

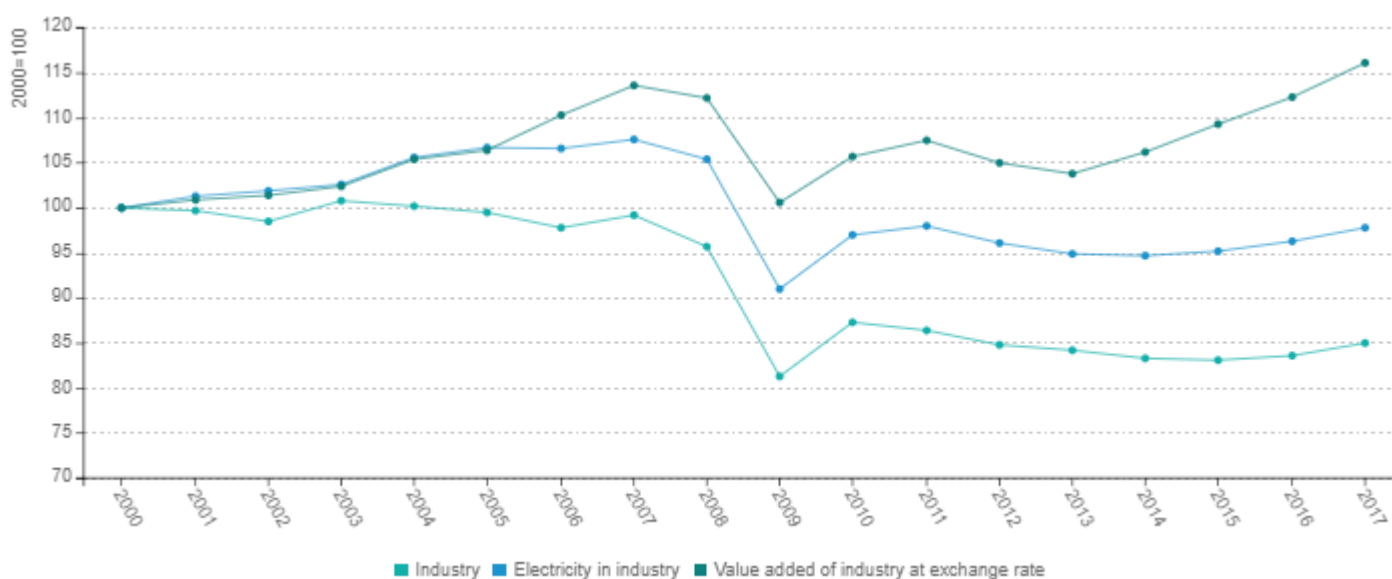
# Sectoral Profile - Industry

## Energy consumption

### Energy consumption trends in EU

- There was a regular decrease in energy consumption between 2003 and 2015, although there was growth in industrial activity from 2003 to 2007 and from 2013 to 2015. However, both energy and electricity consumption are rising since 2015, following a strong growth in industry activity.
- Between 2007 and 2015, electricity followed the same declining trend as total consumption, while it was increasing regularly before. Since 2015, it has been following the same growing trend
- In 2017, industry energy consumption is around 15% lower than in 2000.

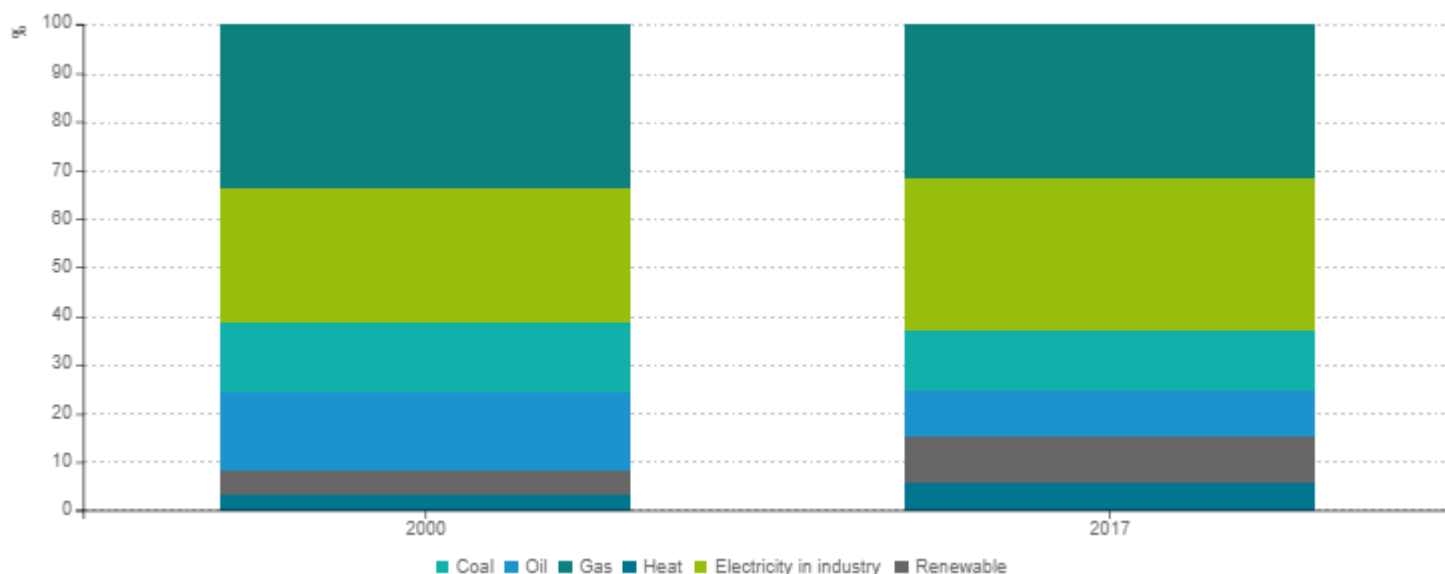
*Energy consumption and activity in industry (2000 = 100)*



### Change in fuel mix in EU industry

- In 2000, natural gas was the main energy used in industry (34%). However, electricity has now overpassed natural gas in industry consumption (32% for electricity, 31% for natural gas).
- The shares of oil and coal have been decreasing since 2000 (-6.5 points and -2.3 points respectively).
- Rather, the shares of heat and renewables have been increasing (+2.4 points and +4.4 points respectively).

