the main system for heating, most buildings are heated by individual systems. Figure 3 shows that 84% of all heating system have a small capacity.

**Figure 3: Share of heating device capacities in Europe (2015)**

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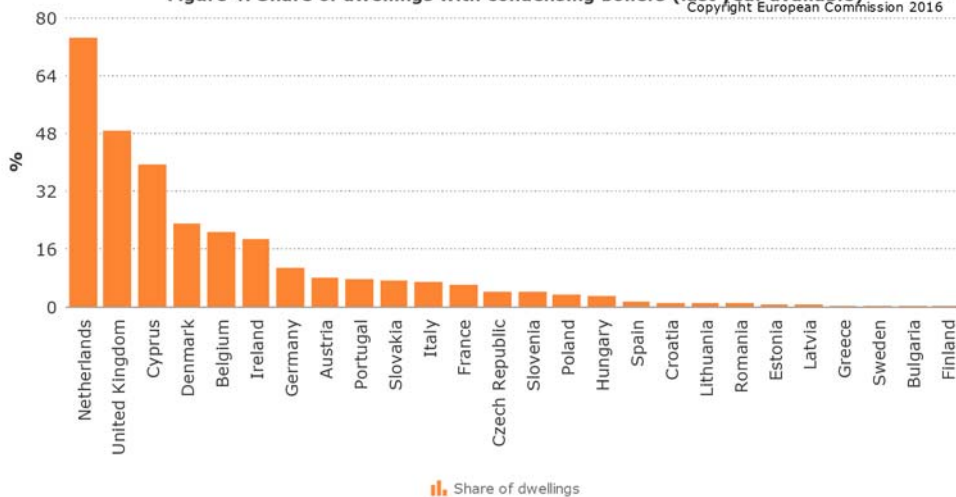


Sources: [Notes](#)

Eco-Design requirements for heating systems have been applied since 2013, in order to stimulate the market uptake of more efficient boilers. Condensing boilers and heat pumps are more efficient than conventional boilers. In the Netherlands, the share of condensing boilers is relative high (67%, see Figure 4). In other European countries the number of condensing boiler is rather low (3% in France, below 1% in Sweden). Figure 5 shows that Italy, Malta, Bulgaria and Sweden are frontrunners in heat pumps.

**Figure 4: Share of dwellings with condensing boilers (last year available)**

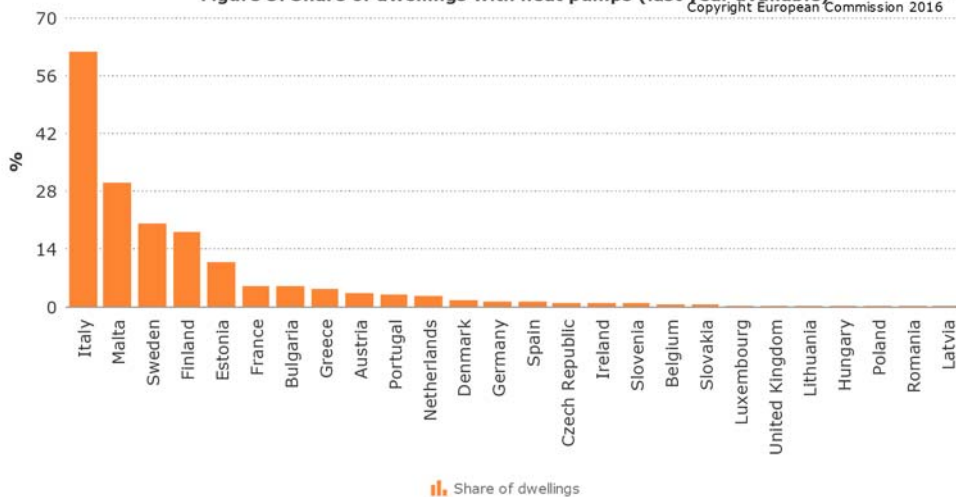
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Sources: Own calculations [Notes](#)

**Figure 5: Share of dwellings with heat pumps (last year available)**

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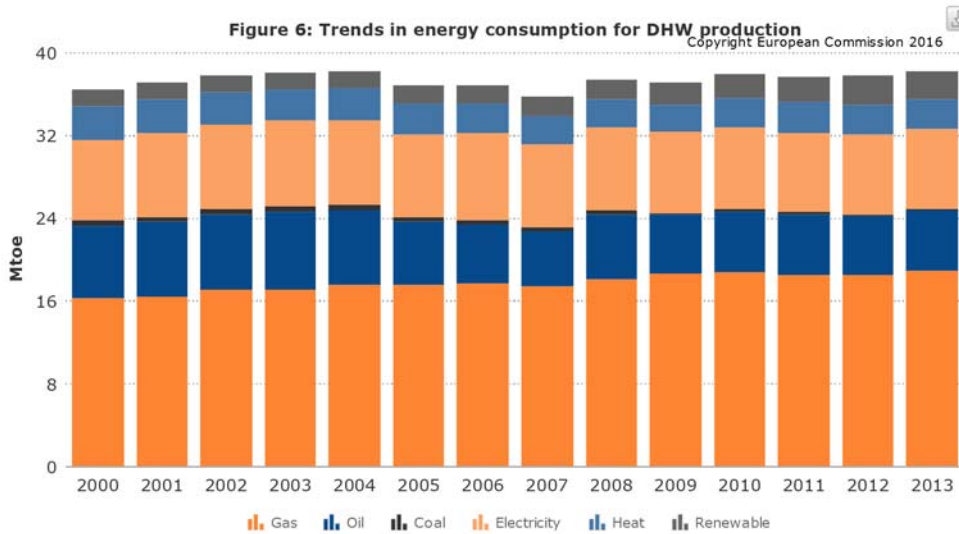


