

On-site renewable energy

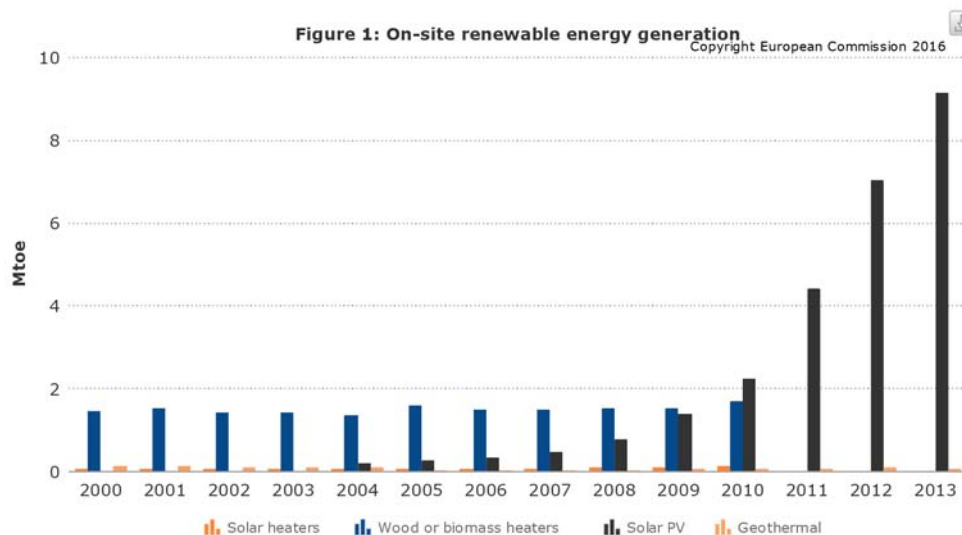
Disclaimer: The graphs below show data available in the EU Building Stock Observatory: a country not represented only means data was not available for this specific country.

Introduction

The Renewable Energy Directive (RED) establishes an overall policy for the production and promotion of energy from renewable sources in the EU. It requires the EU to fulfil at least 20% of its total energy needs from renewables by 2020 - to be achieved through the attainment of national targets.

In article 13 (6) of the RED, it is stated that "With respect to their building regulations and codes, Member States shall promote the use of renewable energy heating and cooling systems and equipment that achieve a significant reduction of energy consumption. Member States shall use energy or eco-labels or other appropriate certificates or standards developed at national or Community level, where these exist, as the basis for encouraging such systems and equipment."

On-site renewable energy generation stabilising in Europe

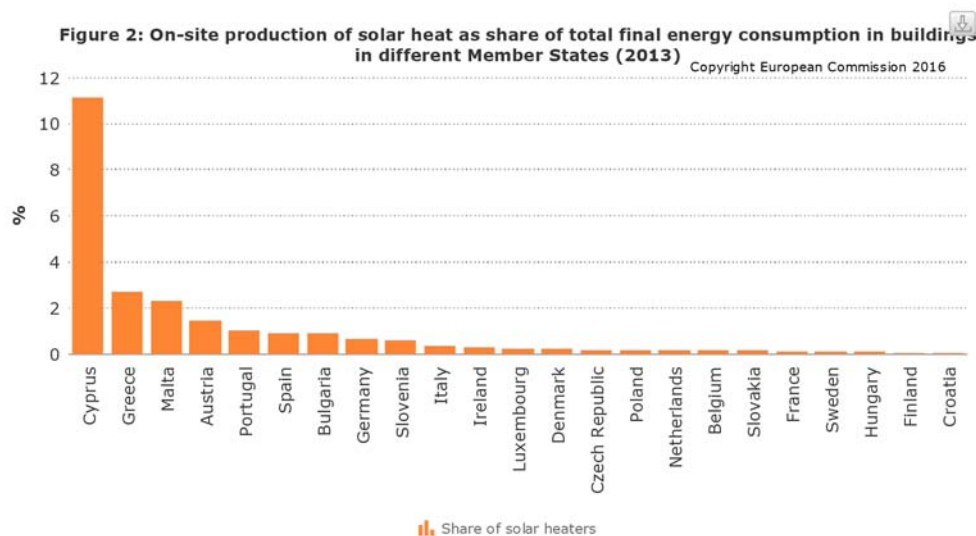


Sources: Eurostat - JRC-IDEES [Notes](#)

