

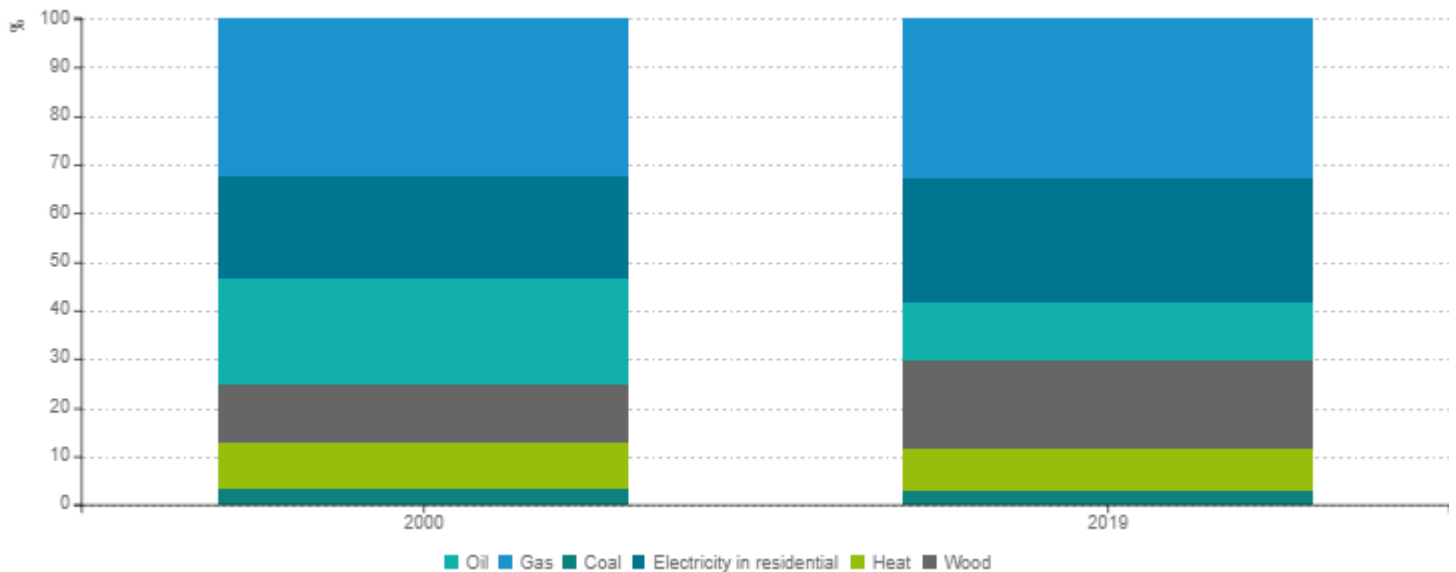
# Sectoral Profile - Households

## Energy consumption

### Household energy consumption by energy in the EU

- Natural gas is the most widely used energy source by households in the EU (33%).
- Electricity comes second and its share is increasing rapidly (from 21% in 2000 to 25% in 2019).
- Oil is slowly being replaced by other energy sources (12% in 2019 compared to 22% in 2000) but its use remains important in the island countries.
- The share of wood has increased by 6 points since 2000 to reach 18% in 2019.

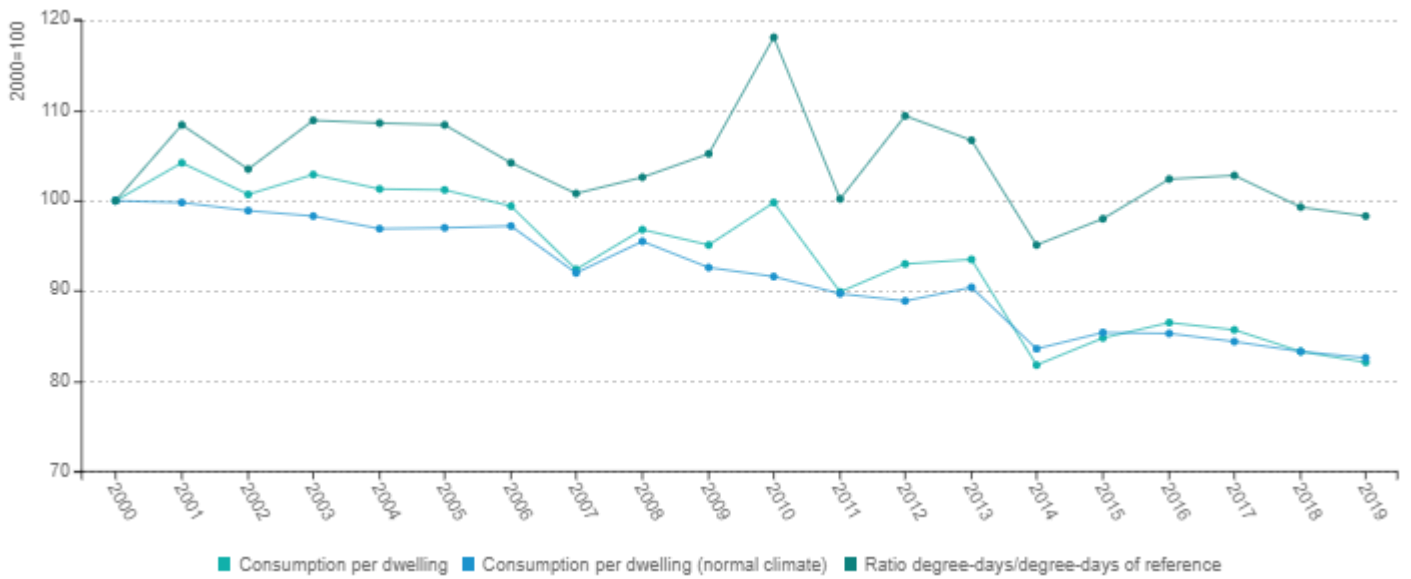
*Household energy consumption by energy in the EU*



### 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.

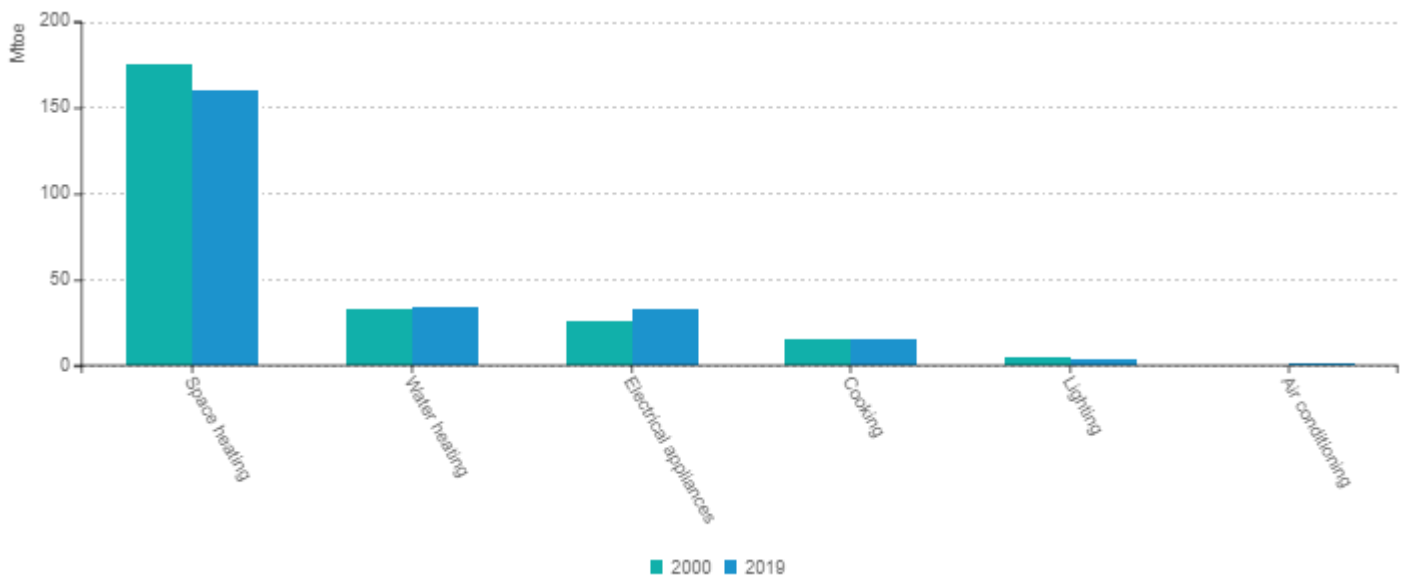
### Specific consumption per dwelling: actual value VS climate-corrected