### Change in fuel mix in industry (EU)



### Industry absorbs a declining share of final consumption

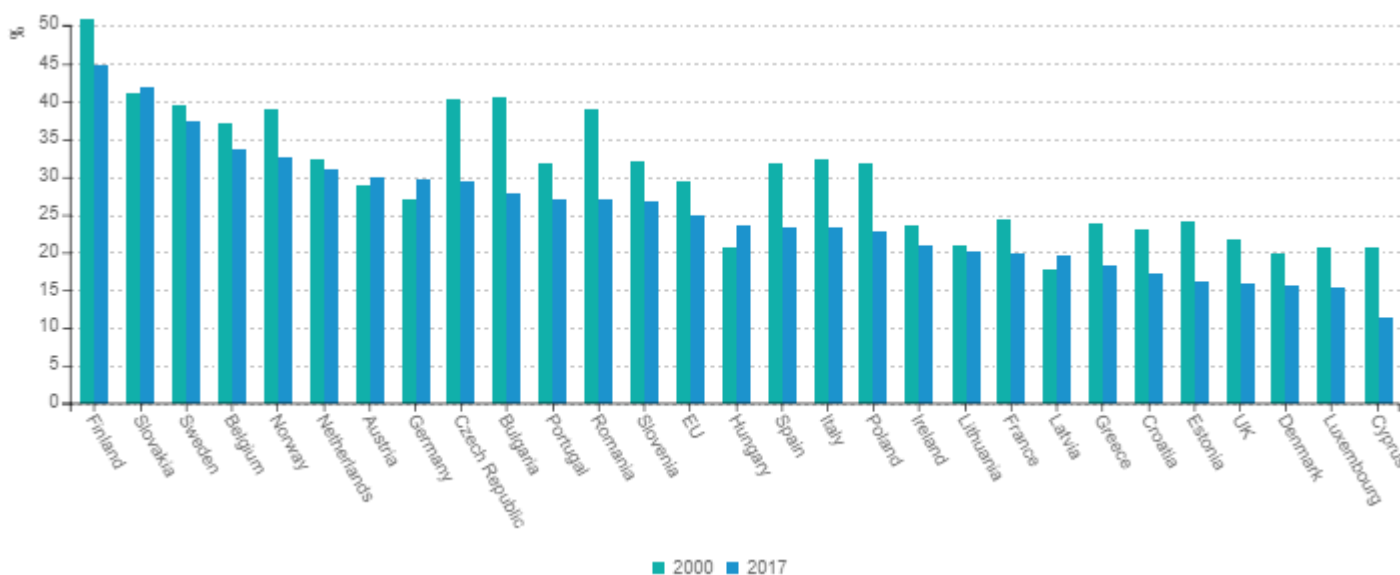
In most EU countries, the share of industry in the final energy consumption is declining (by 4.5 points at EU level since 2000).

This decline was very significant in Bulgaria, Romania, Spain, Poland, Czech Republic and Italy (by around 10 points).

This share has increased in 5 countries, namely Germany, Austria, Latvia, Slovakia and Hungary, by 1 to 3 points.

There are large discrepancies in the share of industry in final consumption among countries: from more than 40% in Finland and Slovakia to around 15% in Estonia, UK, Denmark, Luxembourg and Cyprus (25% for EU on average).

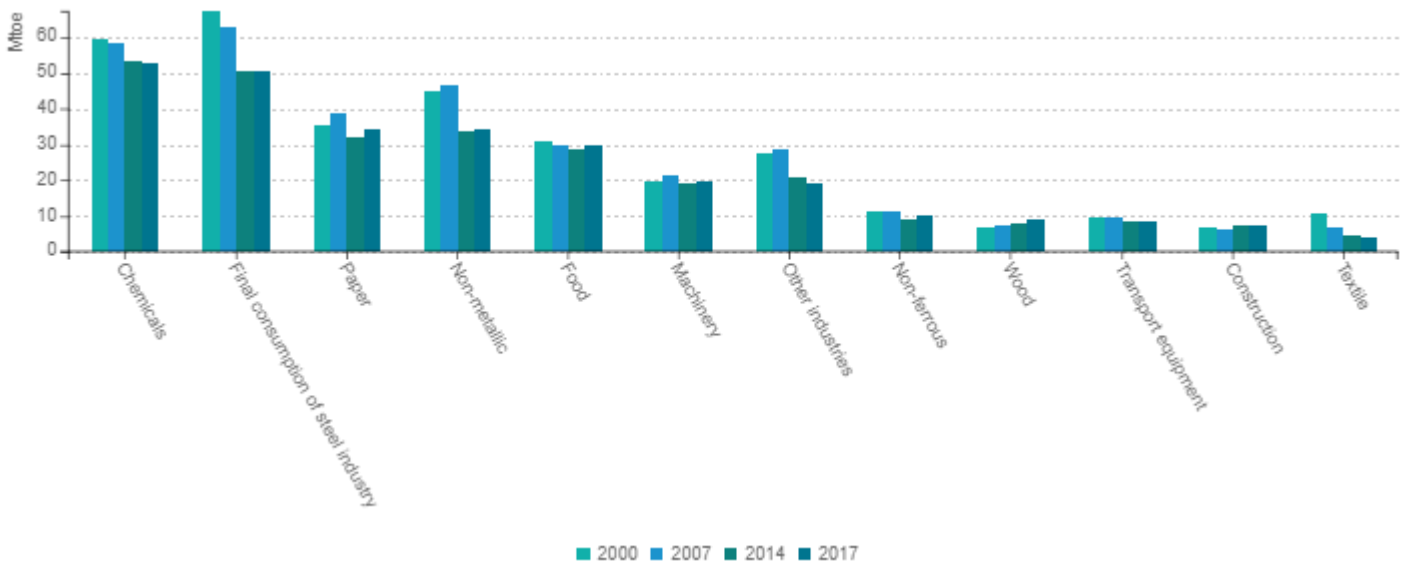
### Share of industry in the final consumption