Although fossil fuels are still the dominant source of energy in Europe, renewable energy generation is growing fast. A special category of renewable energy production is on-site energy generation. Four categories can be distinguished: solar heat, solar electricity, biomass, and geothermal energy (including heat pumps). Figure 1 shows that within this category, biomass was the biggest source of renewable energy until 2010, when it was passed by solar PV. Energy generation from solar PV has increased dramatically, with an average of 67% annually since 2008.

Southern Member States together with Austria and Germany are the top producers of solar heat

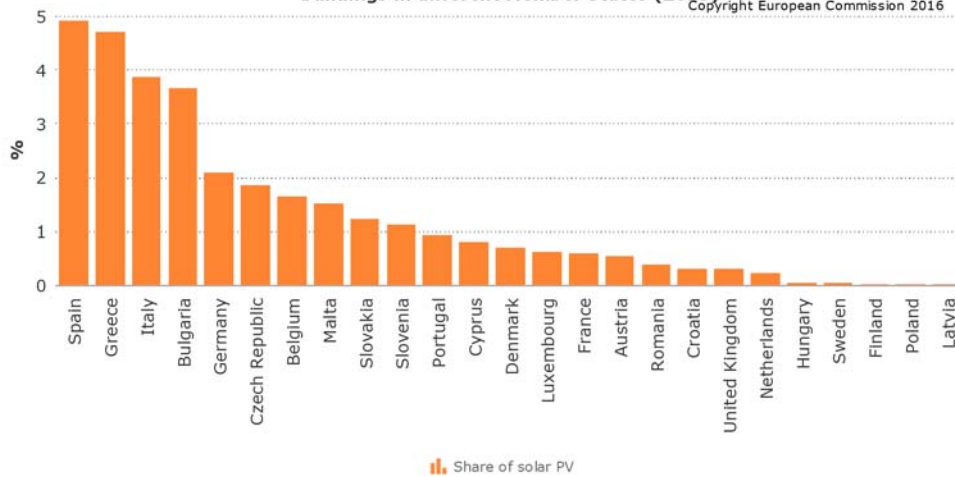
Solar heating installations are used to produce hot water and for the heating of buildings. Germany produces the most solar heat with a generation of 0.5 Mtoe. The country produces significantly more on-site solar heat than the following countries, Spain, Greece and Austria combined. But considering the relative numbers, which compares the generation with the total energy consumption in buildings (both for the residential and non-residential sector) Germany comes first on 8th place. According to this ranking, Cyprus is by far the country with the highest generation of solar heat. Other southern countries like Greece, Malta, Spain and Slovenia are also in the top 10, while Austria takes the 4th place.



Sources: Own calculations [Notes](#)

Spain, Greece, Italy and Bulgaria generate the most electricity from solar photovoltaic (PV), relative to their building consumption. Germany is also a large producer of electricity by PV panels with 0,34 Mtoe, but compared to their overall consumption it is a small share.

Figure 3: On-site production of solar electricity as share of total final energy consumption in buildings in different Member States (2013)

