

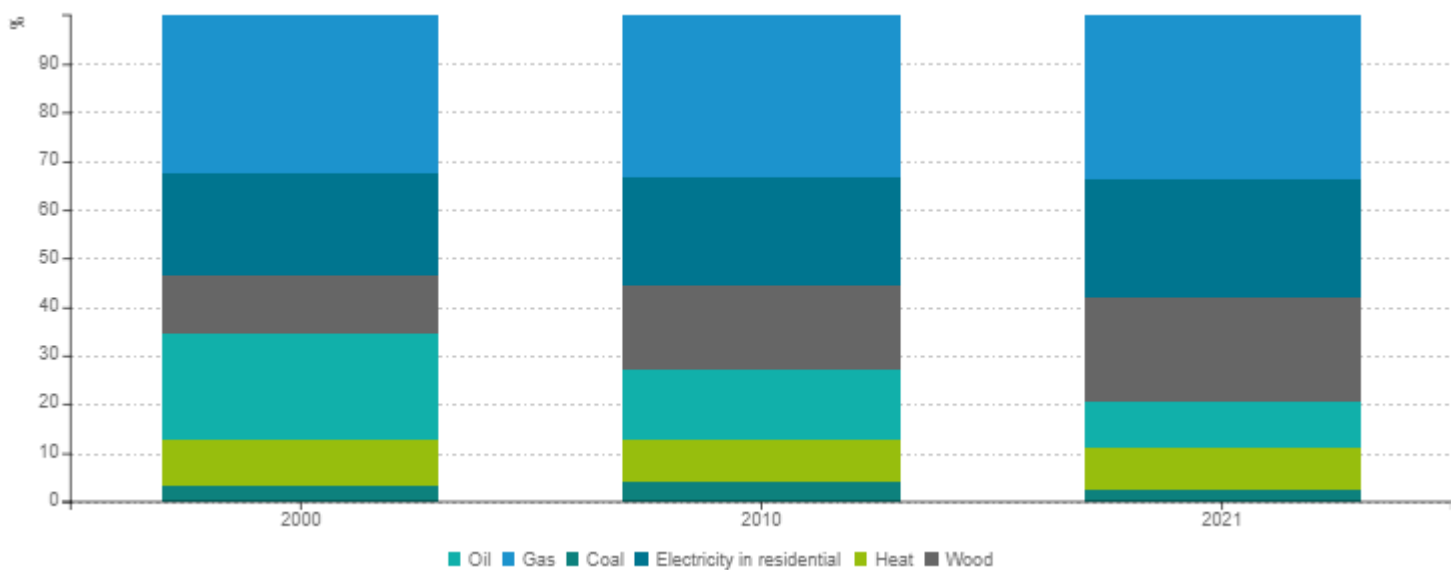
Sectoral Profile - Households

Energy consumption

Household energy consumption by energy in the EU

- Natural gas is the most widely used energy source by households in the EU. Its share has been relatively stable around 33% since 2000 (33.5% in 2021).
- Electricity comes second with a steadily increasing share, rising from 21% in 2000 to 22.5% in 2010 before reaching 25% in 2021.
- Oil is slowly being replaced by other energy sources (10% in 2021 compared to 14.6% in 2010 and 22% in 2000) but its use remains important in the island countries.
- The share of wood stood at 21% in 2021. It has shown a consistent increase since 2000 (+9 points) with the most significant growth observed between 2000 and 2010 (+5 points).

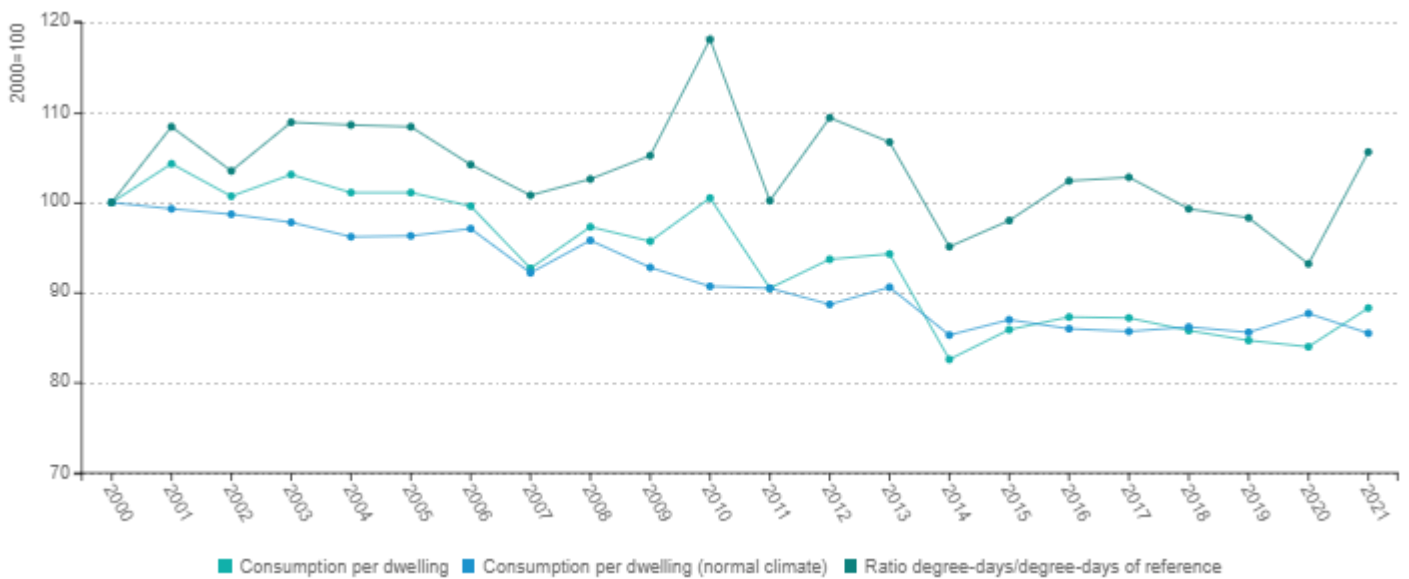
Household energy consumption by energy in the EU



Influence of climate on the consumption per dwelling

- Large variations in climate from one winter to another can influence energy consumption: higher consumption in cold winters and vice versa in mild winters, all other things being equal.
- Climate corrections provide a measure of consumption that is independent of annual climate variations. These corrections are based on the ratio of actual to normal degree days (i.e. reference degree days*).
- Energy efficiency indicators should be climate corrected and measured at normal climate.

Specific consumption per dwelling: actual value VS climate-corrected

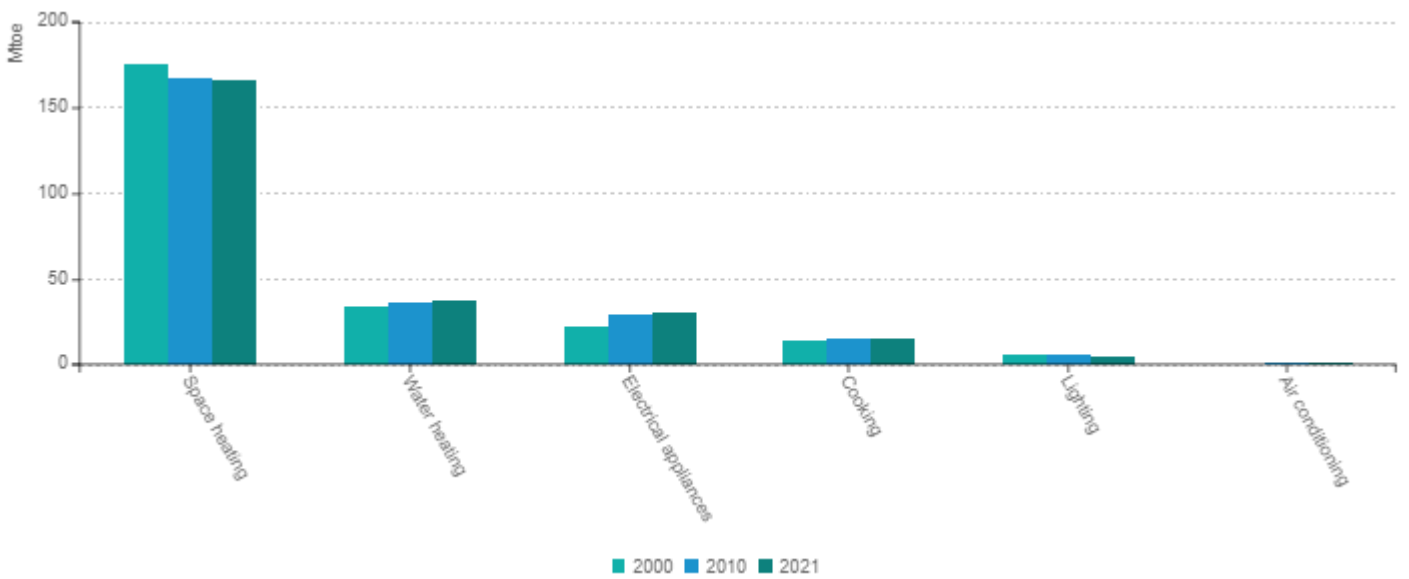


*More information on reference (or normal) degree days calculation available in the Q&A.