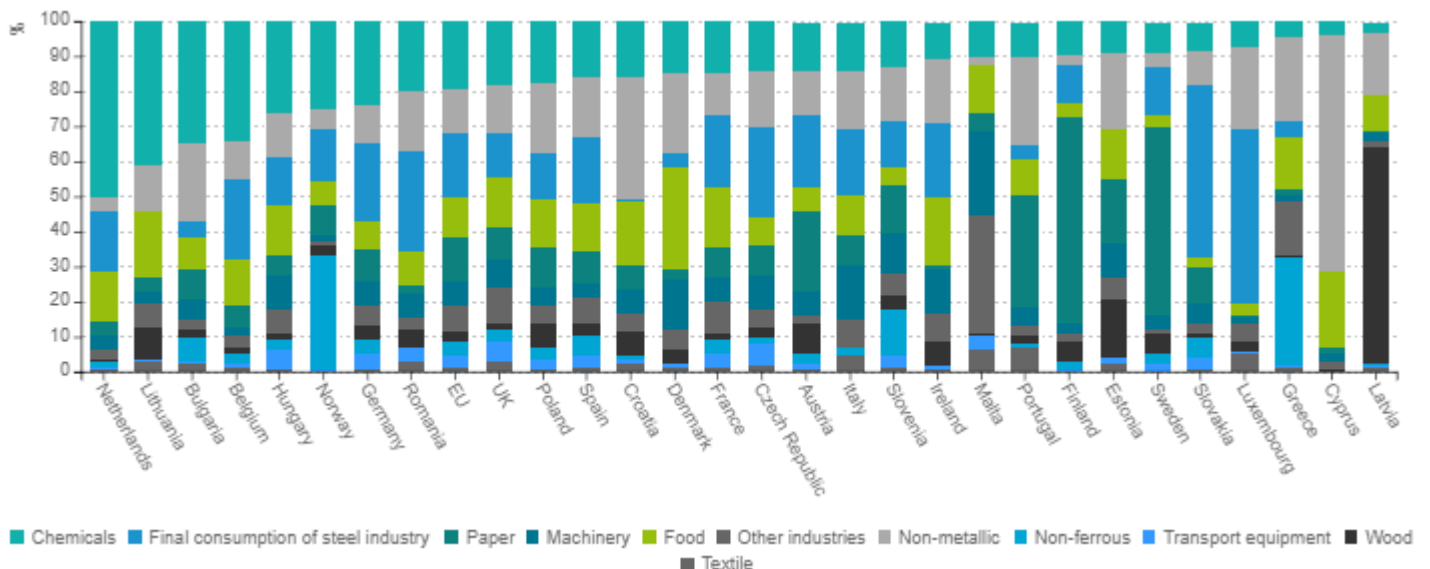
## Energy consumption trend by industrial branch

- Chemicals and steel are the largest energy consumers in industry (around 19% each in 2017), followed by paper and non-metallic minerals (12% each).
- Energy consumption of non-metallic minerals and steel have strongly decreased since 2000 (-28% and -25% respectively). Textile energy consumption has also dropped by 60%.
- Chemicals, steel, paper and non-metallic industries contribute to more than 60% of industry energy consumption in EU.
- In most branches, energy consumption is stabilizing or rising again since 2014.

*Energy consumption of industry by branch (EU)*



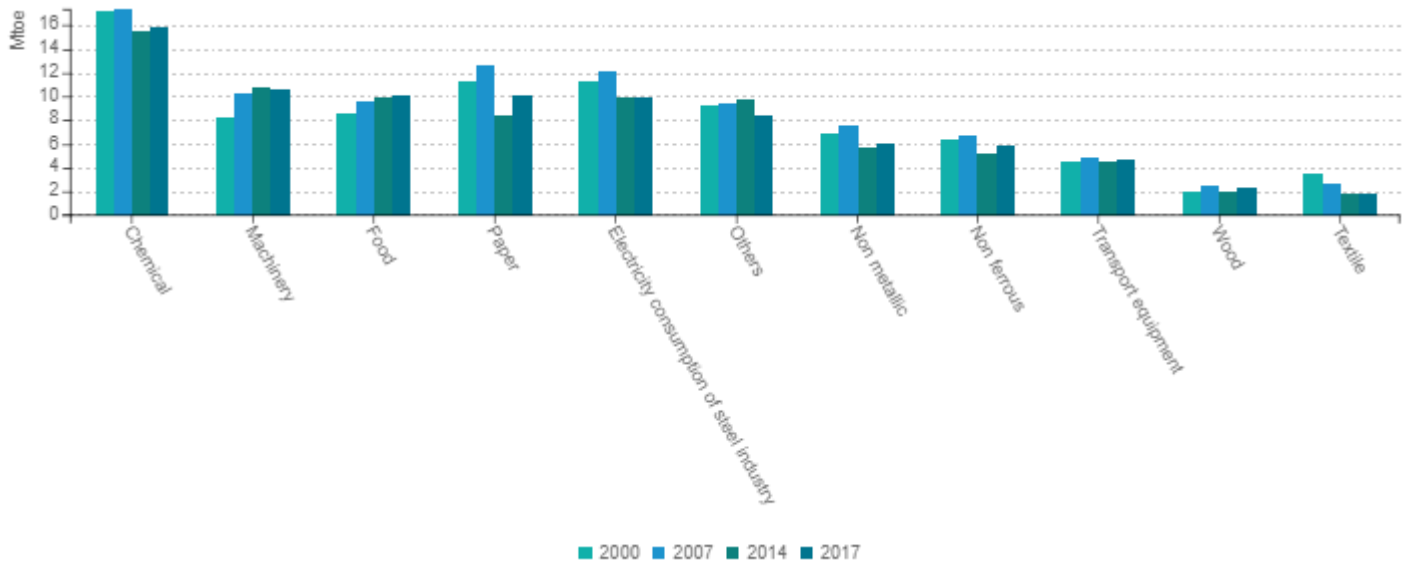
*Energy consumption by industrial branch (2017)*



## Variation of electricity consumption of industry by branch

- In most branches, electricity consumption increased between 2000 and 2007, then decreased between 2007 and 2014 and has been rising again since then.
- Chemical is the largest electricity intensive branch (18%) followed by machinery, paper and food (~11% each)
- Machinery, food and, to a lesser extent, transport equipment have known a continuous rising electricity demand since 2000.