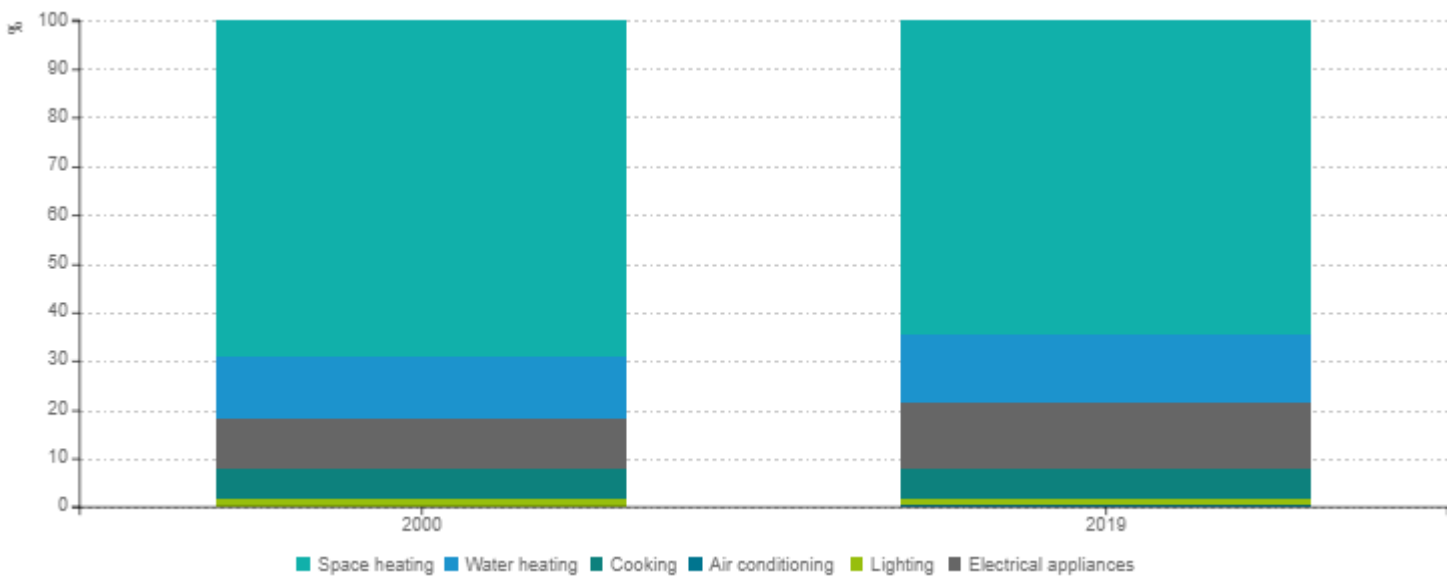
### Declining share of space heating in the EU

- Space heating consumption is decreasing (-0.5%/year since 2000), while the consumption of electrical appliances is increasing rapidly (+1.3%/year since 2000).
- The share of space heating in household energy consumption has decreased, from 69% in 2000 to 65% in 2019.
- The second most important end-use is water heating (increasing share from 13% to 14%), closely followed by electrical appliances, with a share rising from 10% in 2000 to 13% in 2019.
- The share of cooking is stable at 6%.
- Lighting accounts for just under 1.5% (6% of electricity consumption).
- Air conditioning is negligible (1.6% of electricity consumption).

### Household energy consumption in the EU



### Household energy consumption in the EU, in %



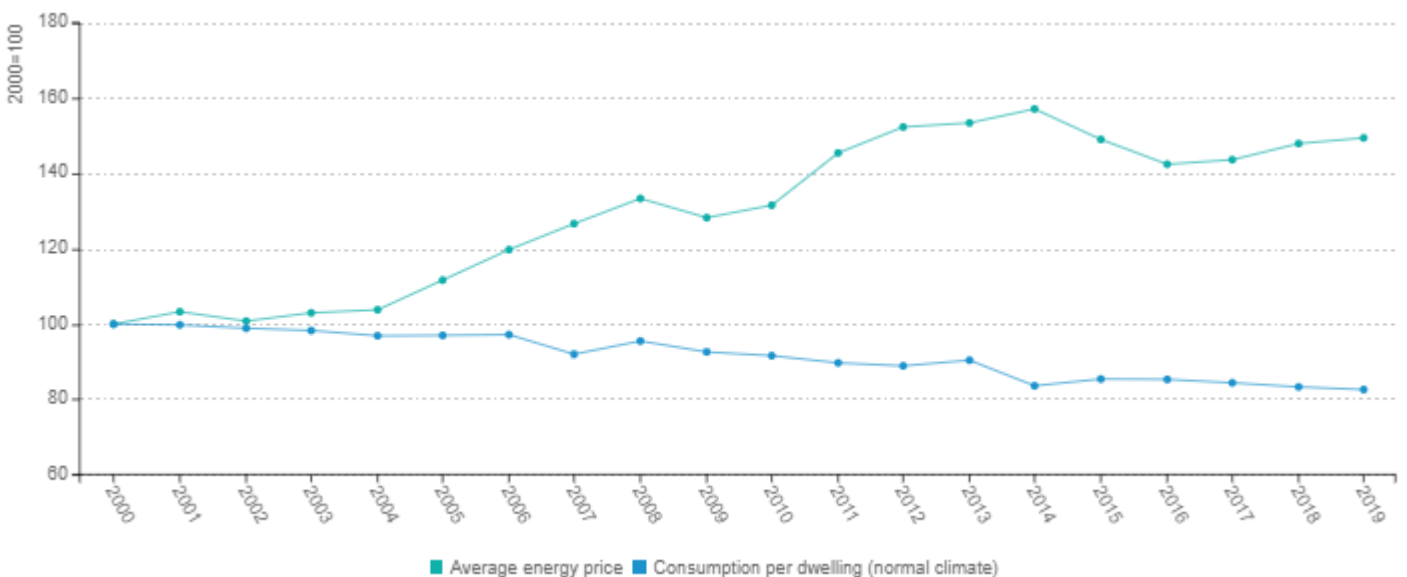
Note: Energy consumption at normal climate.

## Energy consumption per dwelling

### Consumption per dwelling and energy price

- Energy consumption per dwelling has been generally decreasing since 2000 but at a lower rate since 2014, after a fairly steady decline between 2000 and 2014 (-1.3%/year) and with the largest reduction between 2008 and 2014 (-2.2%/year).

### Specific consumption per dwelling and energy price

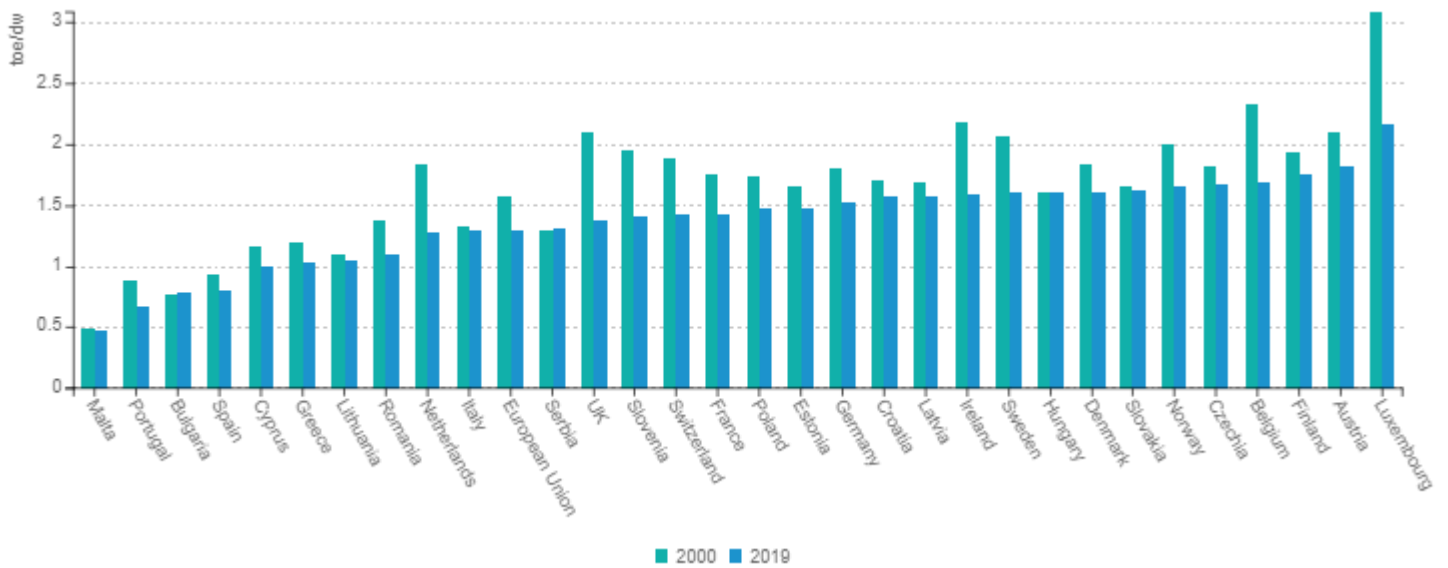


Note: Energy consumption at normal climate.

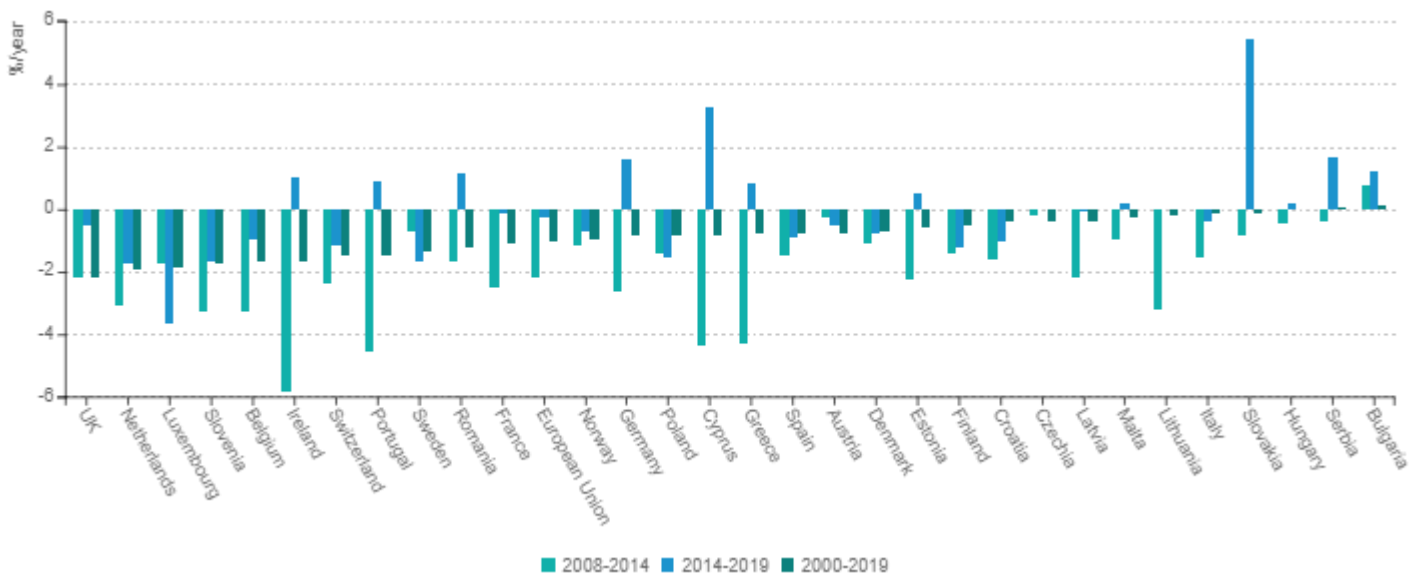
## Average energy consumption per dwelling

- Energy consumption per dwelling has decreased in almost all countries (-1%/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 at EU level (-0.2%/year). Energy consumption per dwelling has even increased again in Slovakia, Cyprus, Germany, Bulgaria, Romania and Ireland (>+1%/year).
- Energy consumption per dwelling varies between 0.7 and 1.8 toe/dwelling depending on the country, and the EU average is 1.3 toe/dwelling in 2019. These values are not adjusted for the same climate, see below with adjustment.