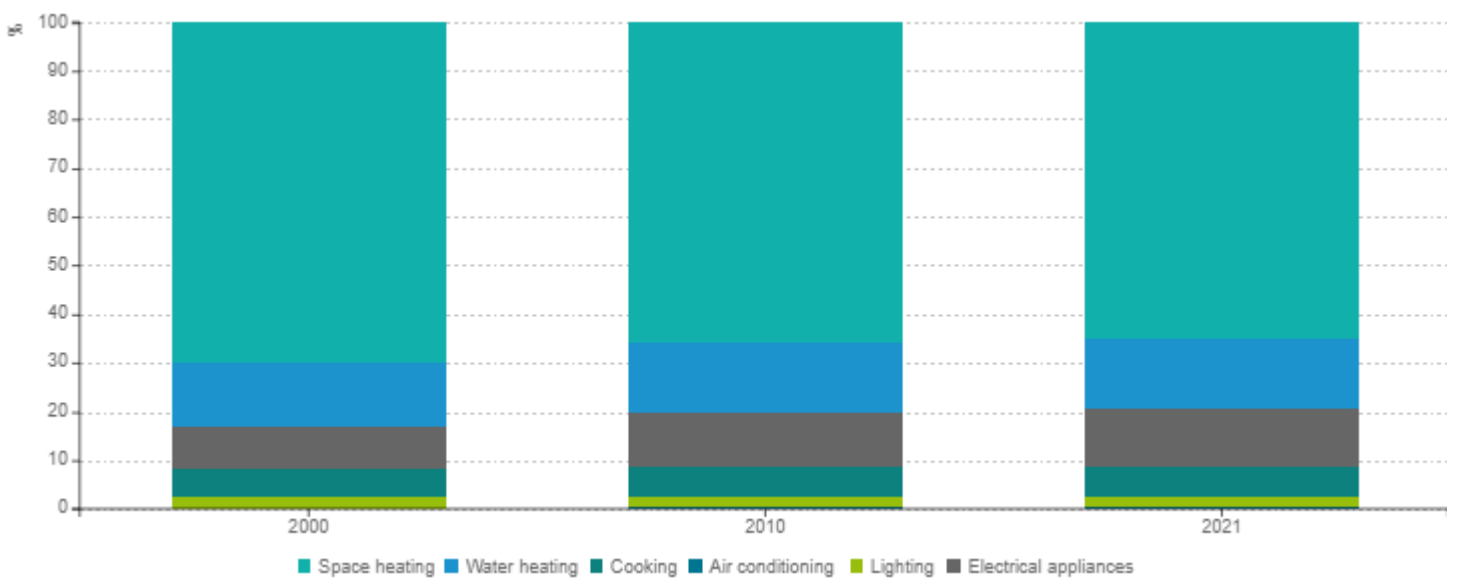
Declining share of space heating in the EU

- Space heating consumption has been decreasing at 0.25%/year since 2000, with the most significant decrease observed between 2000 and 2010 (-0,5%/year).
- The consumption of electrical appliances is steadily increasing (+1.6%/year since 2000).
- The share of space heating in household energy consumption at normal climate has lost 5 points since 2000 (70% in 2000 to 65% in 2021), with the most significant decrease observed between 2000 and 2010 (-4 points).
- The second most important end-use is water heating (share increased from 13% in 2000 to 15% in 2021), closely followed by electrical appliances, (share rising from 9% in 2000 to 12% in 2021).
- The share of cooking is stable around 6%.
- Lighting accounts for just under 2% (7.5% of electricity consumption) and has been relatively stable around this level since 2000.
- Air conditioning is negligible (1.9% of electricity consumption).

Household energy consumption in the EU



Household energy consumption in the EU, in %



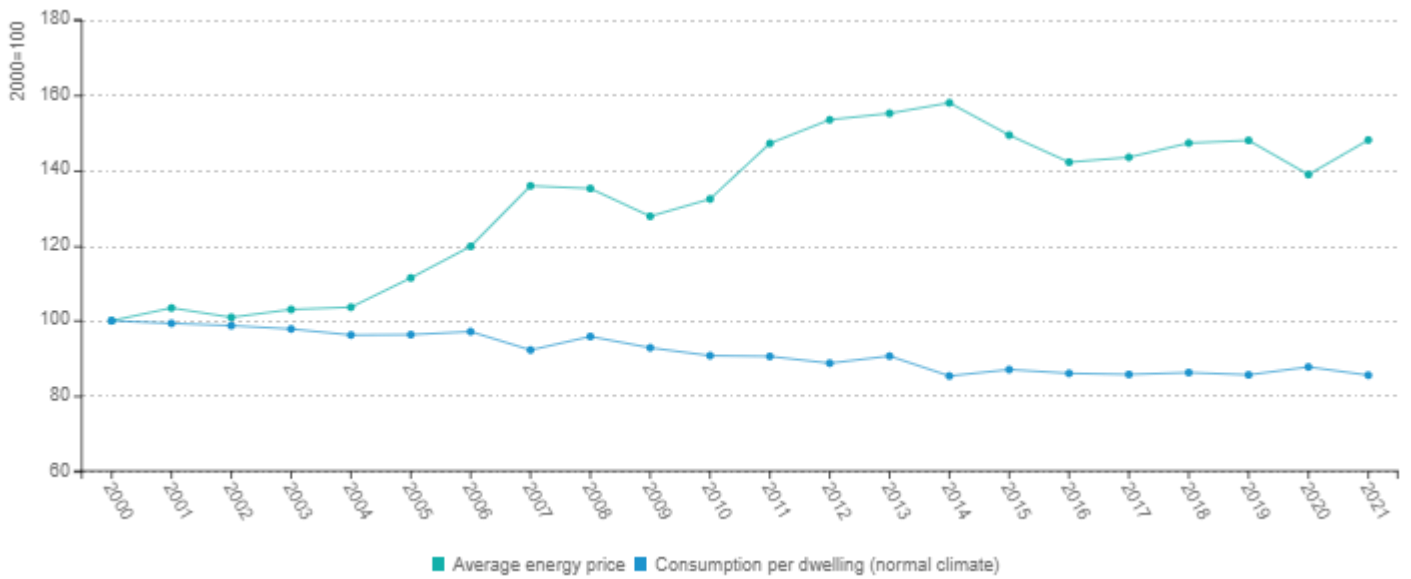
Note: Energy consumption at normal climate.

Energy consumption per dwelling

Consumption per dwelling and energy price

- Energy consumption per dwelling at EU level has been generally decreasing since 2000 (-0.7%/year), but at a lower rate since 2014, after a fairly steady decline between 2000 and 2014 (-1.1%/year).

Specific consumption per dwelling and energy price

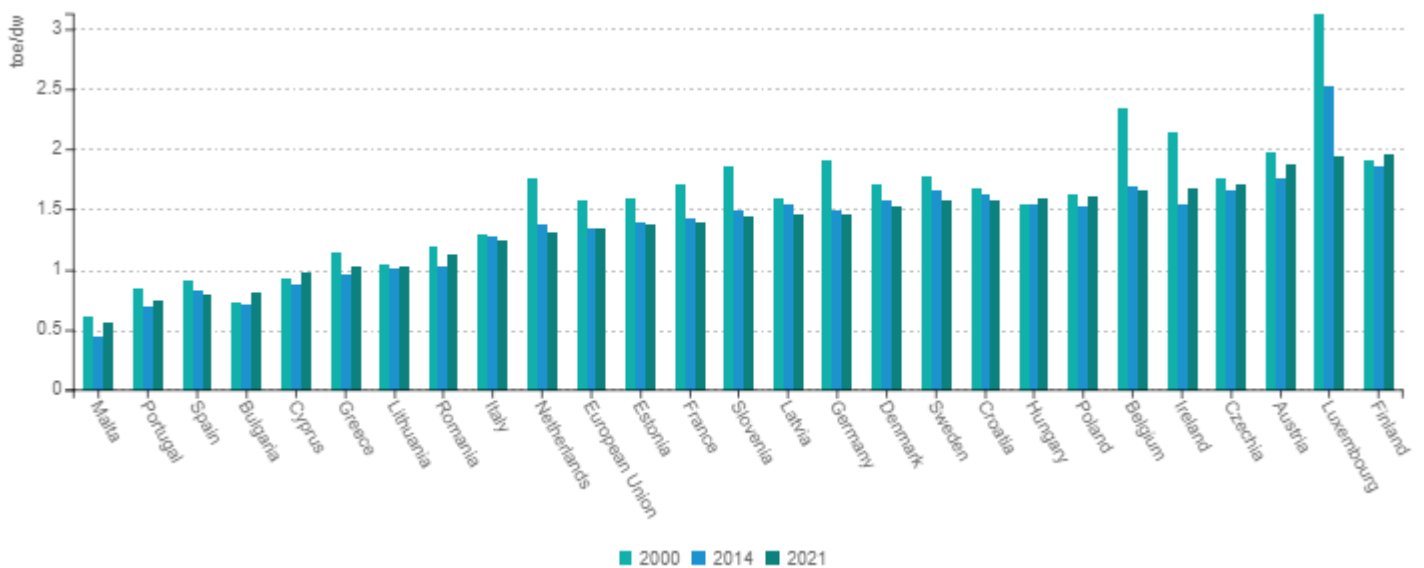


Note: Energy consumption at normal climate. Energy price at constant prices of 2015

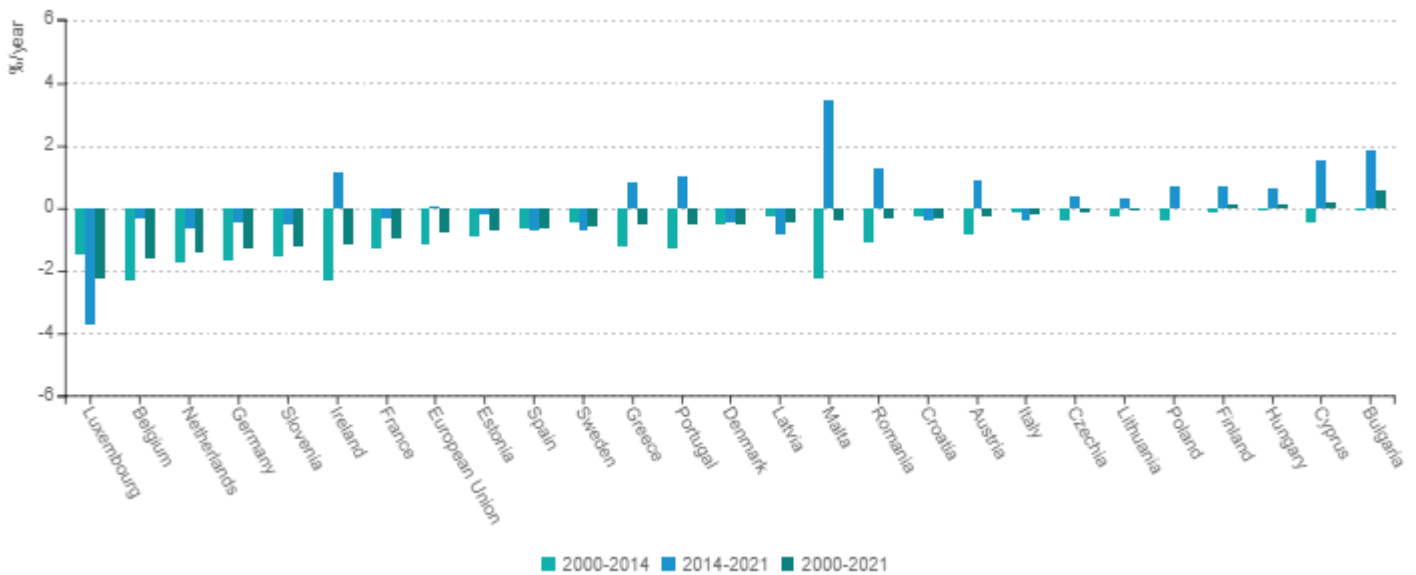
Average energy consumption per dwelling

- Energy consumption per dwelling has decreased in almost all countries between (-0,7%/year at EU level since 2000) with the largest reduction between 2008 and 2014 in most countries.
- Since 2014, the reduction has slowed down significantly in most countries. Consumption even increased in some Member States (>+1%/year in Malta, Bulgaria, Cyprus, Romania, Ireland, and Portugal).
- The EU average energy consumption per dwelling in 2021 was 1.35 toe/dwelling, with values ranging from 0.6 to 2 toe/dwelling among Member States , i.e. by a factor 3.3. These values do not take into account climatic differences between countries (see below the comparison with an adjustment to the same climate).