*Electricity consumption of industry by branch - EU*

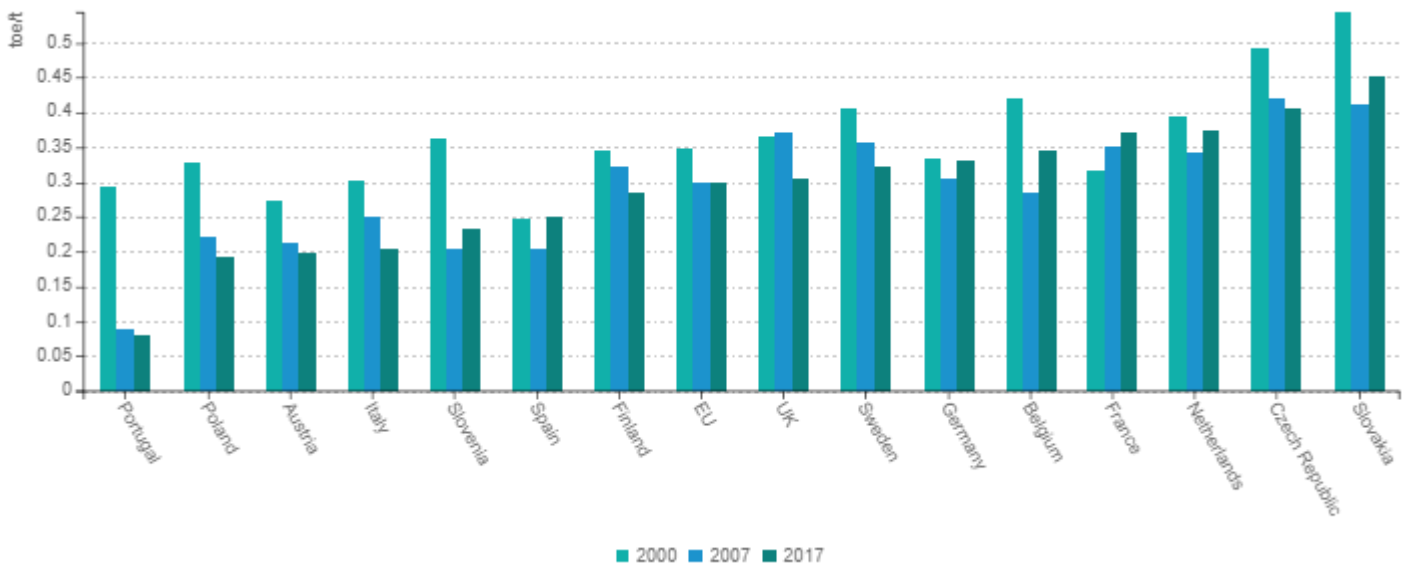


# Specific consumption

## Energy efficiency trends in steel industry

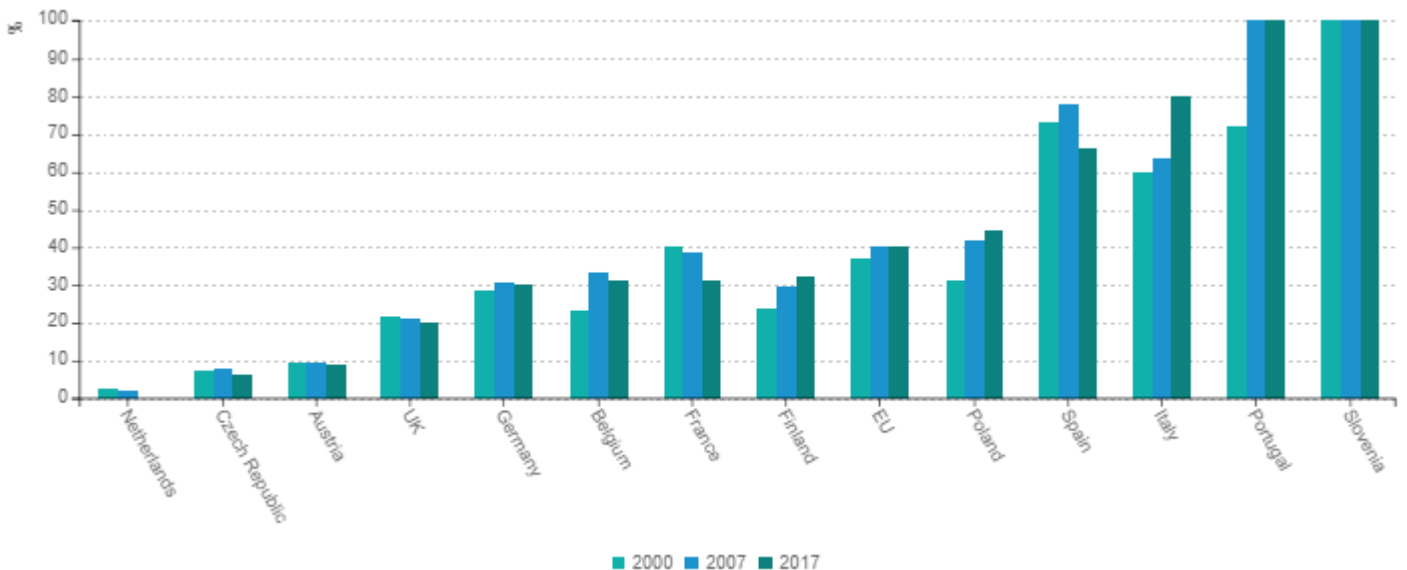
- There is an apparent deterioration of energy efficiency in steel production since 2007 in half of countries, as shown by the increase in the specific consumption per ton of steel: this is mainly a result of the deep recession in this sector due to the economic crisis. At EU level, the specific consumption of steel is stable since 2007.
- Decreasing specific consumption over years for the other countries: Poland, Austria, Italy, Finland, Sweden, UK and Czech Republic.
- Different performances, partly explained by the share of the electric process, the less intensive process, in steel production are visible across countries.