*Average consumption per dwelling (at normal climate)*

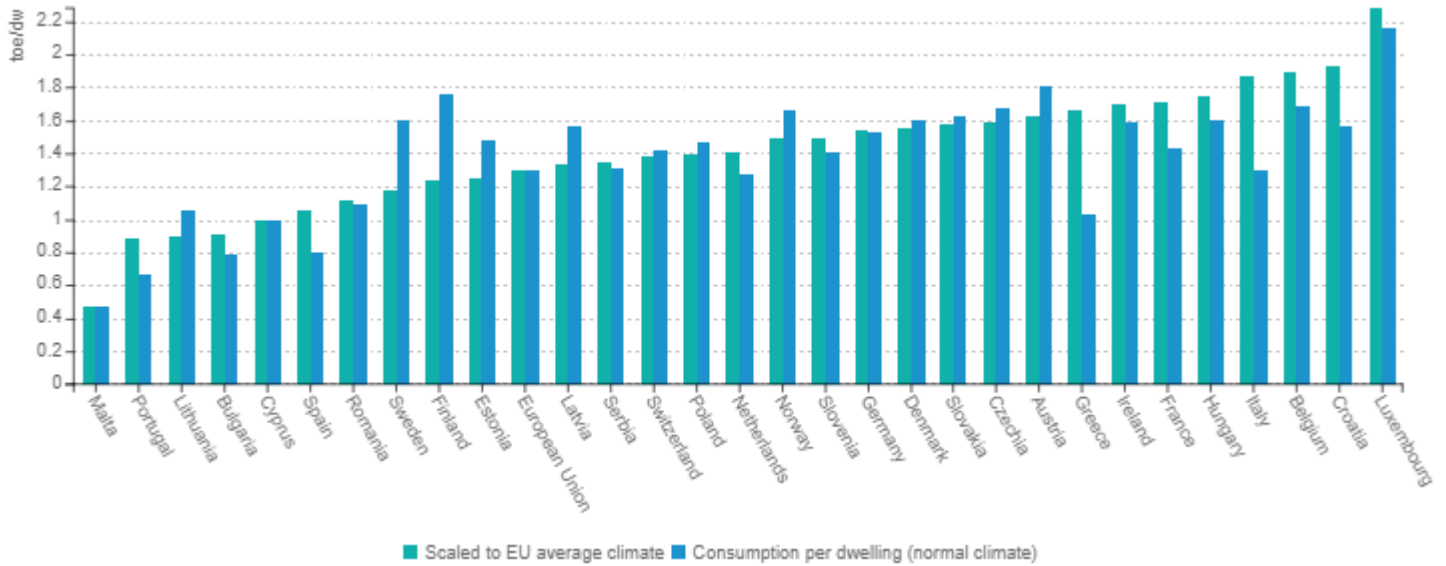


*Variation of average consumption per dwelling (at normal climate)*



- The comparison between countries is more relevant if the heating consumption is adjusted to the same climate (EU average climate).
- Even after adjustment to the average EU climate, there are large differences between countries, ranging from 0.9 toe/dwelling in Portugal to 2.5 times more in Luxembourg (2.3 toe/dwelling). Luxembourg, Croatia, Belgium and Italy turn out to have the highest consumption.

*Average consumption per dwelling (adjusted to EU climate, 2019)*

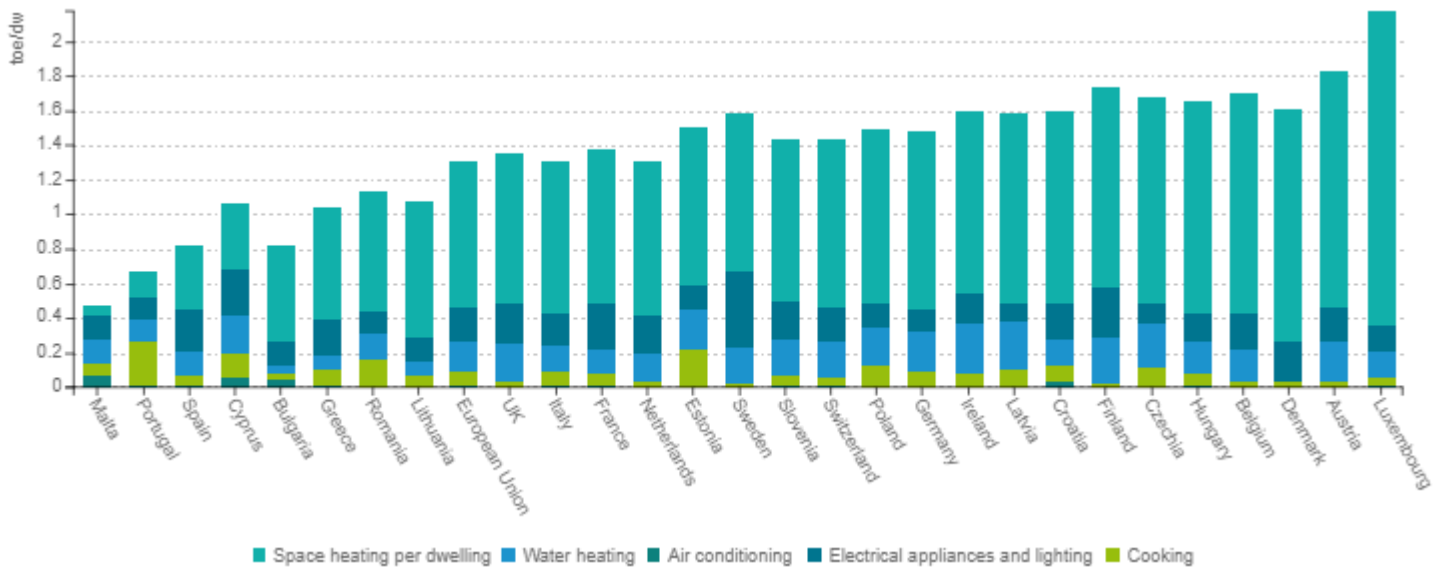


Note: Malta and Cyprus not adjusted.

## 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 household consumption in most countries (except Portugal and Malta). It represents on average 0.85 toe/dwelling (in a range of 0.06 to 1.8 toe/dwelling).
- The second highest share is electrical appliances and lighting or water heating depending on countries. Electrical appliances and lighting consumption ranges from 0.1 to 0.3 toe/dwelling (except in Sweden, 0.43 toe/dwelling).
- Water heating consumption varies from 0.05 to 0.3 toe/household. Since 2014, the reduction in unit consumption for water heating has slowed significantly in two large countries (France and Spain) and has even reversed (i.e. increased) in six countries (Italy, Greece, Austria, Ireland, Poland, Romania).
- The reduction in unit consumption for cooking has been steady since 2000 (-0.7%/year at EU level). However, it has increased in Germany, Greece, Poland, Italy and Ireland.
- Air cooling still represents a marginal share of dwelling consumption in most countries except Malta, Cyprus, Bulgaria and Croatia.