Average consumption per dwelling (at normal climate)

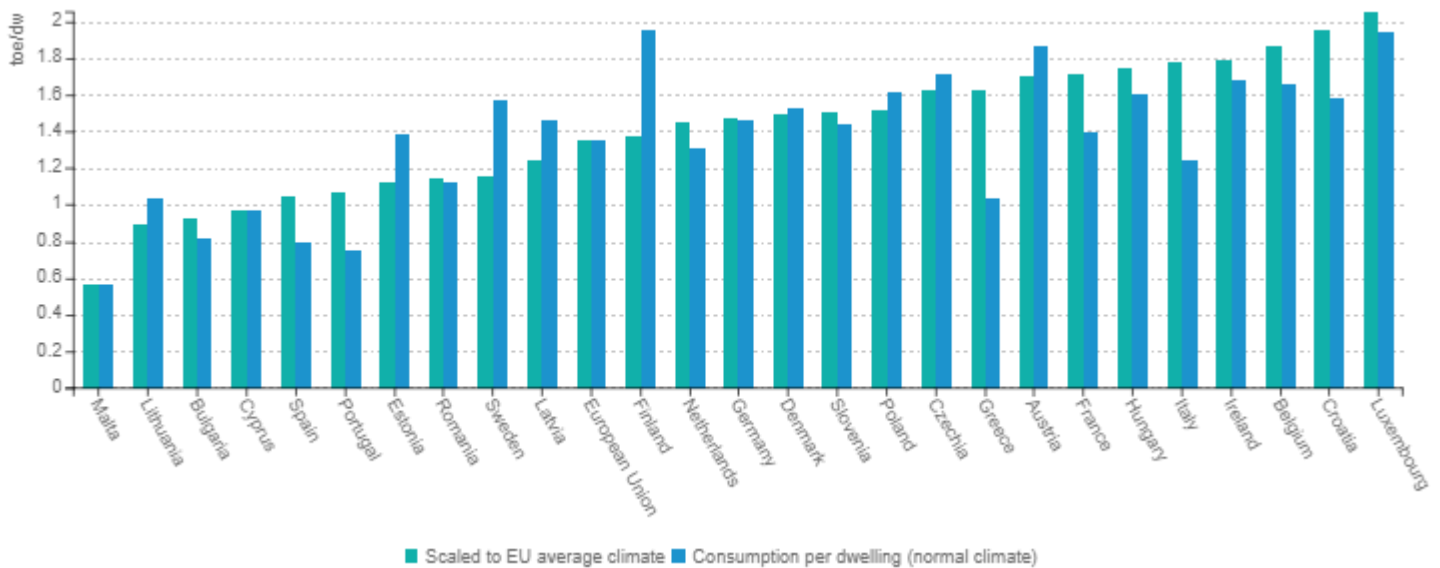


Variation of average consumption per dwelling (at normal climate)



- The comparison between countries is more relevant if the heating consumption is adjusted to the same climate (EU average climate).
- After adjustment to the average EU climate, the gap between countries becomes narrower (factor 2.2) with values ranging from 0.9 toe/dwelling in Lithuania to 2 toe/dwelling in Luxembourg. After adjustment, Luxembourg, Croatia, Belgium, Ireland and Italy have the highest consumption per dwelling.

Average consumption per dwelling (adjusted to EU climate, 2021)



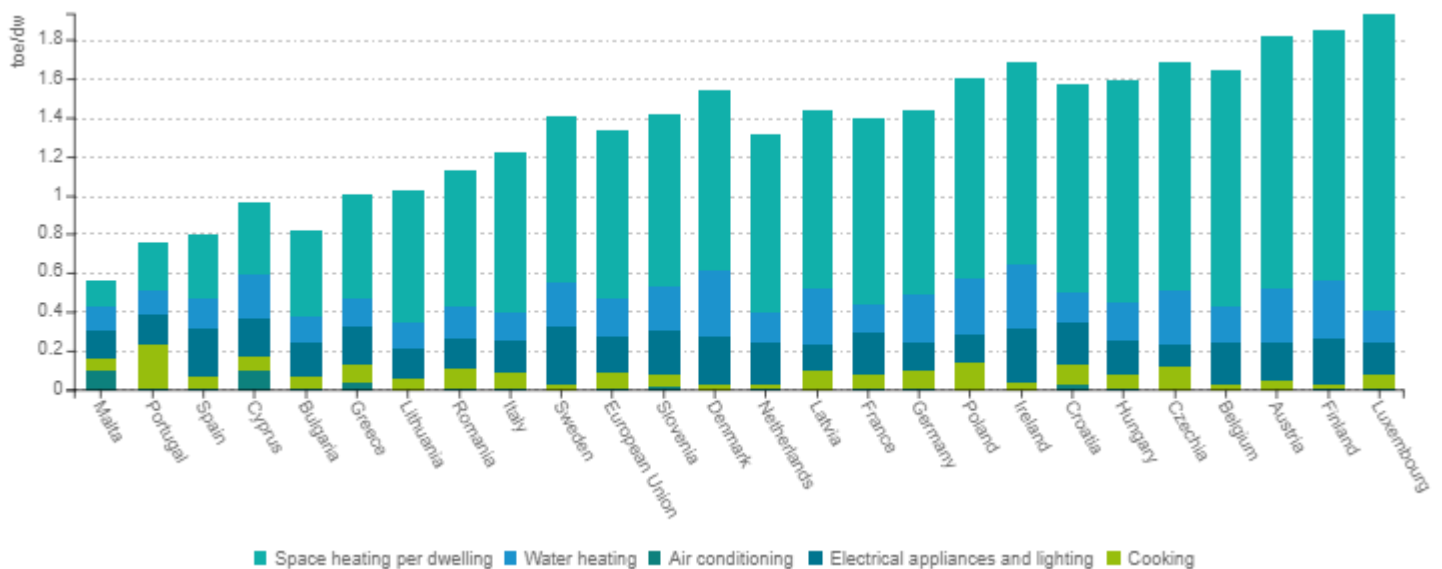
Note: Malta and Cyprus not adjusted.

Energy consumption by end-use

- The breakdown of household energy consumption by end-use differs substantially between Member States.
- Space heating has the highest share in this consumption in most countries (except Malta). It represents on average 0.86 toe/dwelling (in a range of 0.13 to 1.52 toe/dwelling).

- The second highest share is electrical appliances and lighting or water heating depending on countries, except for Portugal where cooking comes second. Electrical appliances and lighting consumption ranges from 0.15 to 0.3 toe/dwelling.
- Water heating consumption varies from 0.13 to 0.34 toe/household.
- Air cooling still represents a marginal share of dwelling consumption in most countries except Malta, Cyprus, Greece and Croatia, where it ranges between 0,03 toe/dwelling and 0.099 toe/dwelling.

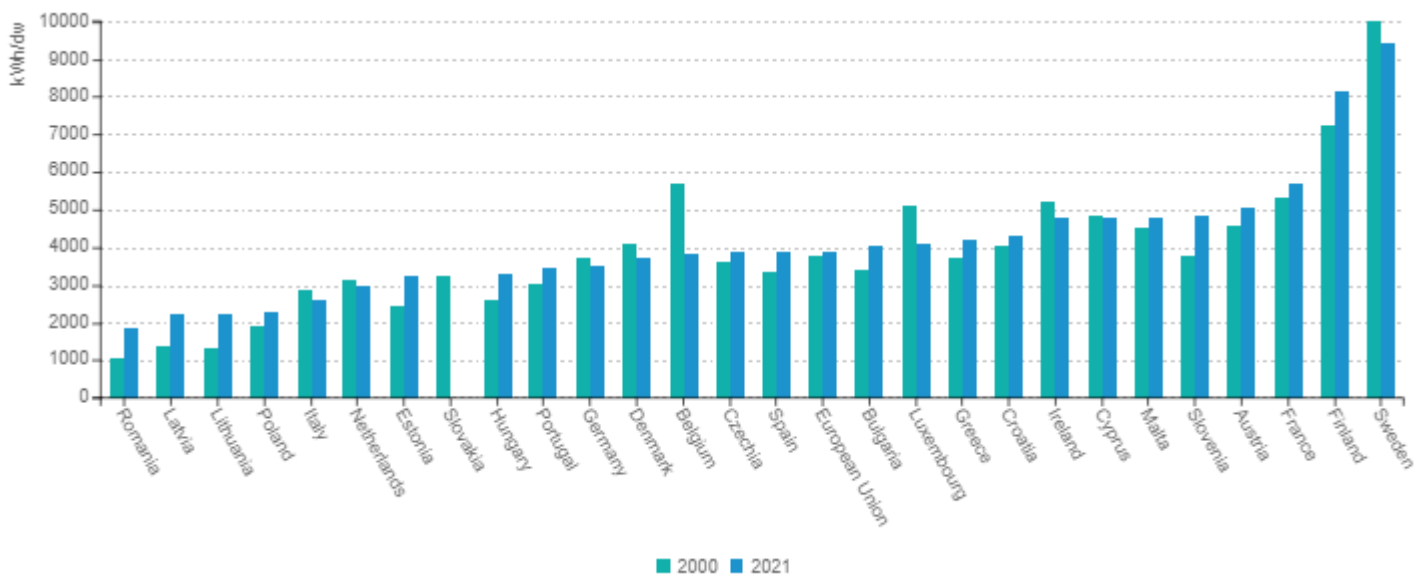
Specific consumption of households by end-use (2021)