*Specific consumption of steel*



The energy performance of the steel industry should be considered in relation to the share of electric steel: the higher this ratio, the lower the specific consumption. For Slovenia, Portugal, Italy and Spain, the high share of electric process can explain part of the low specific consumption.

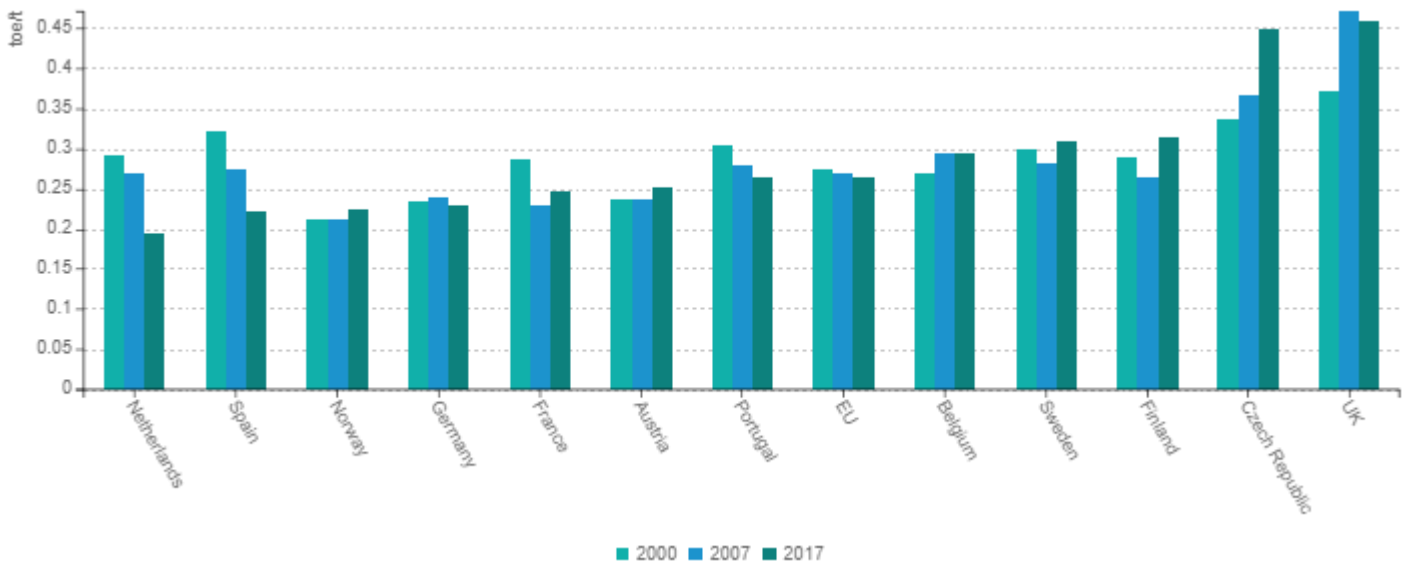
*Ratio electric steel / total steel production in EU countries*



## Energy efficiency trends in paper industry

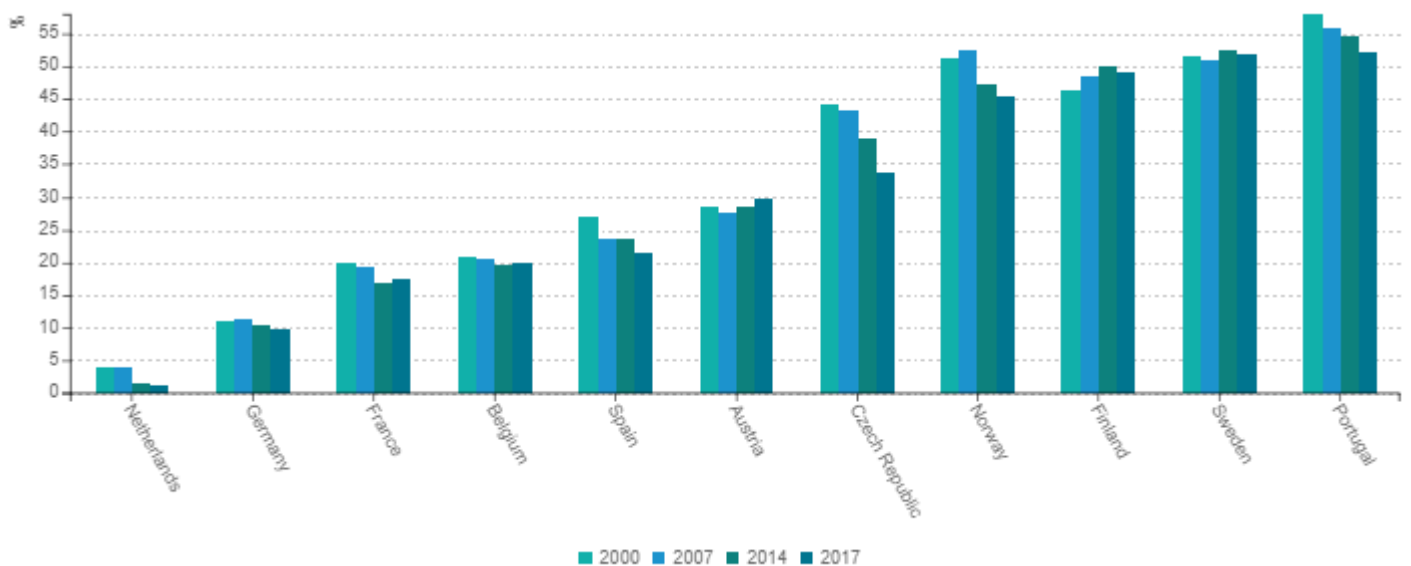
- There is a regular decrease of the specific consumption per ton of pulp and paper in most countries (-0.3%/year at EU level from 2000 to 2017).
- The largest reduction is observed in The Netherlands and Spain (> 2%/year since 2000).
- These trends are influenced by energy efficiency but also by variation of the share of pulp produced in the country.
- Differences among countries also depend on the level of pulp production.

*Specific consumption of paper and pulp*



- There is a decreasing share of the ratio pulp production over paper production in almost all countries over time.
- The lower the pulp/paper ratio, the lower the average energy consumption per ton of paper is.
- A ratio >100% means that countries export pulp - this is for instance the case of Finland, Norway and Sweden.
- Comparison among countries of specific energy consumption per ton of paper should be made at similar level of pulp/paper ratio.