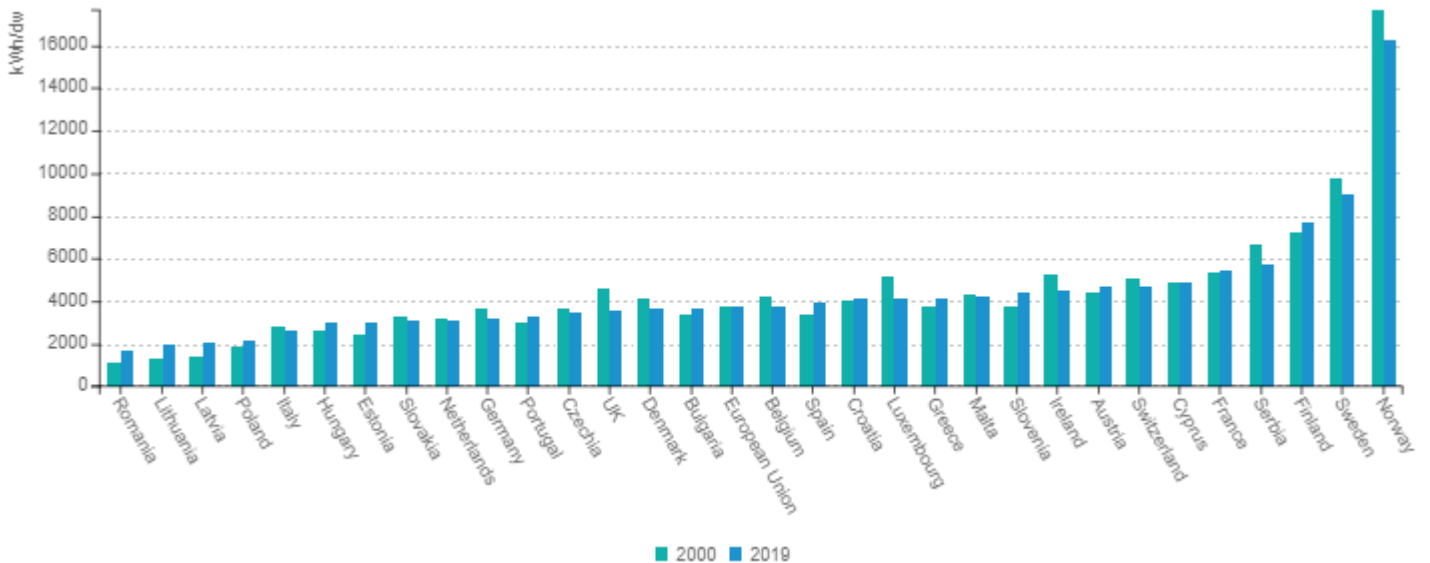
### Specific consumption of households by end-use (2019)



### Electricity consumption per dwelling

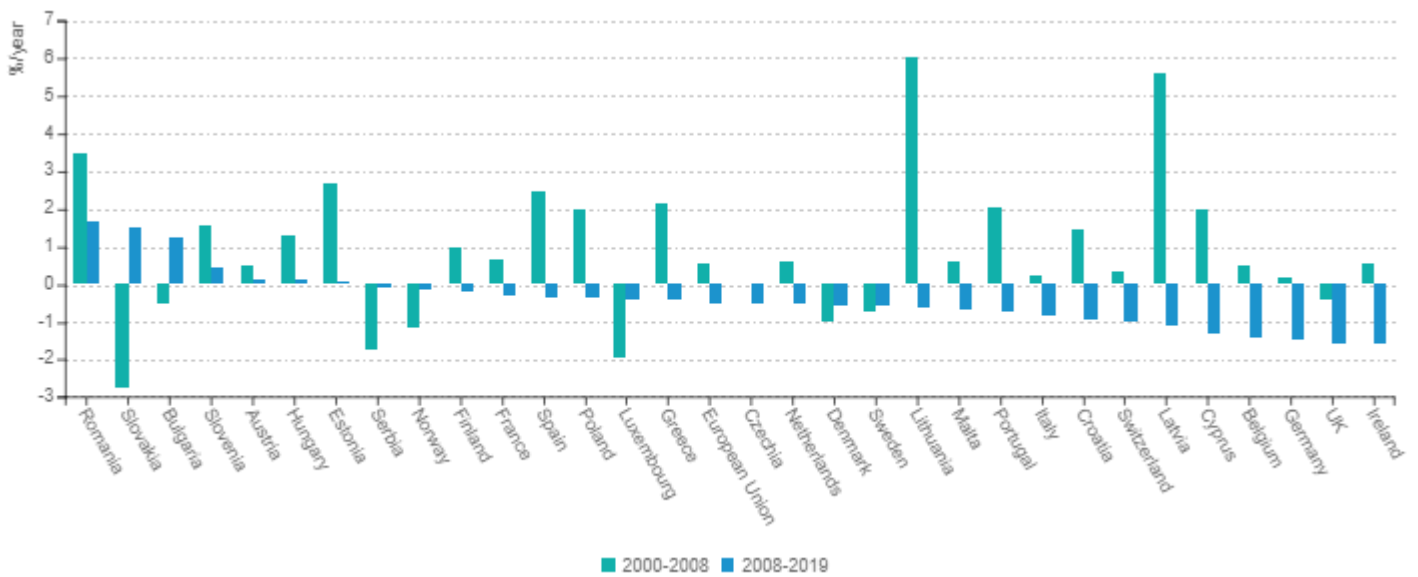
- Very unequal level of electricity consumption per dwelling among EU Member States: from 1.7 MWh in Romania to 9 MWh in Sweden (3.7 MWh for the EU average).
- This heterogeneity is partly due to thermal uses (e.g. electricity is the main energy source for space heating in some countries such as France), different equipment rates of electrical appliances and different levels of energy efficiency.

### Electricity consumption per dwelling



- Since 2008, decrease of electricity consumption per dwelling in most EU Member States (20) and at EU level (-0.5%/year).
- Strong reduction in Ireland, Germany, Belgium and Cyprus (> 1.3%/year).
- Strong progression until 2008 in Southern countries (e.g. Spain, Greece, Portugal, Cyprus) due to air conditioning, but also in Lithuania, Latvia, Romania, Estonia and Poland.

*Trends in electricity consumption per dwelling*

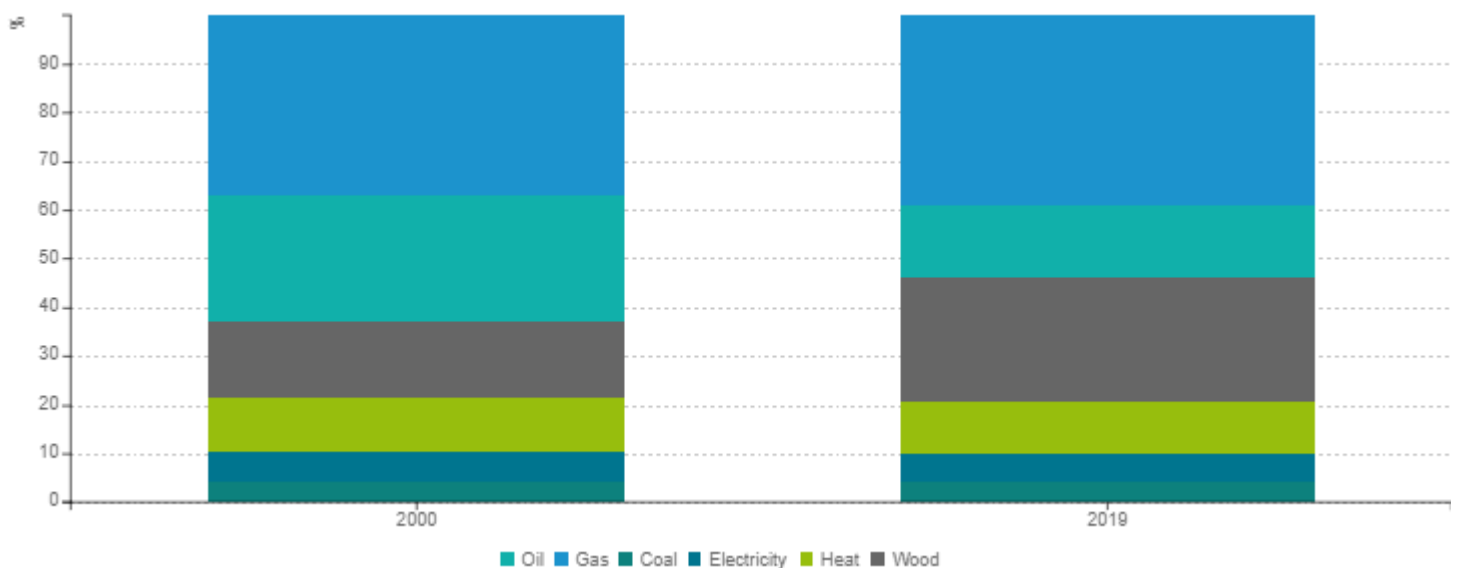


## Space heating

### Heating energy consumption by energy source

- Natural gas is the leading energy source for households heating in the EU, with a rather stable share (39% in 2019).
- Oil is slowly being phased out (-11 points) but remains significant in island countries for instance.
- Wood is progressing (+10 points).

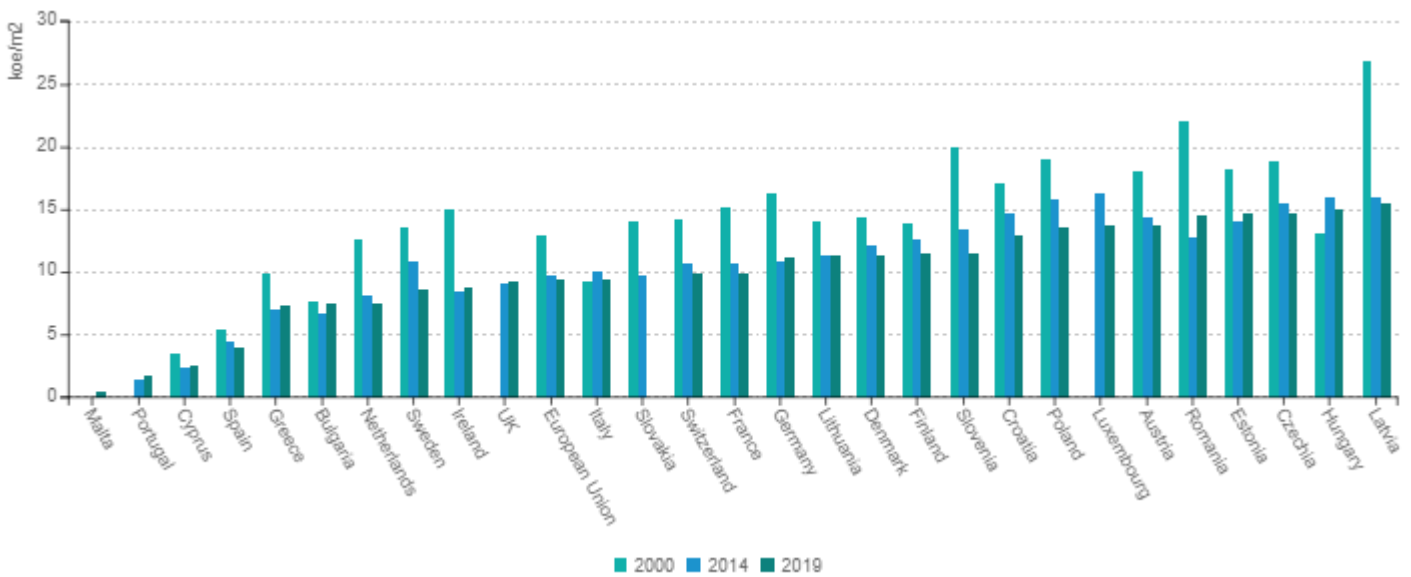
*Household energy consumption for heating by energy*