Electricity consumption per dwelling

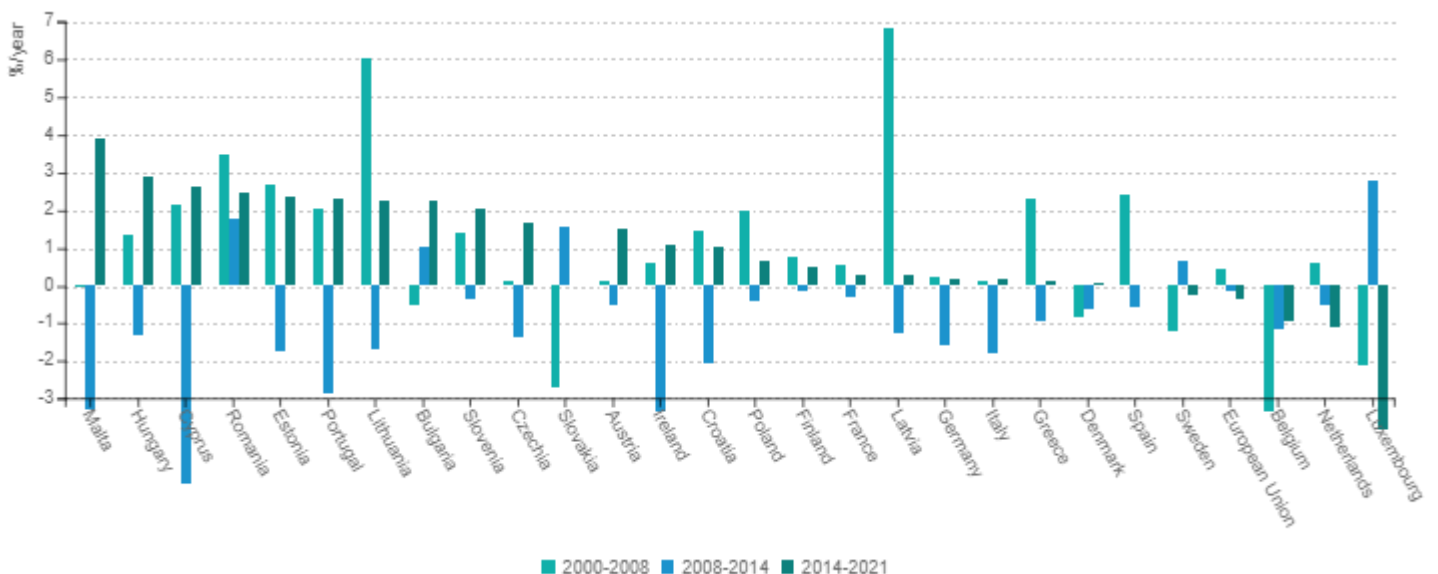
- There are significant disparities in the electricity consumption per dwelling among EU Member States: from 1.9 MWh in Romania to 10 MWh in Sweden (3.9 MWh for the EU average).
- This heterogeneity is partly due to the use of electricity for thermal uses, which is significant in Sweden or France, for instance, as well as different equipment rates of electrical appliances and different levels of energy efficiency.

Electricity consumption per dwelling



- Since 2014, the electricity consumption per dwelling has been increasing at EU level, (+0.7%/year) and in most EU countries, with a rapid progression in 9 EU Member States (Cyprus, Portugal and 7 Central and Eastern countries). However, this consumption has remained roughly stable in 2 countries (Sweden and Spain) and even decreased (Luxemburg, Belgium and The Netherlands).
- Significant increase between 2000 and 2008 (+2%/year and above) in some Member States, including Southern countries mainly due to air conditioning (e.g. Spain, Greece, Portugal, Cyprus), but also in Lithuania, Latvia, Romania, Estonia and Poland.
- Decreasing trend at EU level (-1%/year) and in most countries after the economic crisis of 2008 until 2014.

Trends in electricity consumption per dwelling

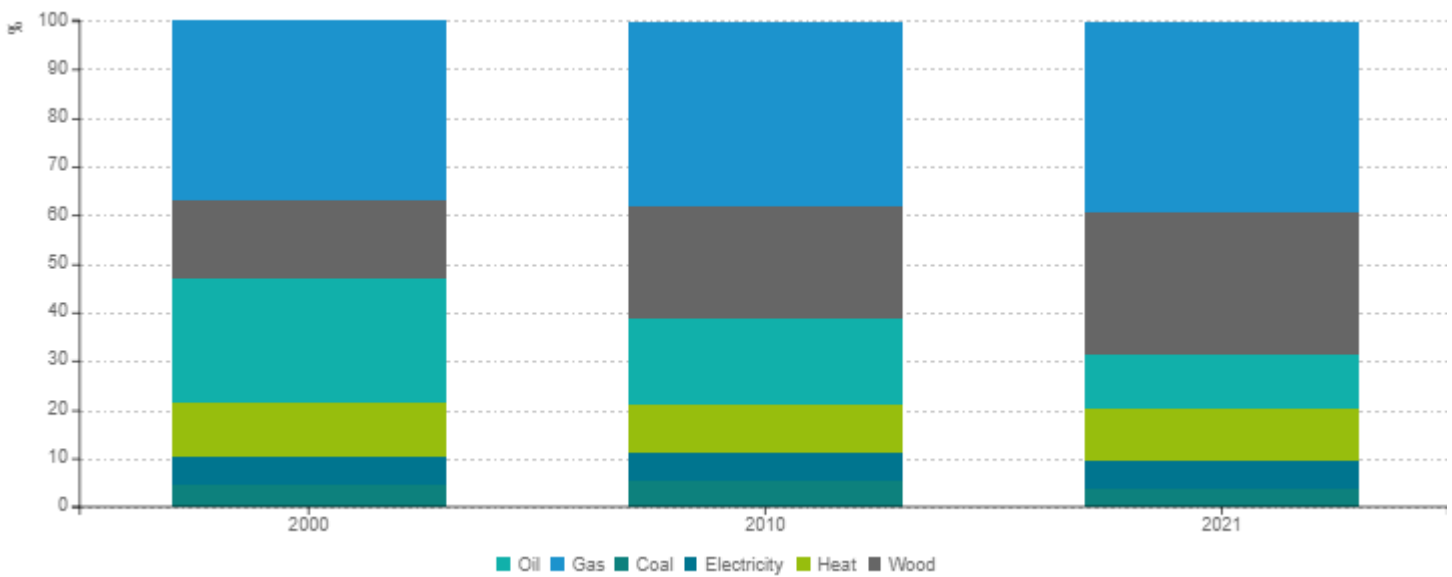


Space heating

Heating energy consumption by energy source

- Natural gas is the leading energy source for households heating in the EU, with a rather stable share (40% in 2021, 38% in 2010 and 37% in 2000).
- The share of electricity stood at 6% in 2021, after having remained stable at 5% between 2000 and 2010.
- Oil is slowly being phased out (-14 points) but remains significant in some Member States such as Cyprus.
- Wood is progressing (+13 points).

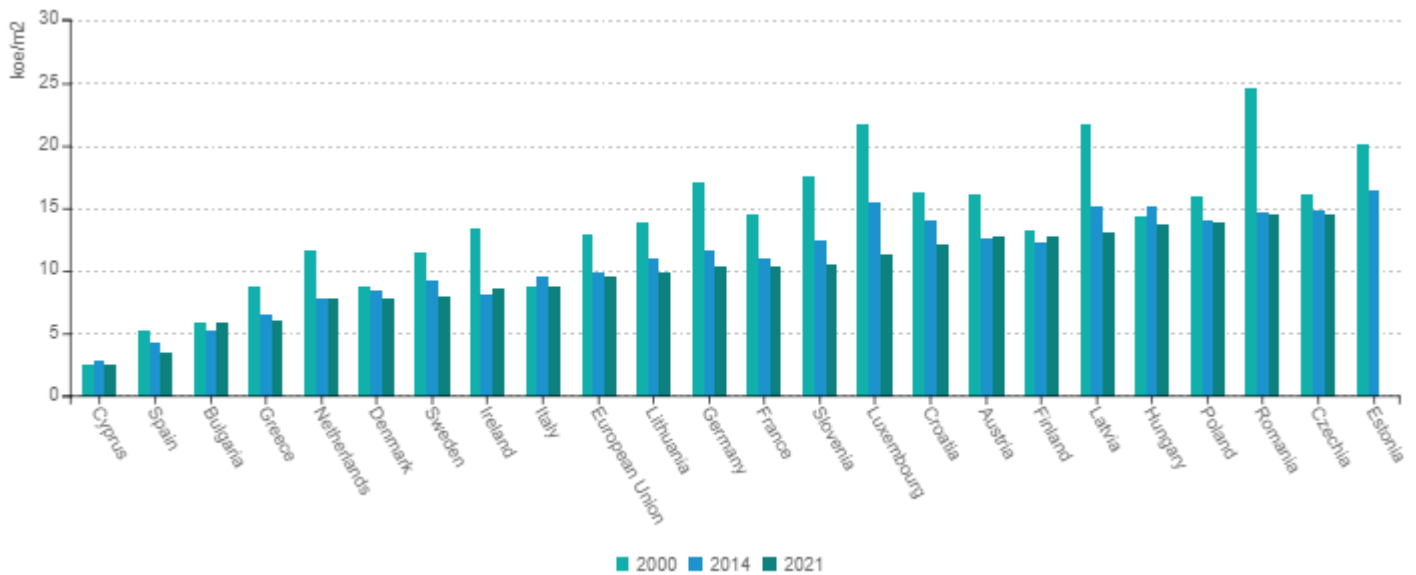
Household energy consumption for heating by energy



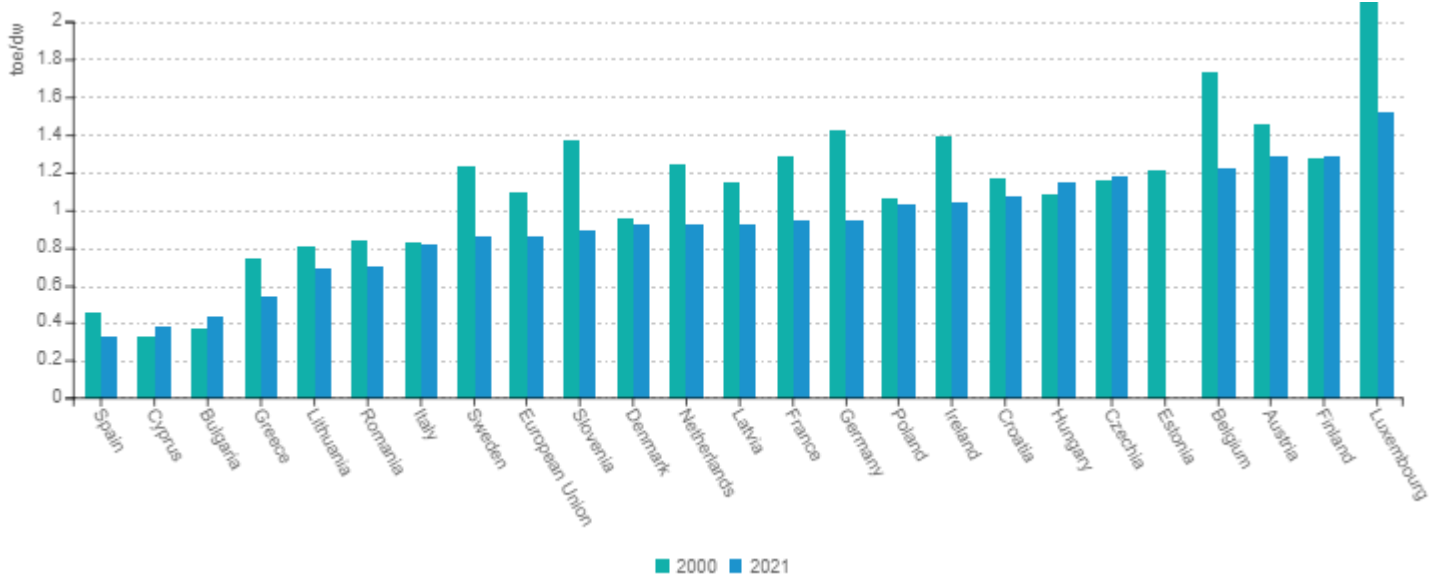
Heating consumption per m² and per dwelling