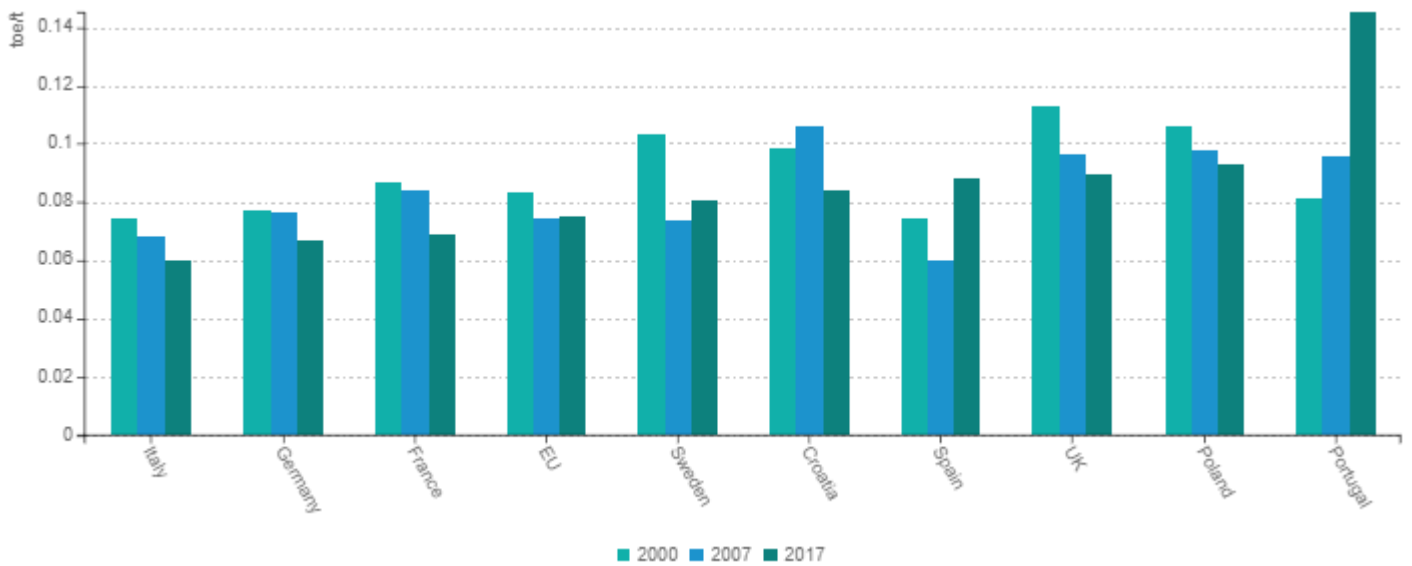
*Ratio pulp/paper production in EU countries*



## Energy efficiency trends in cement industry

- Slight decrease of the specific consumption of cement since 2000 in Italy, Germany, Sweden, France, Croatia and Poland.
- Since 2007, increase in this specific consumption, in countries hit by the recession (e.g. Portugal and Spain), and stabilization at EU level.
- Differences among countries are explained by differences in the efficiency of clinker production, the energy intensive component of cement, as well as in the ratio clinker to cement production: the higher this ratio, the higher the specific energy consumption.

*Specific consumption of cement*

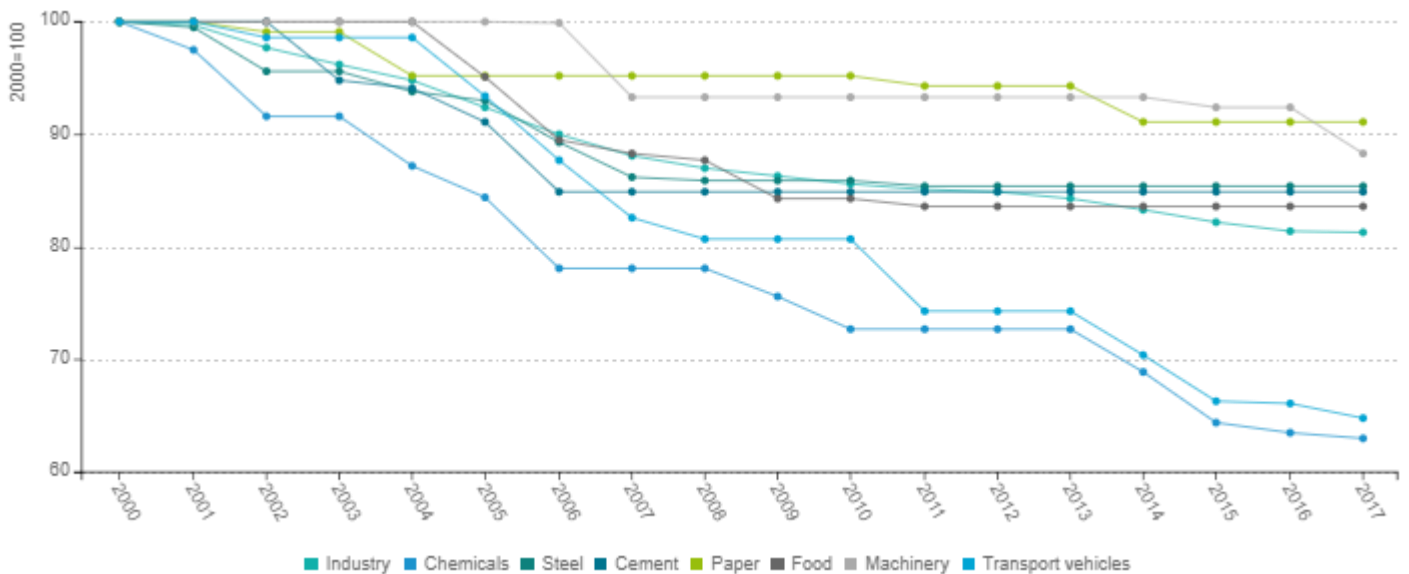


# Energy efficiency and savings

## Slower energy efficiency progress in industry since 2007

- Energy efficiency index in industry is calculated as a weighted average of sub-sectoral indices of energy efficiency progress at the level of 10 branches:
  - 4 main branches: chemicals, food, textile and equipment goods;
  - 3 energy intensive branches: steel, cement and pulp and paper
  - 3 residual branches: other primary metals (i.e. primary metals minus steel), other non-metallic minerals (i.e. non-metallic minerals minus cement) and printing.
- This index is corrected from the apparent loss of energy efficiency due to the recession and corresponds to a technical index.
- Sub-sectoral indices are expressed in terms of energy used per ton produced for energy intensive products (steel, cement and paper) and in terms of energy used related to the production index for the other branches.