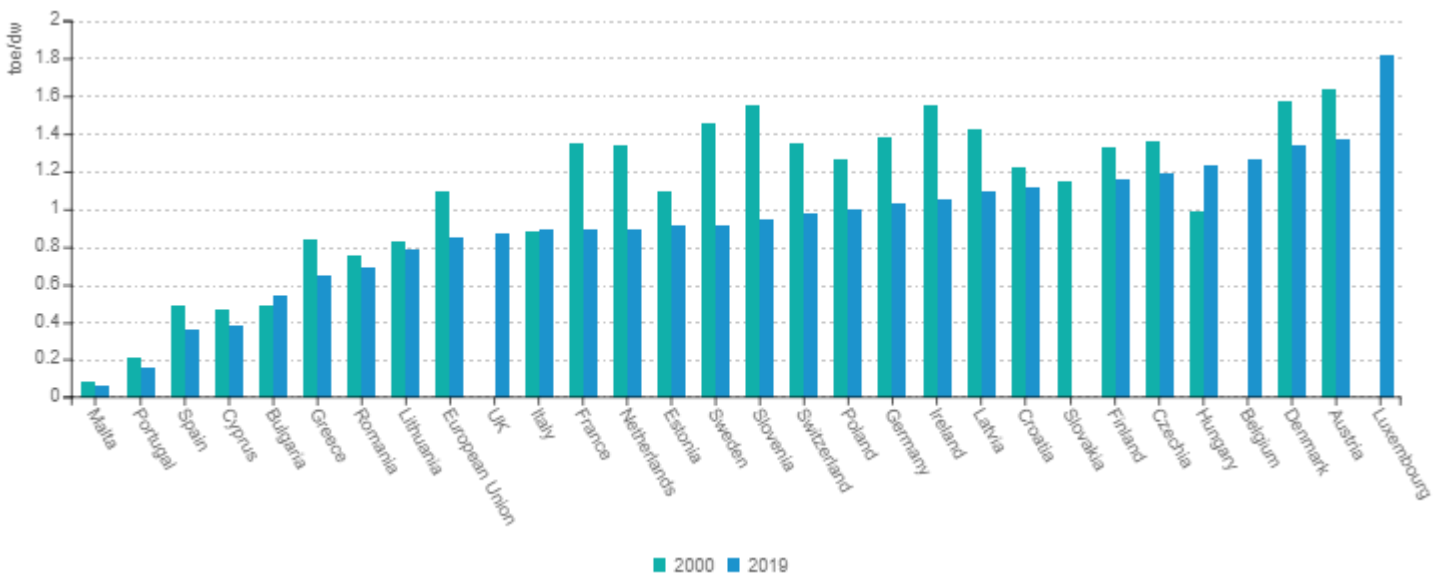
## Heating consumption per m<sup>2</sup> and per dwelling

- Heating consumption per m<sup>2</sup> 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 m<sup>2</sup> was 1.7%/year on average in the EU. It was above 2.5%/year in 4 EU MS (Slovenia, Latvia, Ireland and the Netherlands) and between 2 and 2.5%/year in 4 others (Sweden, France, Romania and Slovakia).
- The reduction in heating consumption per m<sup>2</sup> has slowed down significantly since 2014 in half of the MS and in some of the largest EU countries (Germany, France and the Netherlands). Several factors may explain this trend. There is less new construction, which has very high energy efficiency performance: the construction rate has decreased by 35% since the financial crisis and represents only 0.8% of the existing housing stock each year (i.e. only 8% of the new stock after 10 years). Renovation works are also less numerous, although it is difficult to have consolidated data. The diffusion of efficient heating methods (condensing boiler, heat pumps) has also slowed down.
- Significant differences between countries from less than 5 koe/m<sup>2</sup> in Spain, Cyprus, Portugal and Malta to around 15 koe/m<sup>2</sup> in Latvia, Hungary, Czechia, Estonia and Romania, due to differences in climate conditions.

*Heating consumption per m<sup>2</sup>*



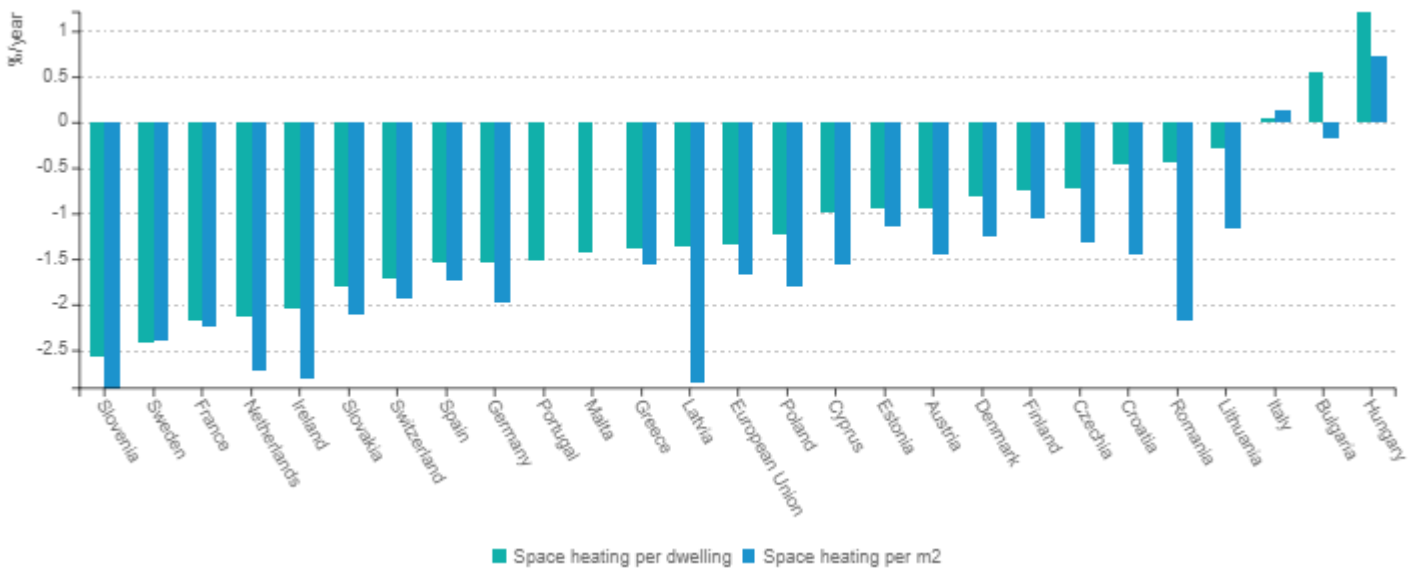
*Heating consumption per dwelling*





- Energy consumption per dwelling has decreased less than consumption per m2 due to the increase in the average size of dwellings. At the EU level, consumption per dwelling has decreased by 1.3%/year since 2000 and consumption per m2 by 1.7%/year, while dwelling size has increased by 7% (0.3%/year). This means that 20% 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).

*Variation of consumption per m<sup>2</sup> VS per dwelling: effect of change in dwelling size (2000-2019)*



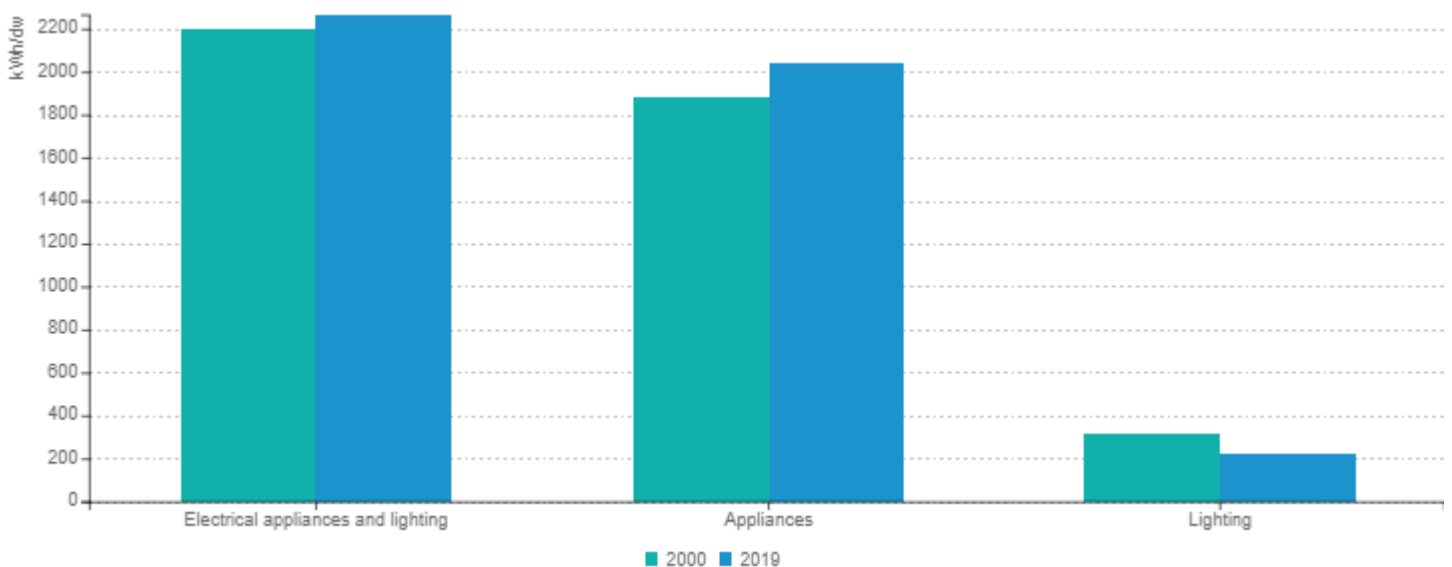
Note: Energy consumption at normal climate.