- Heating consumption per m² and per dwelling has decreased since 2000 in EU MS thanks to the implementation of stricter building codes, combined with financial incentives to promote the thermal retrofitting of existing dwellings and the adoption of more efficient heating systems (e.g. gas condensing boilers, heat pumps, pellet boilers). The reduction in heating consumption per m² was 1.4%/year on average in the EU between 2000 and 2021. It was above 2%/year in 6 EU MS (Luxembourg, Romania, Slovenia, Latvia, Germany and Ireland).
- The reduction in heating consumption per m² has slowed down significantly since 2014 at EU level and in half of the MS, including some of the largest EU countries (Germany and France). This trend can be attributed to several factors, including a decrease in new construction projects that typically exhibit high energy efficiency performance: construction rate has decreased by 32% since the financial crisis and represents only 0.9% of the existing housing stock each year (i.e. only 9% of the new stock after 10 years). The spread of efficient heating systems (condensing boilers, heat pumps) has also slowed down, and the number of renovation projects is also comparatively lower, although it is difficult to gather consolidated data on this matter.
- Significant differences between countries from less than 5 koe/m² in Spain, Cyprus, Portugal and Malta to around 15 koe/m² in Czechia, Estonia and Romania, due to differences in climate conditions.

Heating consumption per m²

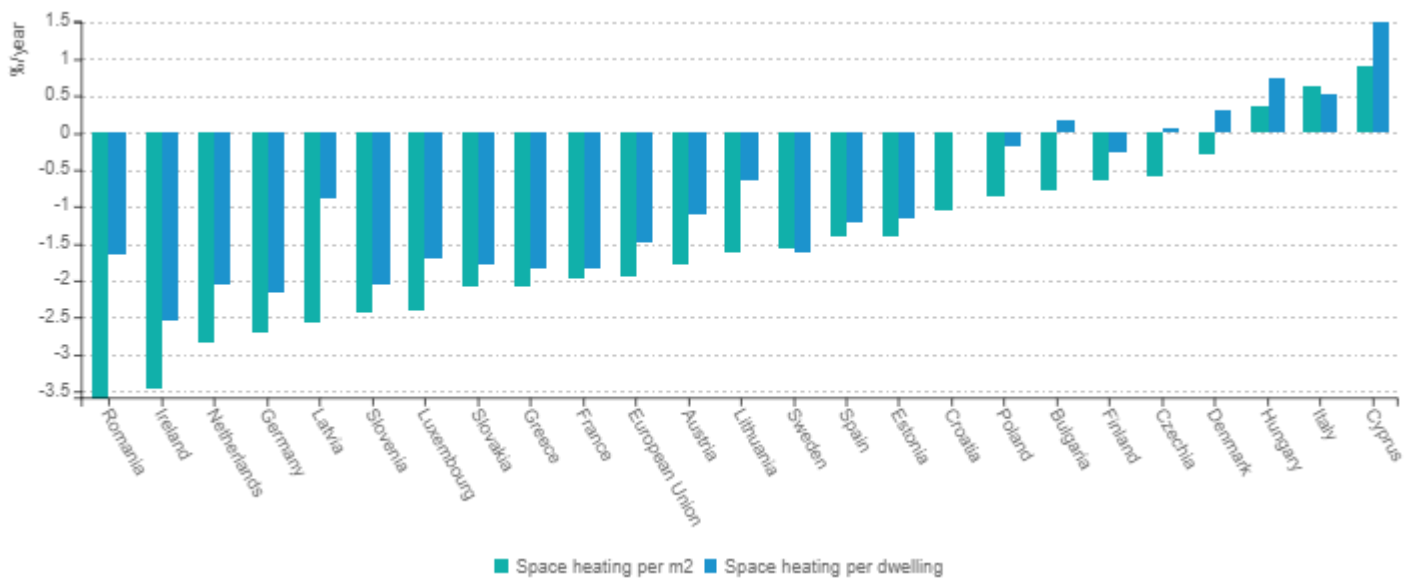


Heating consumption per dwelling



- Until 2014, the energy consumption per dwelling has generally decreased less than the energy consumption per m² because of an increase in the average size of dwellings (-1.1%/year since 2000 at EU level for the consumption per dwelling vs -1.6%/year for the consumption per m², which means that the dwelling size has increased by 0.4%/year). This means that, until 2014, around 30% of the progress in energy efficiency for heating at EU level has been offset by the increase in dwelling size. This has been particularly important in the less developed Member States (e.g. Romania, Lithuania). This size effect has become negligible since 2014 as the average size of dwellings has remained almost stable .

Variation of consumption per m² VS per dwelling: effect of change in dwelling size (2000-2014)



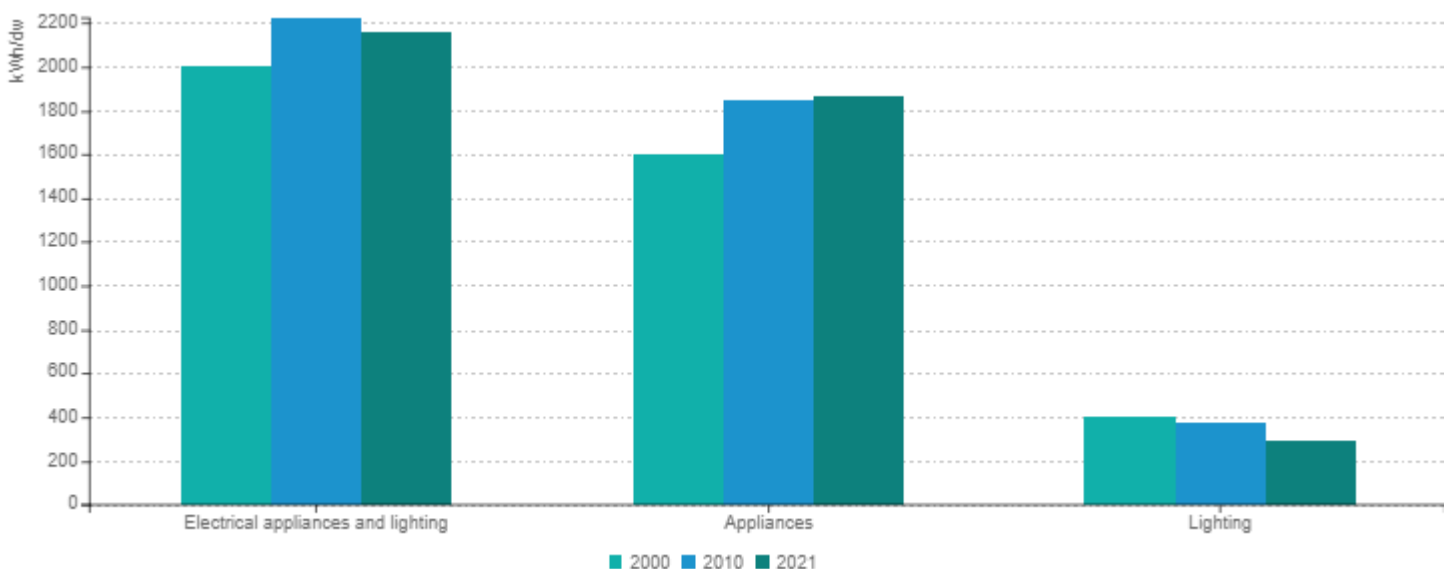
Note: Energy consumption at normal climate.

Appliances and lighting

Captive uses of electricity in the EU

- Electrical appliances (both large and small) and lighting are the so-called captive uses of electricity. They exclude thermal uses.
- Electrical appliances represent the largest share of captive uses of electricity. This share has been increasing over the years, from 80% in 2000 to 83% in 2010 and 86% in 2021.
- The specific consumption per dwelling for lighting is decreasing thanks to the phase out of incandescent light bulbs. It now currently accounts for 14% of captive electricity, compared to 20% in 2000.

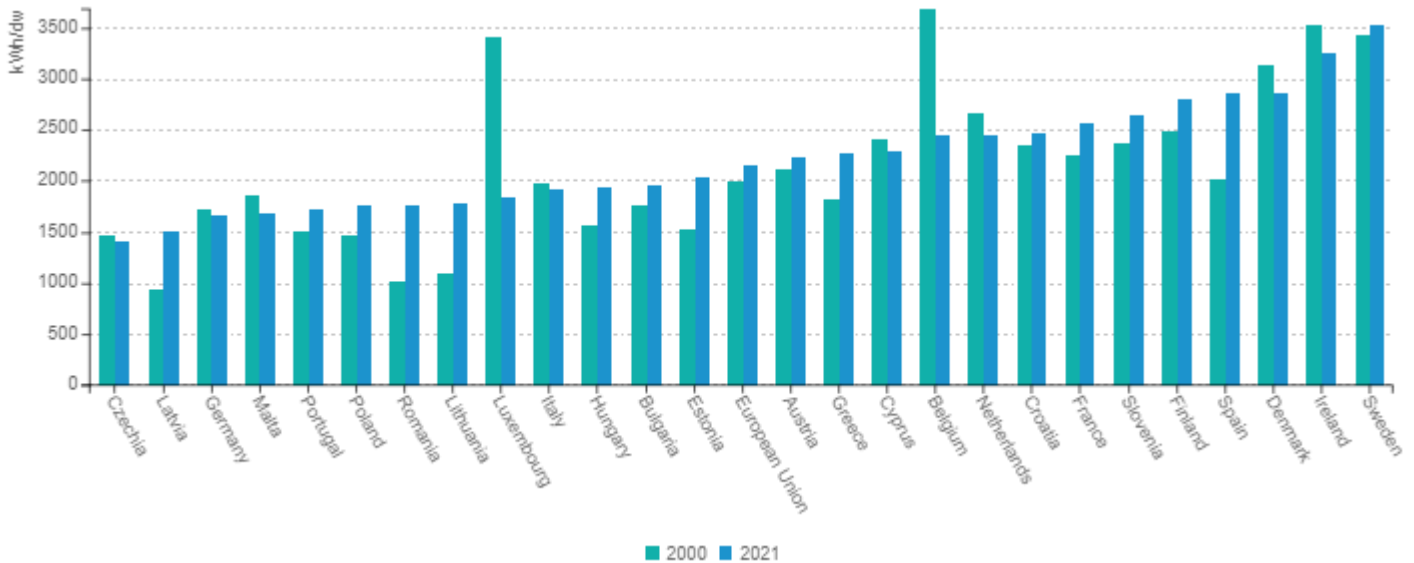
Consumption per dwelling for appliances and lighting (EU)