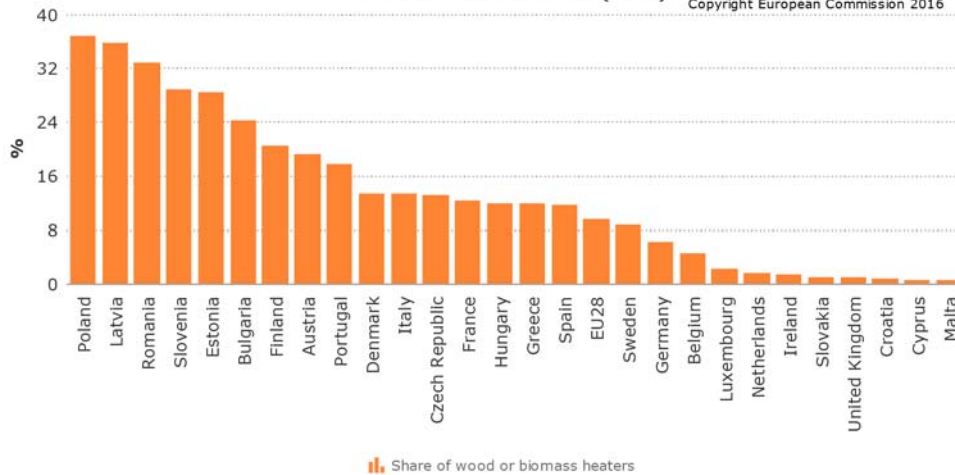


Sources: Own calculations

[Notes](#)

Biomass is the biggest on-site renewable energy source in European Member States

Figure 4: On-site biomass consumption as share of total final energy consumption in buildings in different Member States (2013)



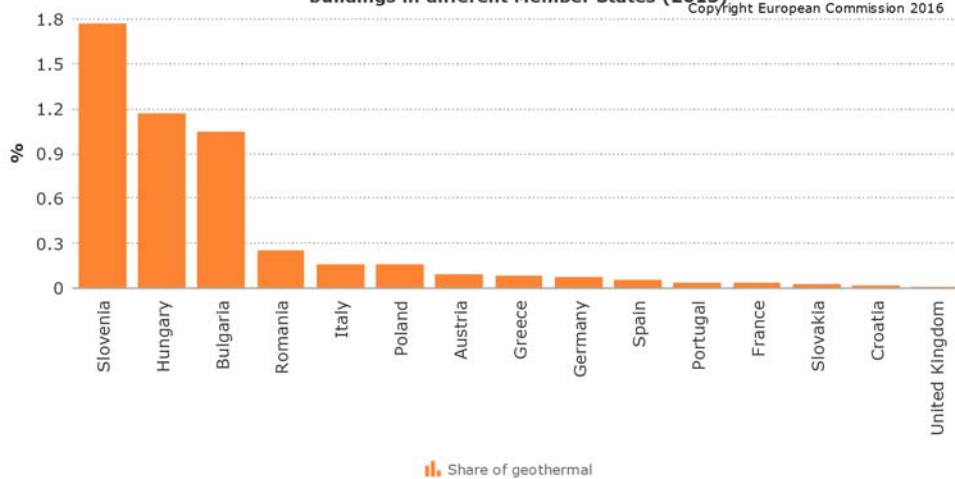
Sources: Own calculations

[Notes](#)

Wood is used in many different ways in buildings. Classic ways to heat buildings are wood stoves and fireplaces but this are not the most efficient ways to use wood as a heat sources. Countries, like Poland, Romania, Latvia, Estonia and Bulgaria, cover between 25% to 36% of their buildings' energy consumption with wood. More sophisticated systems use wood chips or wood pellets, which can be burned much more efficiently. These systems have become popular in Austria, Denmark and Sweden, which cover 8% to 18% of their building's energy consumption with wood. In warmer regions, such as in Italy, Portugal and France, central heating is not always necessary and wood stoves are used for colder days during winter time. In absolute terms, most biomass is used in France, Italy and Germany, due to their relative big populations.

Geothermal energy generation by heat pumps is of minor importance in most Member States

Figure 5: On-site geothermal heat consumption as share of total final energy consumption in buildings in different Member States (2013)



Sources: Own calculations [Notes](#)

The most common way to use geothermal energy is through heat pumps. Compared to other on-site renewable sources, heat pumps play a minor role at the moment. Sweden and Italy are exceptions, which generate relatively large amounts of renewable heat from geothermal sources. They cover 11% and 5% respectively of their building consumption with geothermal heat.

In very energy efficient homes, like passive homes or nearly zero-energy buildings (NZEB), heat pumps can be an important part. Heat pumps either uses air or ground heat as sources to derive heat from. Since NZEB are becoming the standard, geothermal energy generation is expected to grow.