## 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, a share that has been increasing over the years: from 86% in 2000 to 90% in 2019. The specific consumption per dwelling for lighting is decreasing thanks to the phase out of incandescent light bulbs. It now represents only 10% of captive electricity, compared to 14% in 2000.

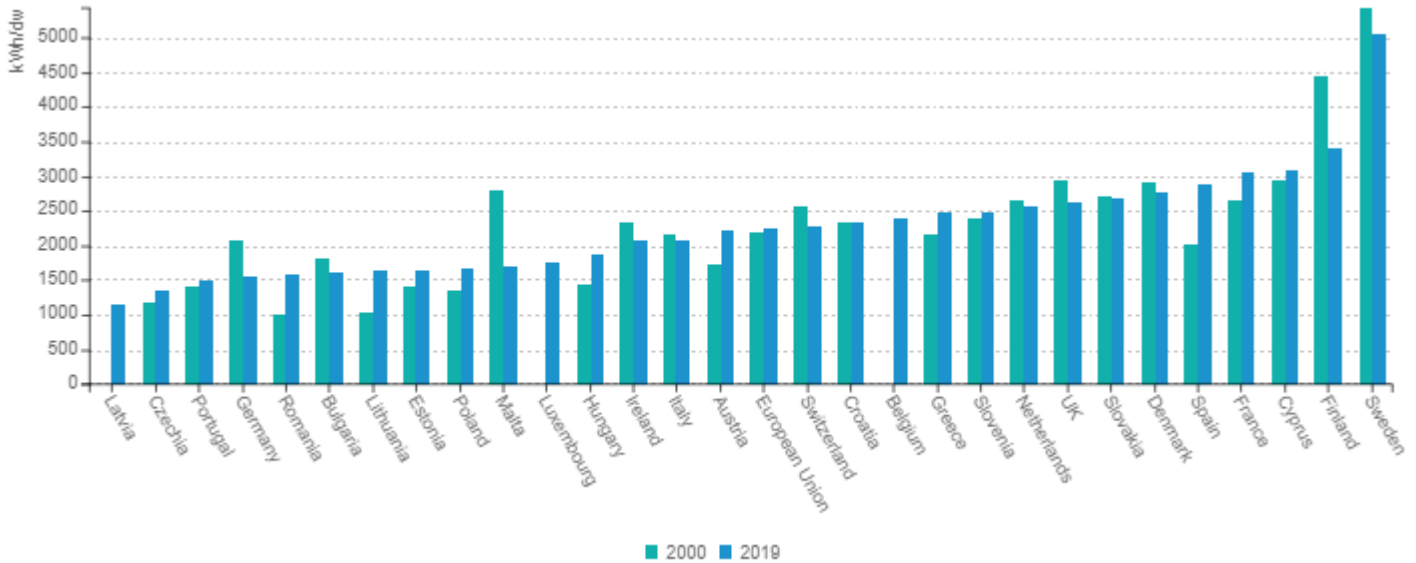
*Consumption per dwelling for appliances and lighting (EU)*



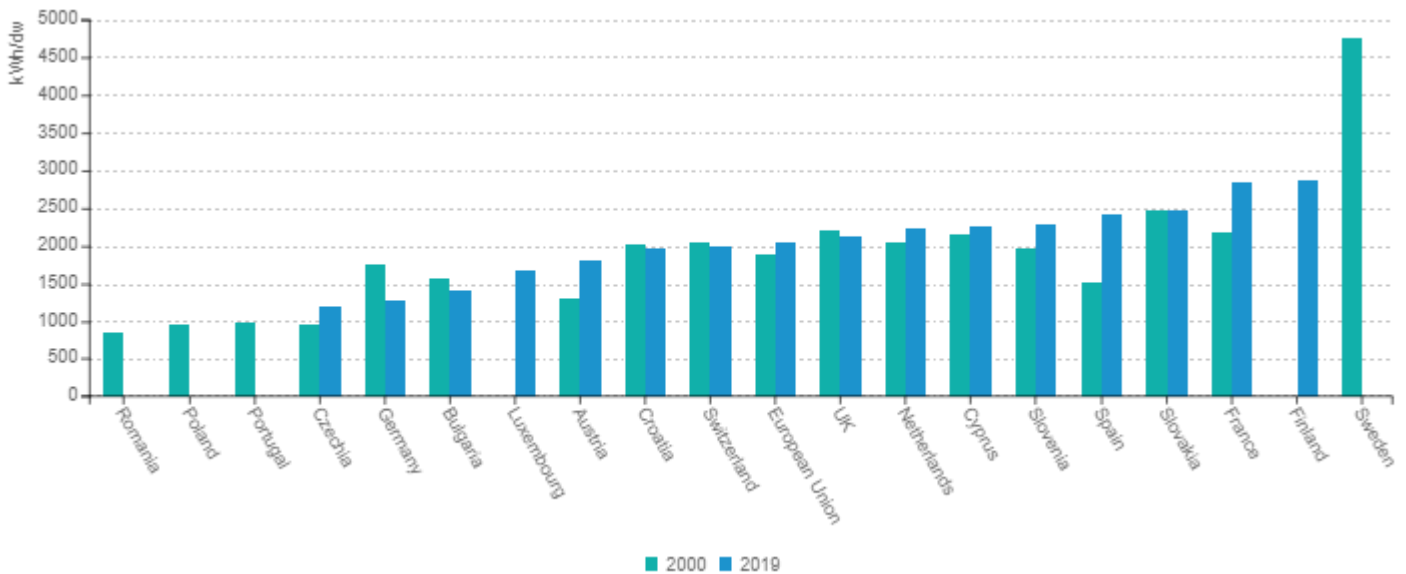
## Electricity consumption per dwelling for electrical appliances and lighting

- Significant differences in electricity consumption for electrical appliances and lighting: from less than 1500 kWh/dwelling in Latvia and Czechia, to 2300 kWh at EU level, up to 3400 kWh in Finland and 5000 kWh in Sweden.

*Electricity consumption per dwelling for electrical appliances and lighting*

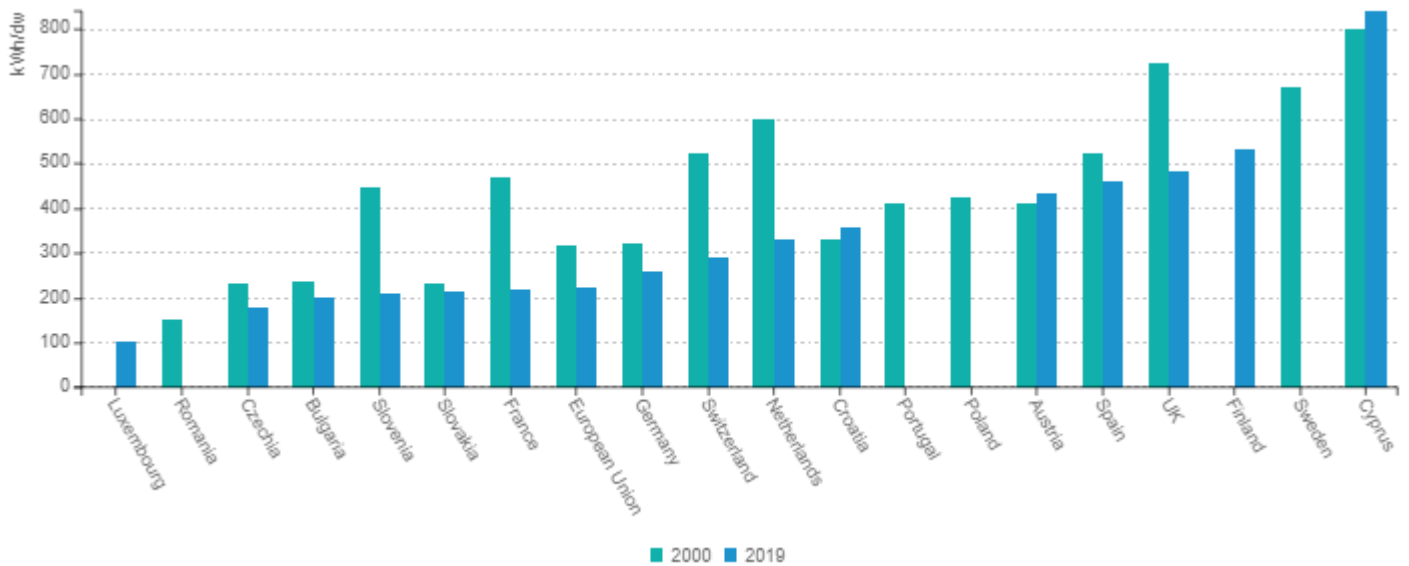


*Electricity consumption per dwelling for electrical appliances*



- Decreasing trends in electricity consumption for lighting in most EU MS due to the diffusion of CFLs.
- Large differences between countries: from less than 200 kWh/dwelling in Luxembourg and Czechia, to around 230 kWh at EU level, up to more than 800 kWh in Cyprus, 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).