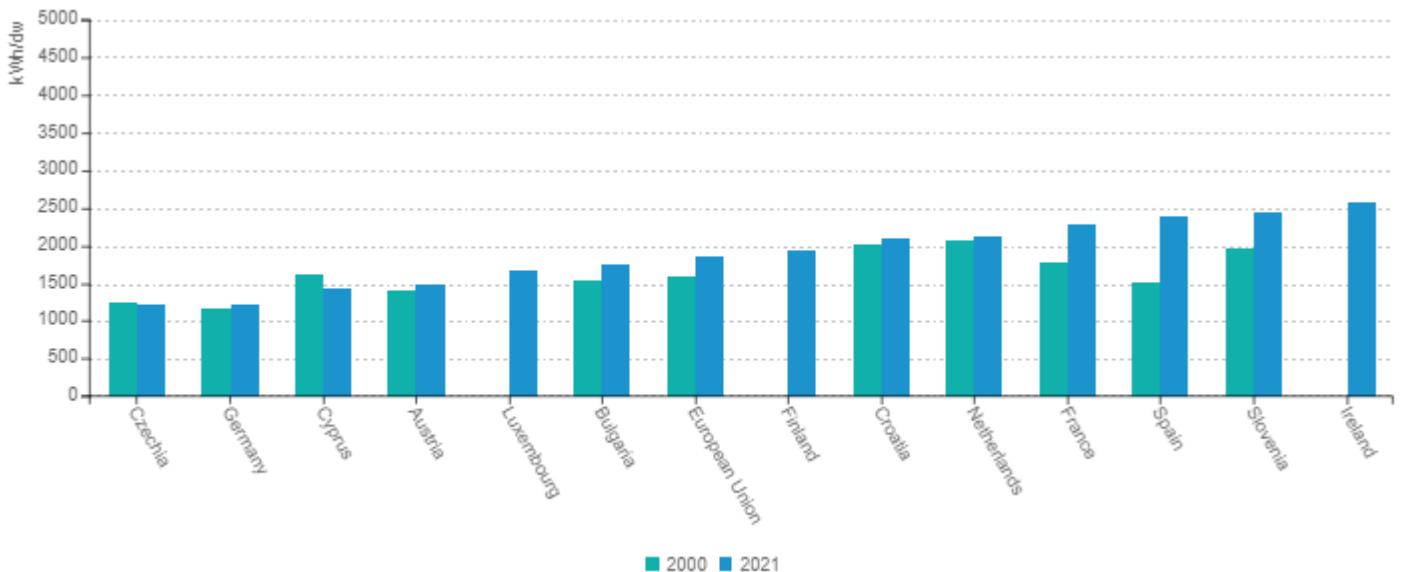
Electricity consumption per dwelling for electrical appliances and lighting

- Significant differences between countries in terms of electricity consumption for electrical appliances and lighting: from less than 1500 kWh/dwelling in Latvia and Czechia, to around 2100 kWh at EU level, up to 3200 kWh in Ireland and 3500 kWh in Sweden.

Electricity consumption per dwelling for electrical appliances and lighting

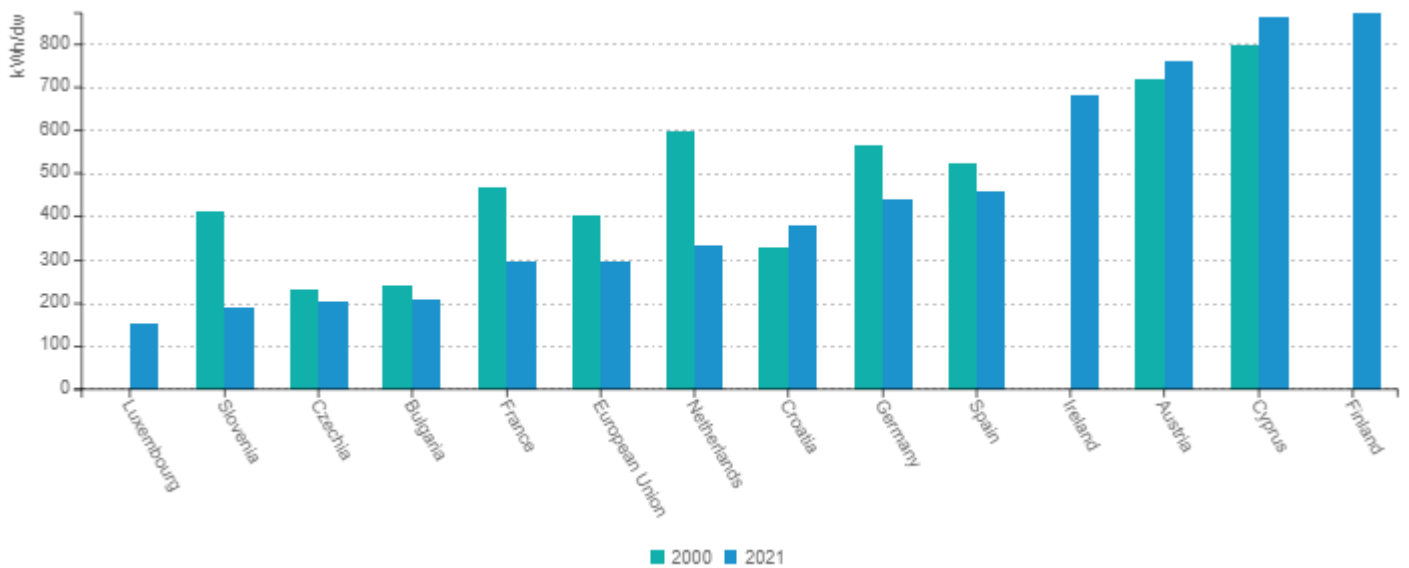


Electricity consumption per dwelling for electrical appliances



- Downward trend in electricity consumption for lighting at EU level and in most EU MS, with the highest decrease in Slovenia and the Netherlands.
- Significant differences between countries: from 151 kWh/dwelling in Luxembourg, to 295 kWh at EU level, up to over 850 kWh in Cyprus and Finland. These differences can be explained by the difference in the number of lamps per dwelling and the geographical location of the country (longer lighting times in the Nordic countries).

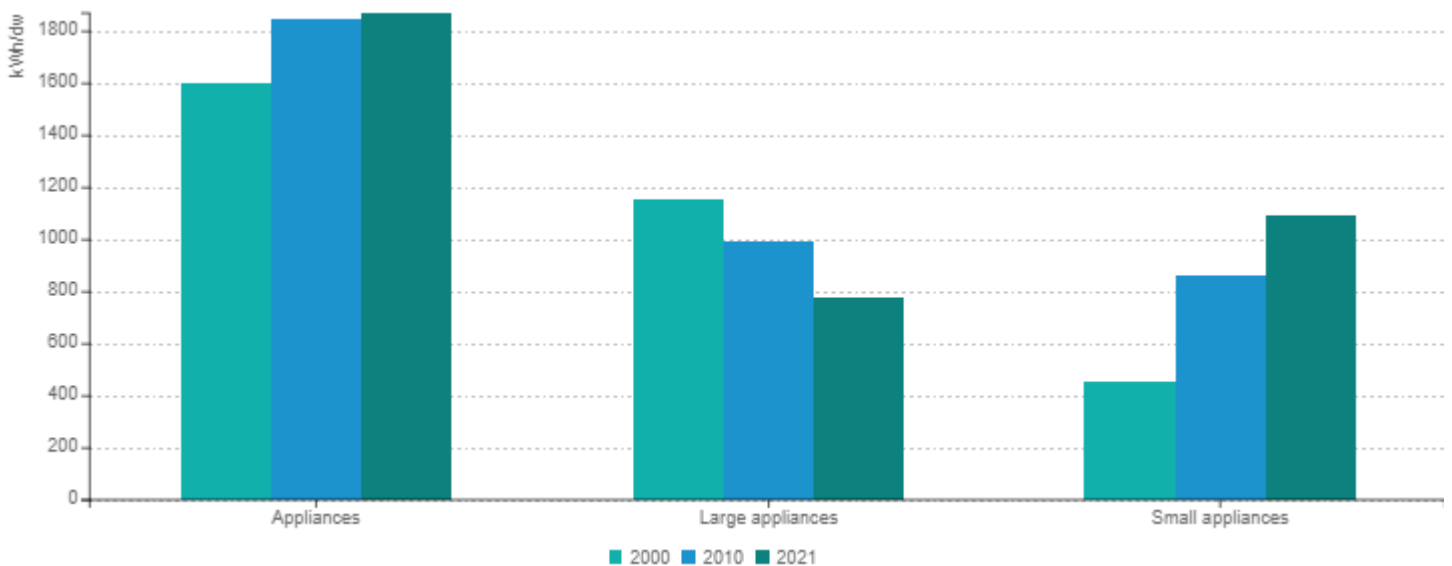
Electricity consumption per dwelling for lighting



Energy consumption of large appliances per dwelling

- EU households' consumption for small appliances grew by 140% between 2000 and 2021 (1091 kWh/dwelling in 2021, 857kWh/dwelling in 2010 and 453 kWh/dwelling in 2000). On the opposite, specific consumption of large appliances decreased by 32% over the same period, thanks to labels and standards.
- Small appliances currently account for the largest share of appliance consumption: 58% of the specific consumption of appliances in 2021 compared to 46% in 2010 and 28% in 2000.
- Energy efficiency of large electrical appliances is improving rapidly. However, this improvement no longer compensates for the fast-growing consumption of small appliances.