Sources: Own calculations [Notes](#)

Natural Gas, electricity and petroleum are main sources for DHW production

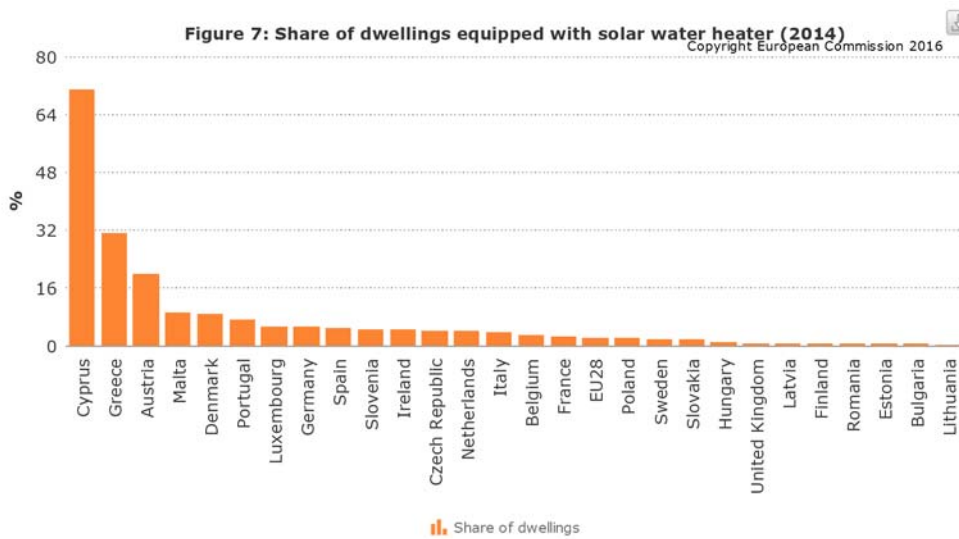
There is hardly any reliable data on hot water systems. Looking at the shares for energy consumption, gas fired water heaters account for over half of all the energy consumed for the production of domestic hot water (DHW). There are two main categories: (i) combi boilers that are used for space heating and DHW production, and (ii) gas fired water heaters. The latter are less efficient than combi-boilers. Less efficient electric boilers and petroleum fired water heaters still supply a relevant share of DHW production in Europe.

Figure 6 shows that the share of oil used for DHW production is steadily declining, while more efficient systems using natural gas and renewables are growing in importance. This could be one of the factors explaining the stable consumption of energy for DHW despite the growing number of households in Europe.



Sources: Estimation [Notes](#)

Solar heat is a renewable energy source used to heat water in buildings. Figure 7 shows that in the sunny countries of Cyprus and Greece many homes are equipped with solar heaters. Apart from Austria, where a fifth of the dwellings has a solar water heater, no Member State have more than 10% of their dwellings equipped with solar water heaters.

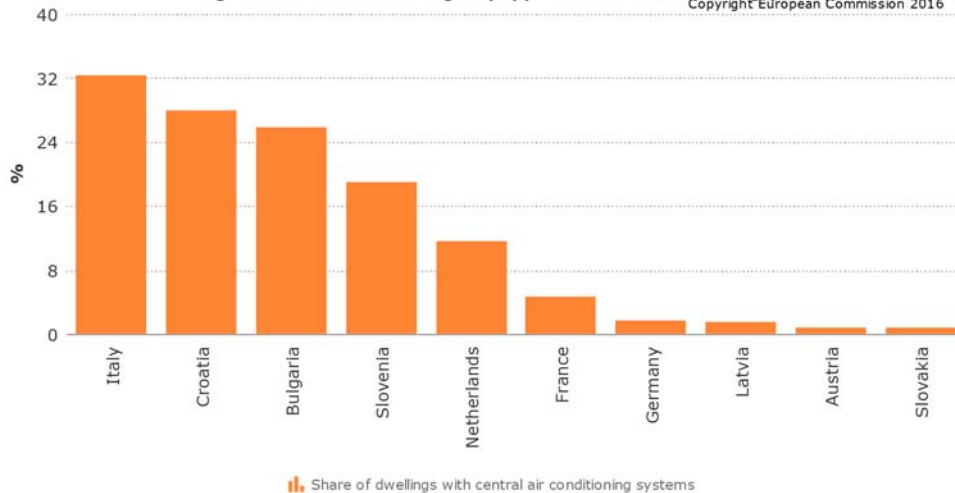


Sources: Odyssee [Notes](#)

Not surprisingly, warmer countries like Italy, Croatia, Bulgaria and Slovenia, have the highest share of dwellings equipped with air conditioners in Europe.

Figure 8: Share of dwellings equipped with air conditioning (2012)

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Sources: Odyssee

Notes

## Cooling and ventilation

Space cooling uses in average less than 1% of total residential energy consumption in Europe, but for countries with warm weather, like Bulgaria, Cyprus and Italy, it represents up to 5% of total residential consumption (even 12% in Malta).

Cooling systems are available in different types. The Eco-design directive identifies three main categories for the residential cooling equipment:

- **Movables:** These are relatively small devices placed in a room and that can be used for heating and cooling.
- **Single Split:** These system are often fixed to the building and cool a single room.
- **Multi Split:** These systems are also fixed to the building but can be used to cool more than one room

The availability of empirical data on cooling equipment is rather poor. Fleiter et al\* made estimations on installed cooling systems based on sales figures. Moveable cooling systems in Europe are estimated to be about 7 million. 19 million split systems can be used for heating and cooling and 3 million split systems can only be used for cooling.

\* Source: Fleiter, T. et. Al. (2016) Mapping and analyses of the current and future (2020-2030) heating/cooling fuel deployment (fossil/ renewables)