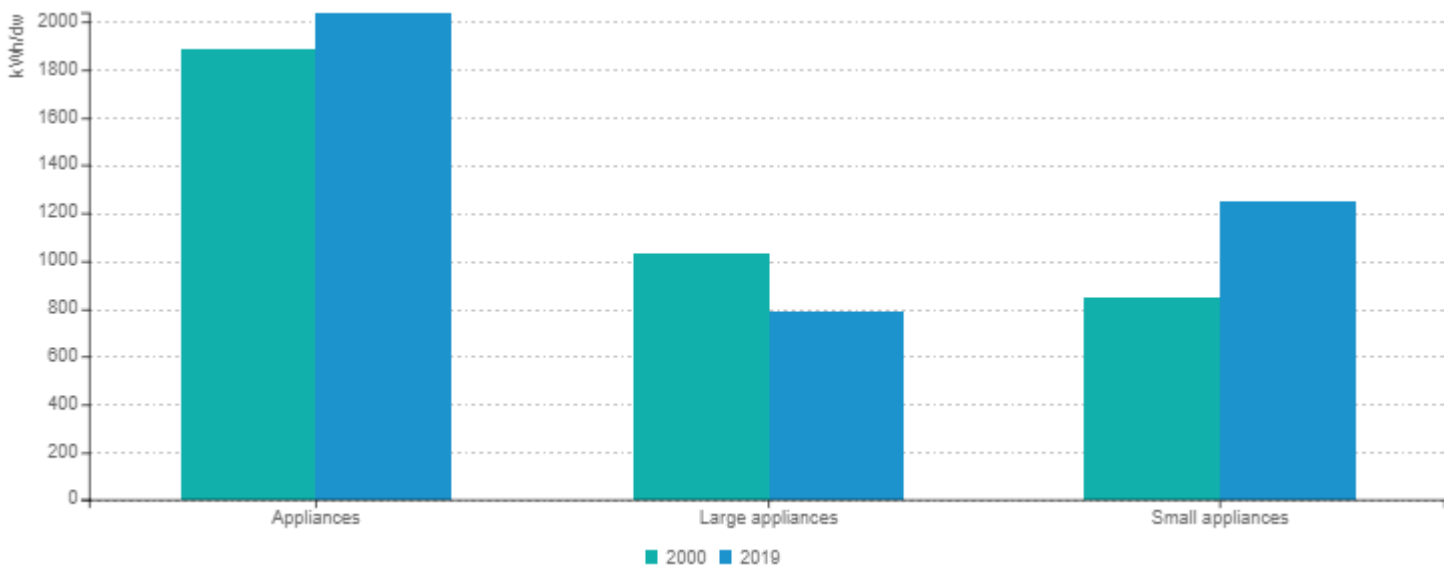
### Electricity consumption per dwelling for lighting



### Energy consumption of large appliances per dwelling

- EU households consumed around 50% more for small appliances in 2019 than in 2000 (1200 kWh/dwelling in 2019). On the opposite, specific consumption of large appliances has decreased by 24% between 2000 and 2019 thanks to labels and standards.
- Small appliances represent now the main share of appliances consumption: 61% of the specific consumption of appliances in 2019 compared to 45% in 2000.
- Energy efficiency of large electrical appliances continues to improve rapidly. However this effect does not counterbalance anymore the rapid growth of the consumption of small appliances.

### Consumption of electrical appliances in the EU

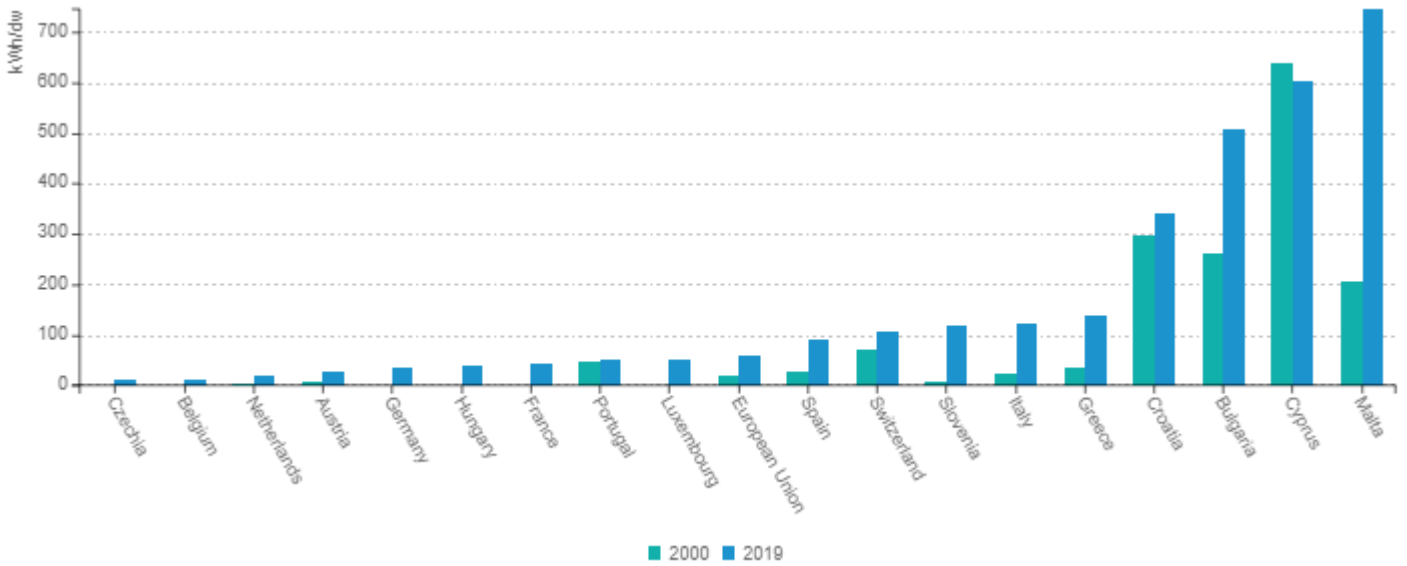


### Unit consumption of air conditioning

- Even if air conditioning only accounts for 1.6% of household electricity consumption at EU level in 2019, the average consumption per dwelling for this use is increasing with the diffusion of air conditioning appliances (from 19 kWh/household in 2000 to 59 kWh/household in 2019).

- This end-use is significant mainly in Malta, Cyprus and Bulgaria.

### Consumption per dwelling for air conditioning



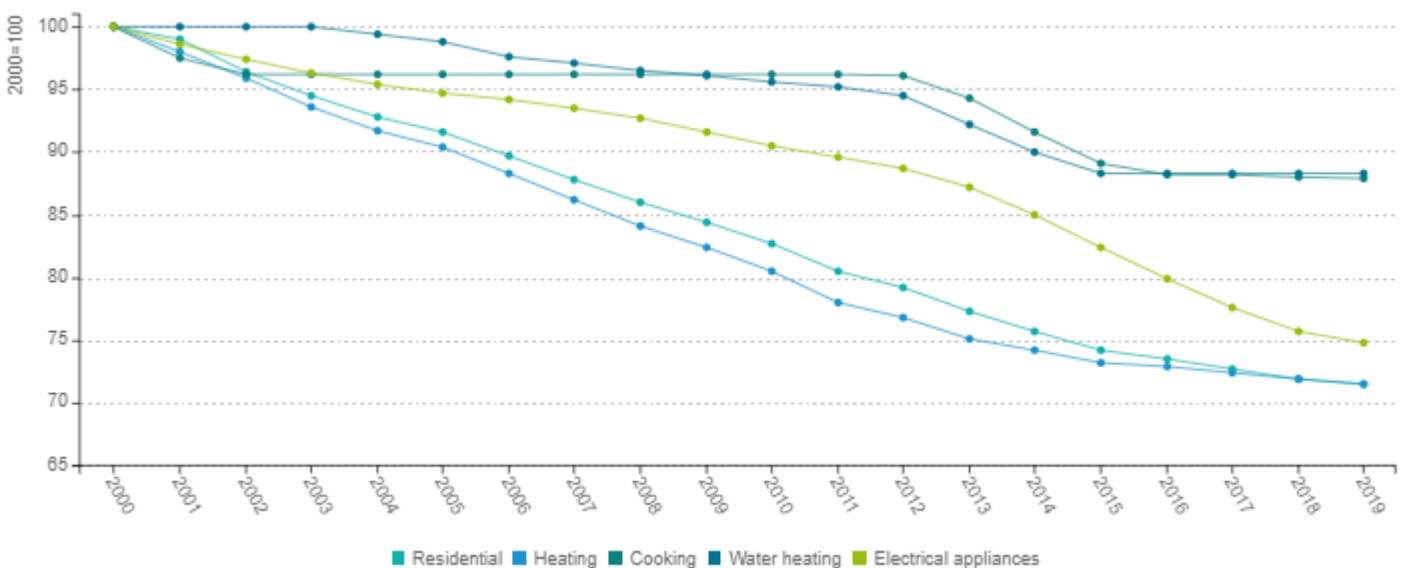
Note: The average consumption per dwelling is obtained by dividing the total consumption for air conditioning by the total number of dwellings, not only those with air conditioning.