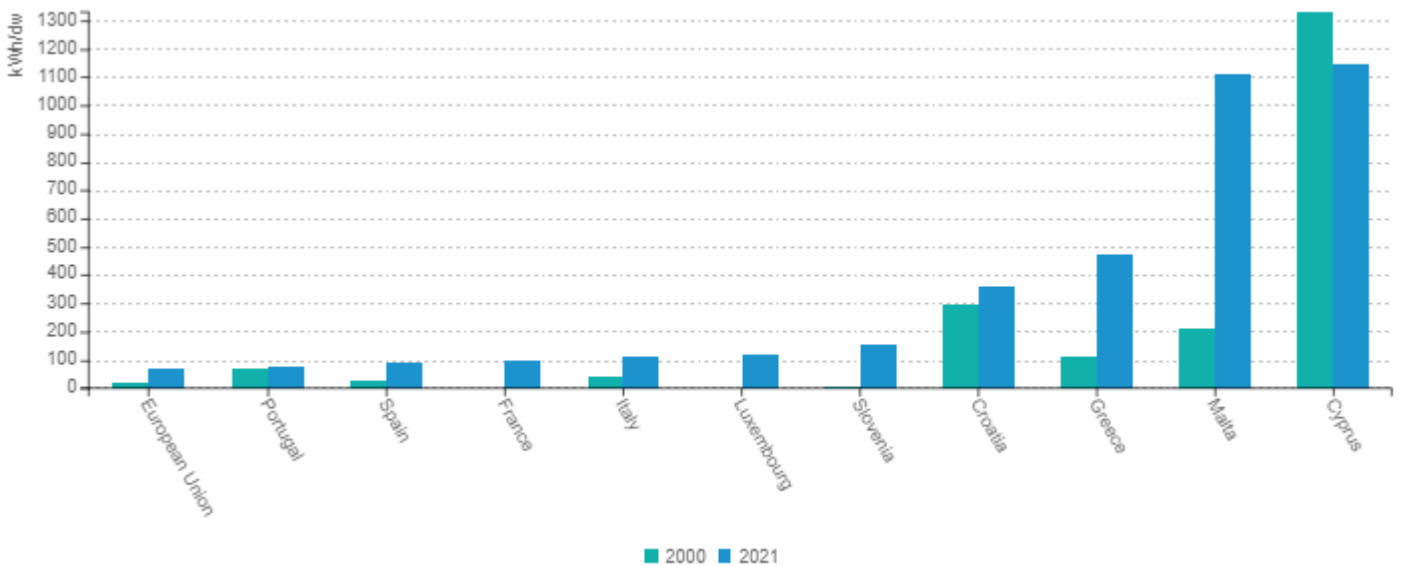
Consumption of electrical appliances in the EU



Unit consumption of air conditioning

- In 2021, air conditioning represents only 1.2% of household electricity consumption in the EU. However, the average per-dwelling consumption for this end use is on the rise, increasing from 21 kWh/household in 2000 to 72 kWh/household in 2021, driven by the growing use of air conditioning appliances.
- This end-use is significant mainly in Malta, Cyprus, Greece and Croatia.

Consumption per dwelling for air conditioning



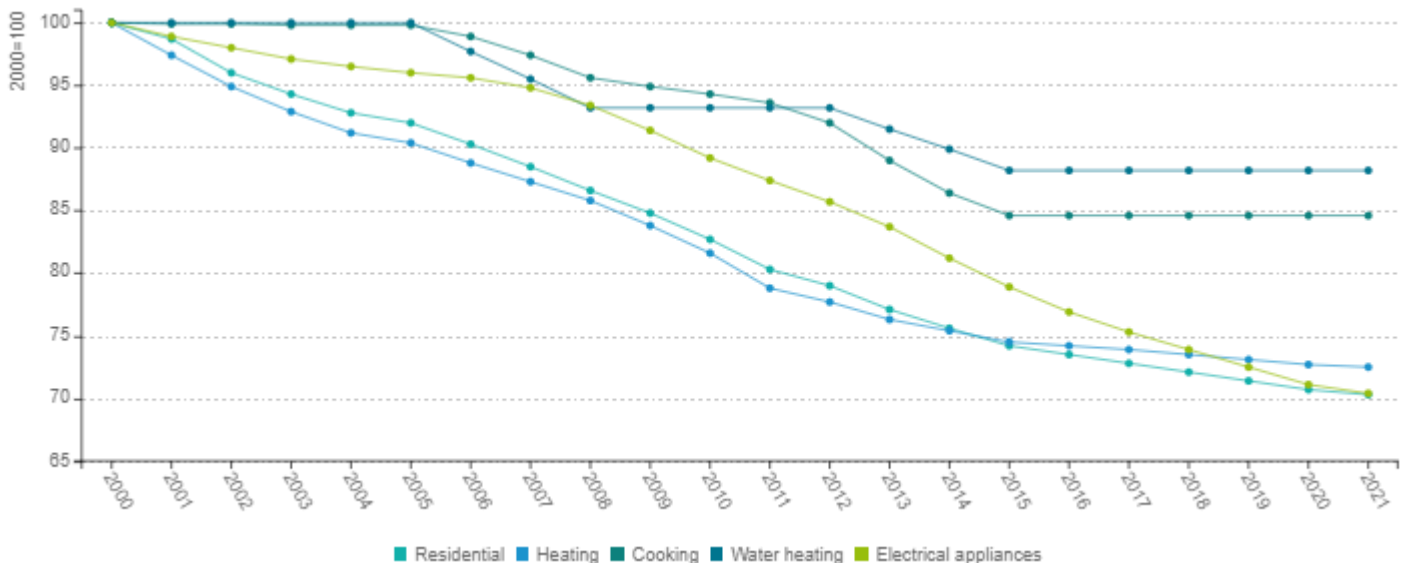
Note: The average consumption per dwelling is obtained by dividing the total consumption for air conditioning by the total number of dwellings, not only those with air conditioning.

Energy efficiency and savings

Energy efficiency trends for households in the EU

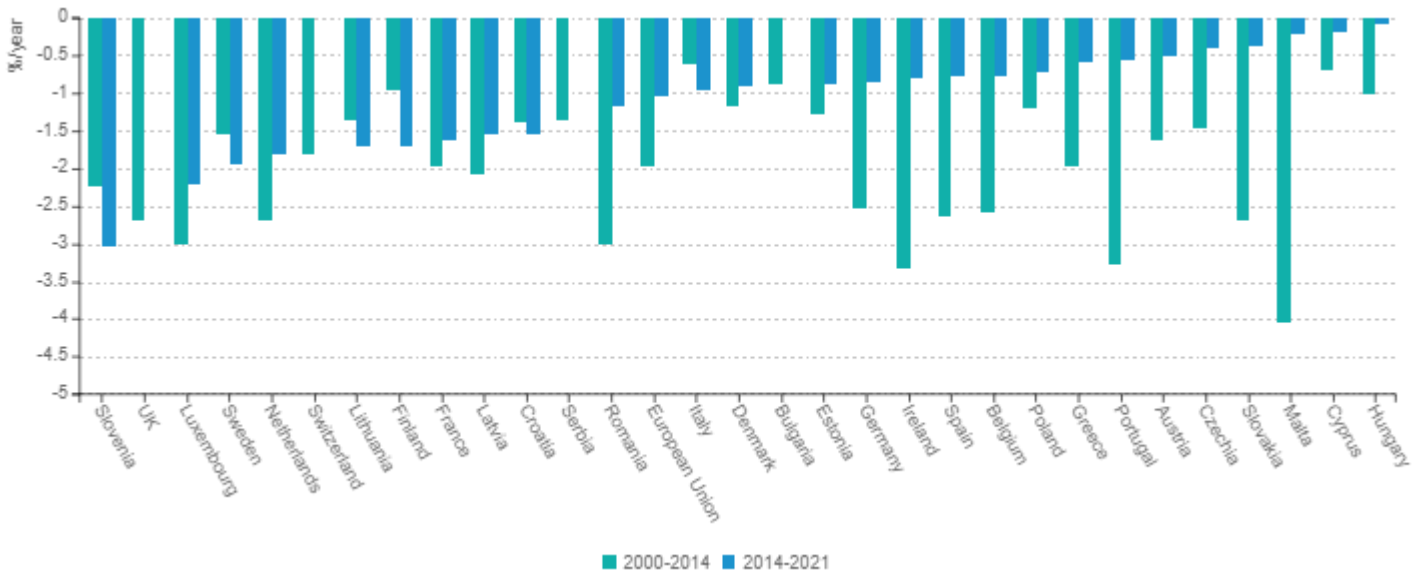
- Households energy efficiency, as measured by ODEX, has improved by around 30% (1.7%/year) over the period 2000-2021 (ODEX equals 70 in 2021), mainly through improvements in space heating and large appliances.

Energy efficiency progress in the EU



- In most countries, energy efficiency has been progressing much slower since 2014, except Slovenia, Lithuania, Finland, Sweden, Croatia and Italy, who have accelerated the pace of progress.
- Slovenia and Luxembourg have demonstrated the steadiest progress since 2014, with rates exceeding 2%/year, more than twice the EU average of 1% per year.

Energy efficiency progress in EU countries

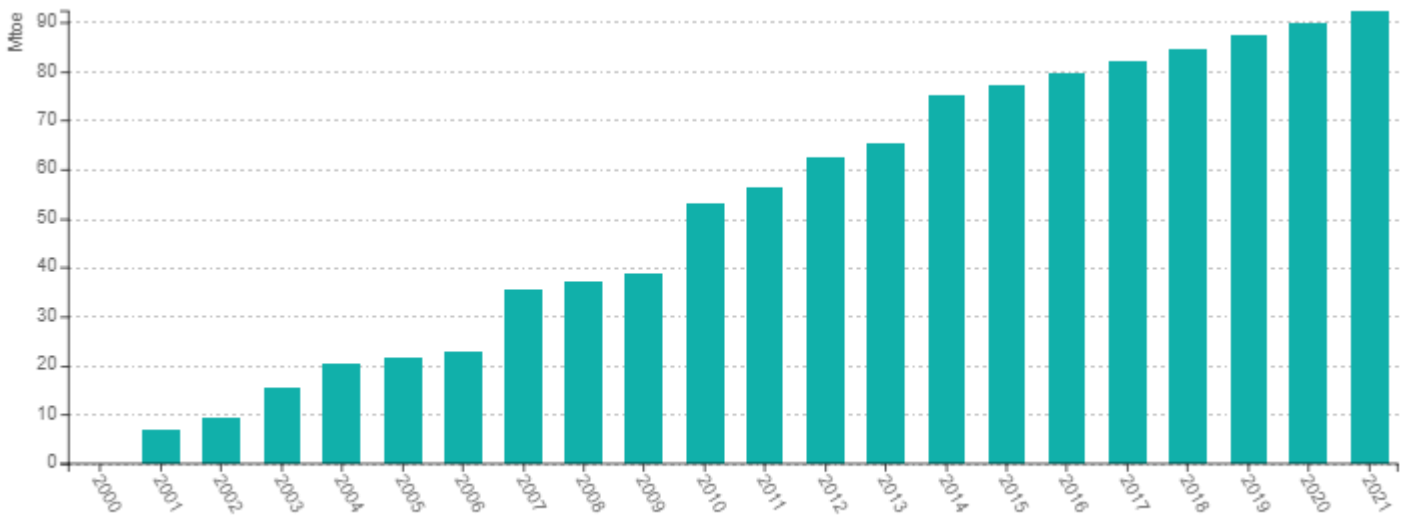


Note: ODEX aggregates energy efficiency gains by end-use, measured by the reduction in unit consumption. ODEX is calculated on the basis of 11 end-uses or large appliances: heating (toe/m², separation between new and existing dwellings), water heating, cooking, lighting, cooling (toe/dwelling), refrigerator, freezer, washing machine, dishwasher, dryer and TV (kWh/appliance).