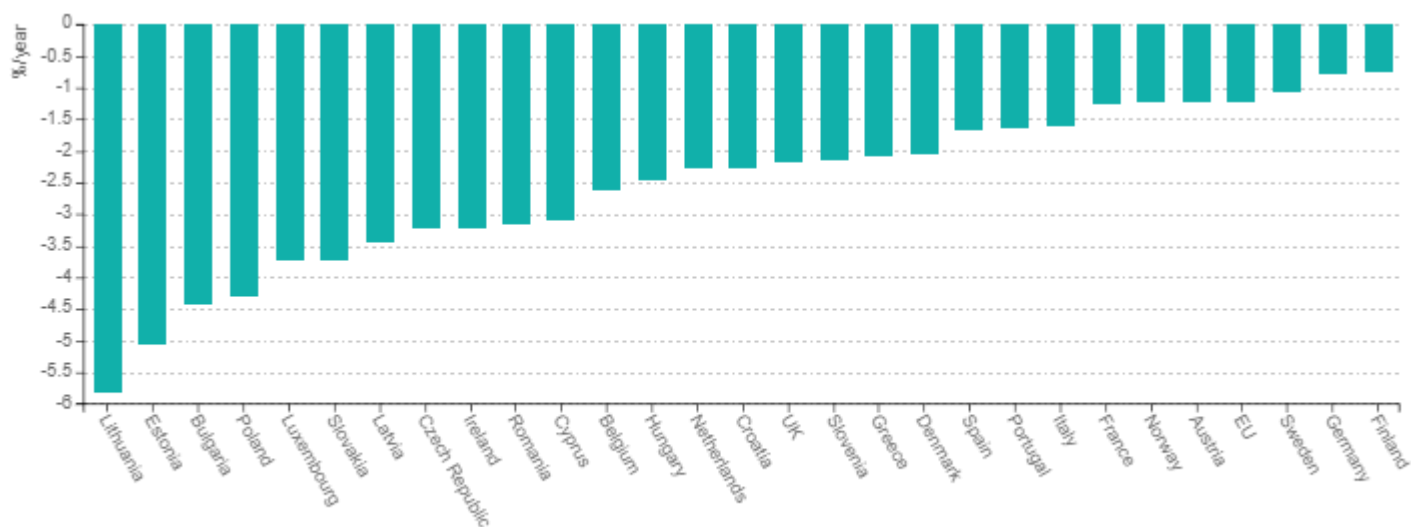
*Energy efficiency index by branch (EU)*



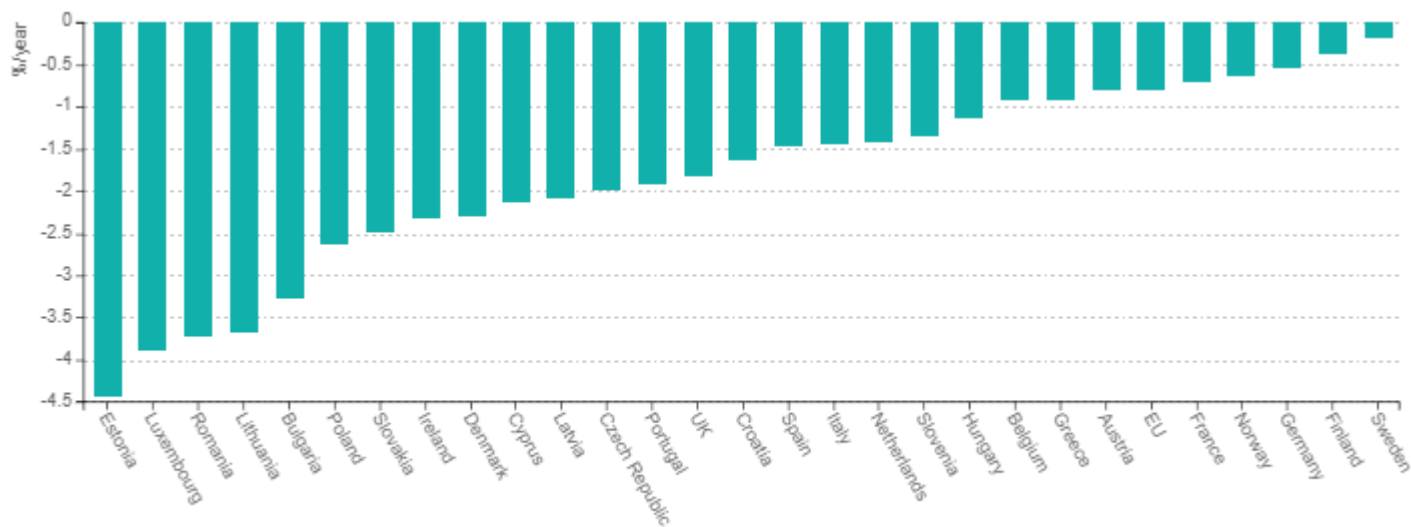
- Energy efficiency in EU industry improved by 1.2%/year on average since 2000.
- The energy efficiency improvement rate has been twice slower since 2007 (0.8%/year) than between 2000 and 2007 (1.8%/year) because of a slower progress in some branches and even no more energy efficiency improvement for others because of the recession (e.g. cement, machinery, steel).
- Since 2007, the deterioration of energy efficiency is observed in almost all countries due to the recession.