## Energy efficiency and savings

### Energy efficiency trends for households in the EU

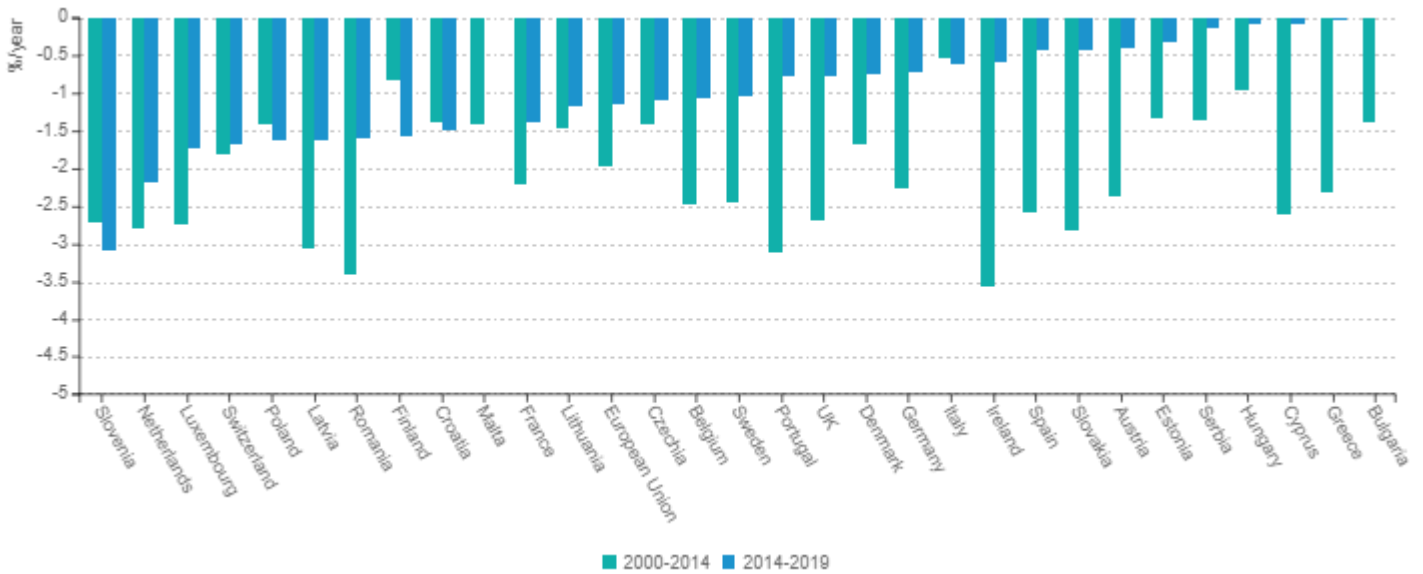
- Households energy efficiency, as measured by ODEX, has improved by around 29% (1.8%/year) over the period 2000-2019 (ODEX equals 71 in 2019), mainly through improvements in space heating and large appliances. Significant slowdown since 2014.
- Energy efficiency gains have been decreasing since 2008 at EU level and in 60% of Member States (16/27). This slowdown is very significant in Romania, Slovakia, Austria and Germany. Conversely, gains are accelerating in 11 MS such as Ireland, Portugal Slovenia and Lithuania.

### Energy efficiency progress in the EU



- In most countries, energy efficiency has been progressing much slower since 2014, except Slovenia, Poland, Finland, Croatia and Italy have accelerated the pace of progress.
- Slovenia, the Netherlands and Luxembourg show the steadiest progress since 2014, higher than 1.7%/year compared to the EU average of 1.2%/year.

*Energy efficiency progress in EU countries*

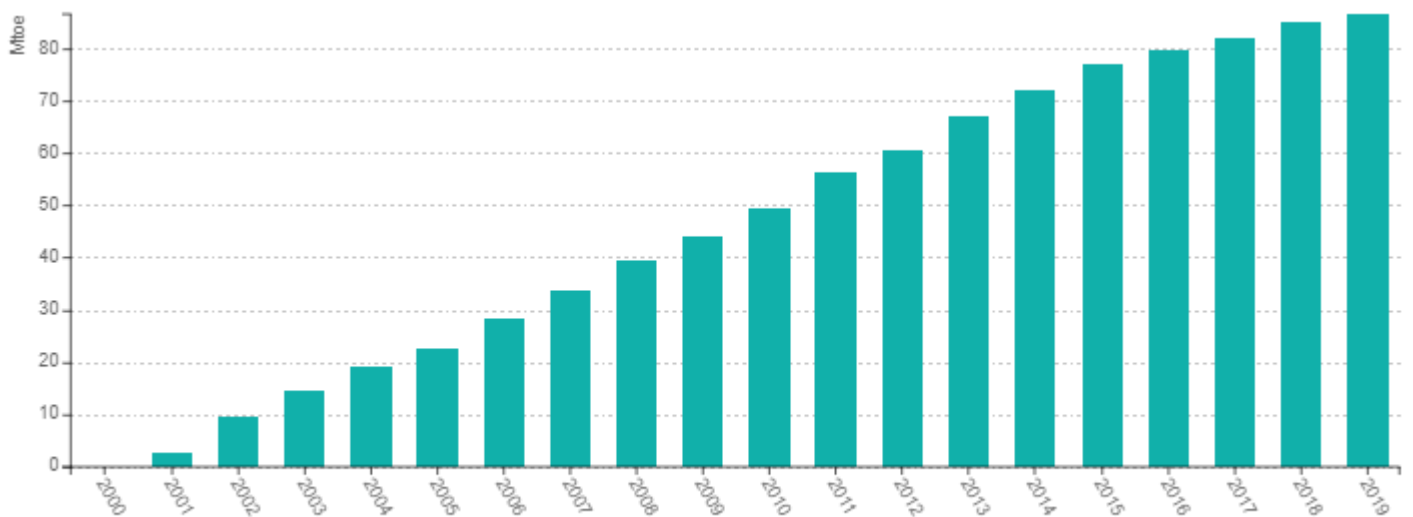


Note: ODEX aggregates energy efficiency gains by end-use, measured by the reduction in unit consumption. ODEX is calculated on the basis of 11 end-uses or large appliances: heating (toe/m<sup>2</sup>, separation between new and existing dwellings), water heating, cooking, lighting, cooling (toe/dwelling), 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 87 Mtoe since 2000, which means that without energy efficiency improvements, energy consumption would have been 87 Mtoe higher in 2019.
- Due to the slowdown in the rate of energy efficiency improvements, the annual additional savings have been decreasing by around 37% since 2014: from an average volume of 5.2 Mtoe/year over 2000-2013 to 3.2 Mtoe/year since 2014.

*Energy savings for households in the EU*

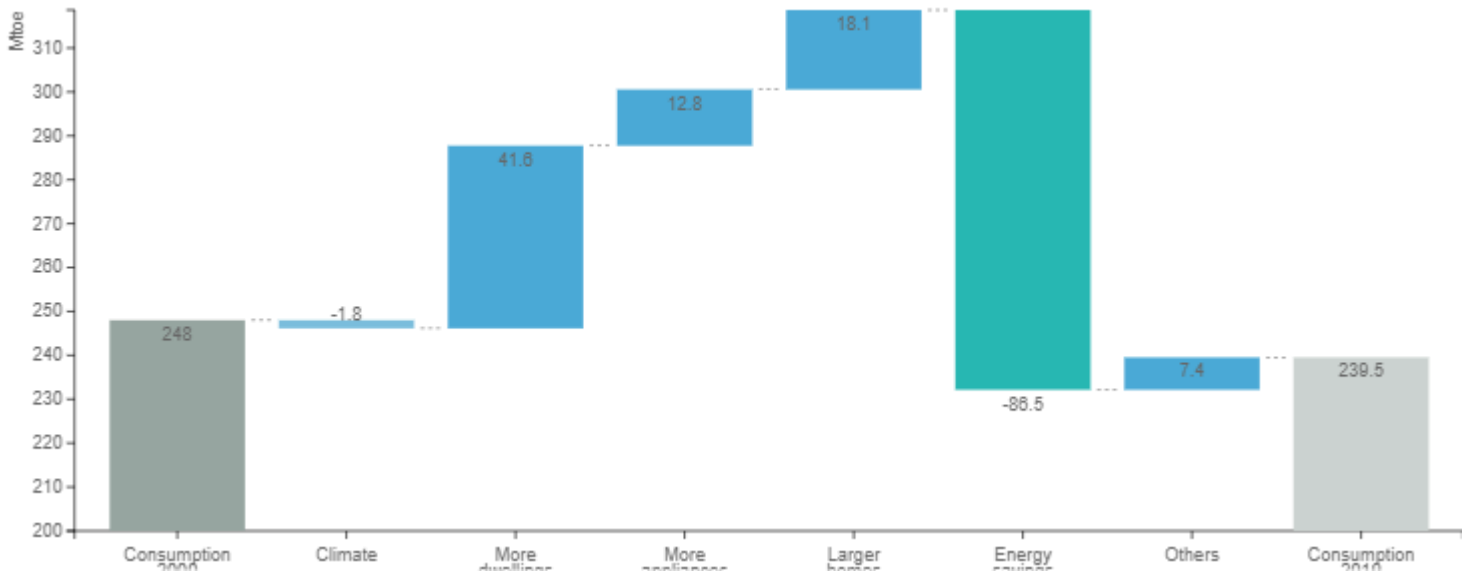


## Decomposition of energy consumption

### Drivers of energy consumption per dwelling (EU)

- At EU level, household energy consumption decreased by 8.5 Mtoe between 2000 and 2019. Indeed, energy savings (87 Mtoe) were slightly higher than the increase in consumption due to the activity effect (72 Mtoe). This activity effect includes the increase in the number of dwellings (42 Mtoe) and the number of appliances per dwelling (13 Mtoe), as well as the trend towards larger dwellings (18 Mtoe).

*Drivers of energy consumption variation in residential at EU level*



### 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 50% and 20% respectively of the energy efficiency gains made since 2000.

*Drivers of the variation in heating consumption per dwelling*