Energy savings for households in the EU

- Cumulated annual energy savings for households have reached 92 Mtoe since 2000, which means that without energy efficiency improvements, energy consumption would have been 92 Mtoe higher in 2021.
- Due to the slowdown in the rate of energy efficiency improvements, the annual additional savings have been decreasing by 34% since 2014: from an average volume of 5 Mtoe/year over 2000-2013 to 3.3 Mtoe/year since 2014.

Energy savings for households in the EU

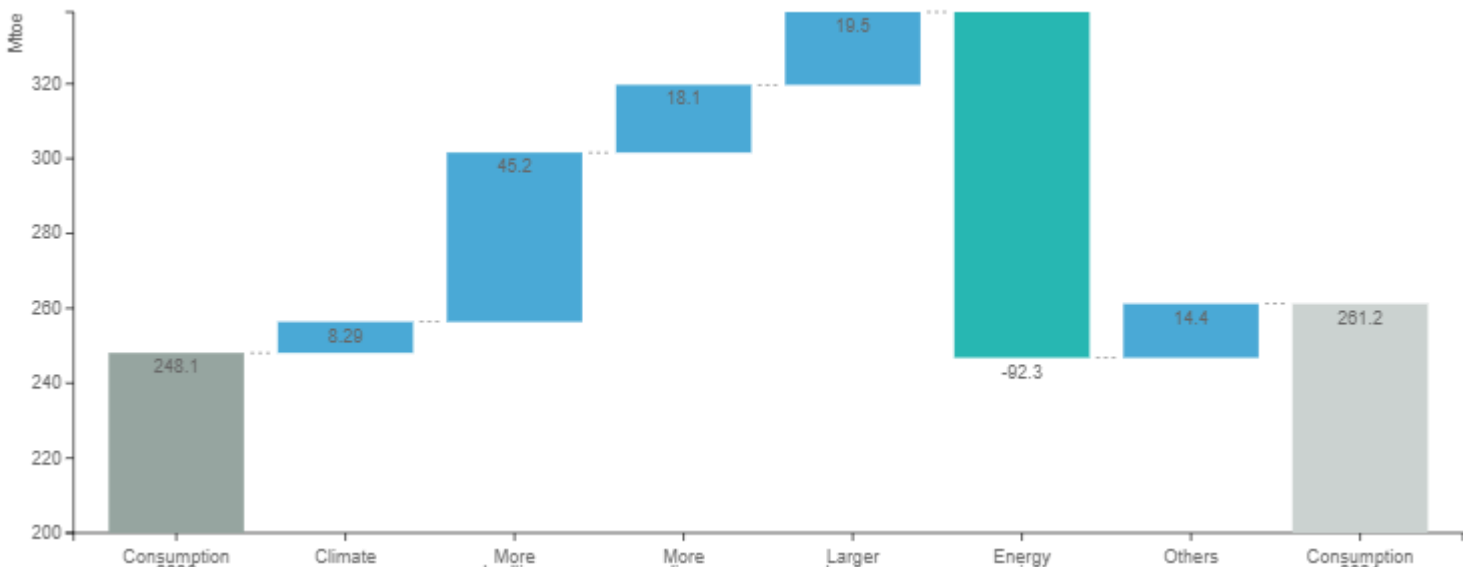


Decomposition of energy consumption

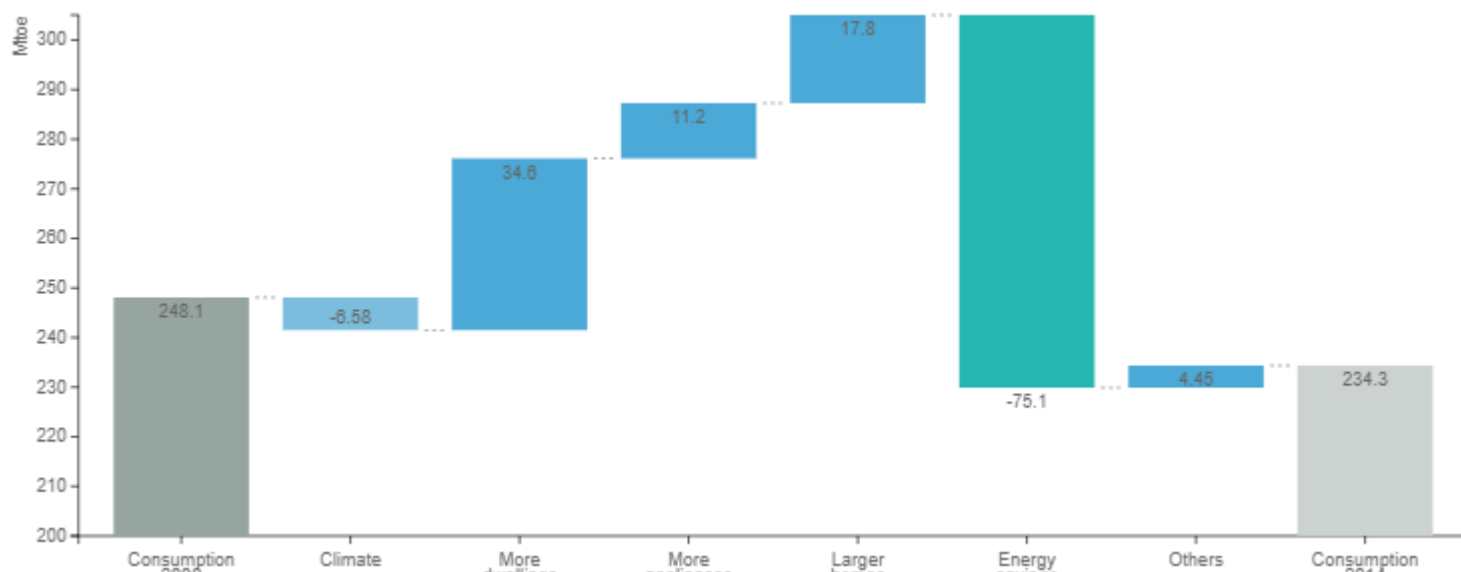
Drivers of energy consumption per dwelling (EU)

- At EU level, household energy consumption increased by 13.2 Mtoe between 2000 and 2021.
- Several factors of activity have contributed to increase consumption: the increase in the number of dwellings (45 Mtoe) and the number of appliances per dwelling (18Mtoe), as well as the trend towards larger dwellings (19.5 Mtoe), corresponding to a total “activity effect” of around 83 Mtoe.
- The consumption increase due to more dwellings was higher during 2000-2014 (35 Mtoe) than 2014-2021 (10 Mtoe).
- Energy savings have offset most of this activity, amounting to around 92 Mtoe.
- The largest part of energy savings was observed between 2000 and 2014 (75 Mtoe), while only 17 Mtoe were cumulated between 2014 and 2021.
- Others factors have increased consumption by 14 Mtoe: they mainly reflect behavioral effects, linked to higher comfort of heating.

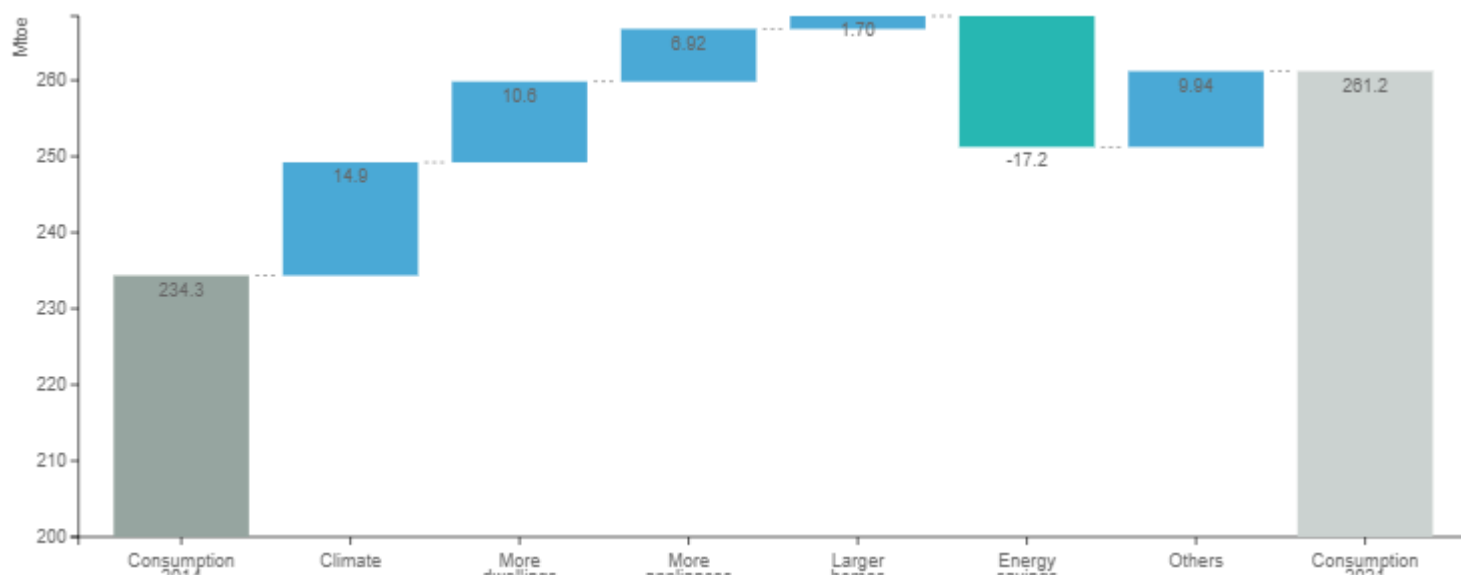
Drivers of energy consumption variation in residential at EU level (2000-2021)



Drivers of energy consumption variation in residential at EU level (2000-2014)



Drivers of energy consumption variation in residential at EU level (2014-2021)



Drivers of heating consumption per dwelling (EU)

- At EU level, the increase in the number of dwellings and the larger size of dwellings have offset, respectively, 54% and 24% of the energy savings since 2000.

Drivers of the variation in heating consumption per dwelling