*Energy efficiency trends in industry in EU countries (2000-2017)*



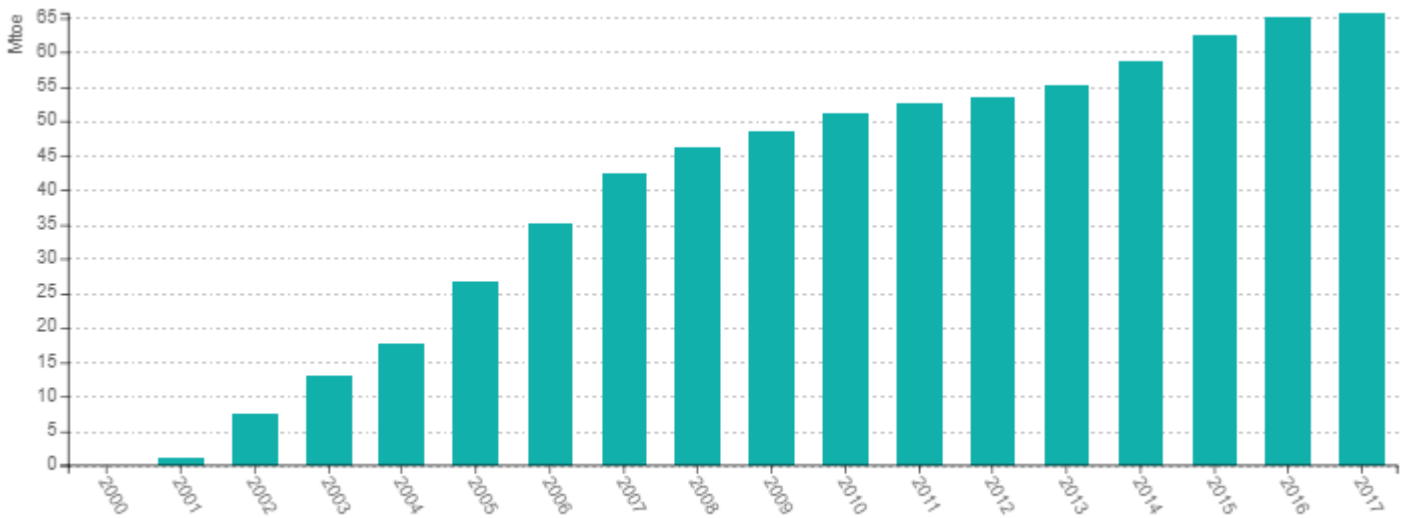
*Energy efficiency trends in industry in EU countries (2007-2017)*



### Energy savings more than twice lower since 2007

- In 2017, energy savings reached around 65 Mtoe compared to 2000. In other words, without energy efficiency improvement, energy consumption would have been higher by 65 Mtoe.
- Energy savings are derived from the ODEX indicator.
- Energy savings were mostly achieved before the 2008 economic crisis. Energy savings are rising again since the end of the recession in 2013.

### Energy savings in industry - EU

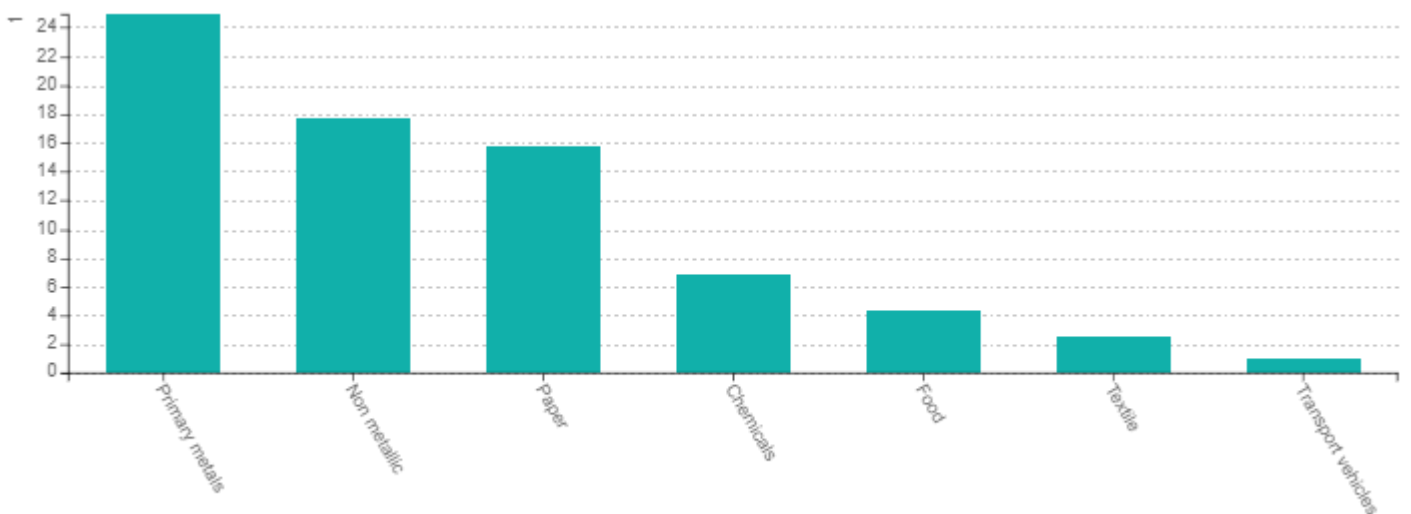


## Structural changes

### Relative levels of energy intensities by branch (machinery = 1) in the EU

- Primary metals, the most energy intensive branch, require around 25 times more energy to produce one unit of value added than machinery, the branch with the lowest intensity (machinery =1 in the graph).
- Non metallic minerals are 18 times more intensive and paper 16 times.
- A reduction in the share of energy intensive branches in the industrial value added with an increase in the share of equipment and machinery will result, all things being equal, in a reduction of the average energy intensity of manufacturing.

### Energy intensities by branch (EU)



## Impact of structural changes on industry intensity

- Energy intensity at constant structure reflects the variation of the energy intensity assuming a constant structure of value added, between the various branches or sub-branches, so as to leave out the influence of structural changes.
- The difference in the variations of the intensity and the intensity at constant structure measures the effect of structural changes.
- For the period 2000-2017, structural changes explain around 14% of the intensity decrease (34% during the years 2000-2007, less than 5% since then).

*Intensity trends and structural changes in manufacturing (EU)*

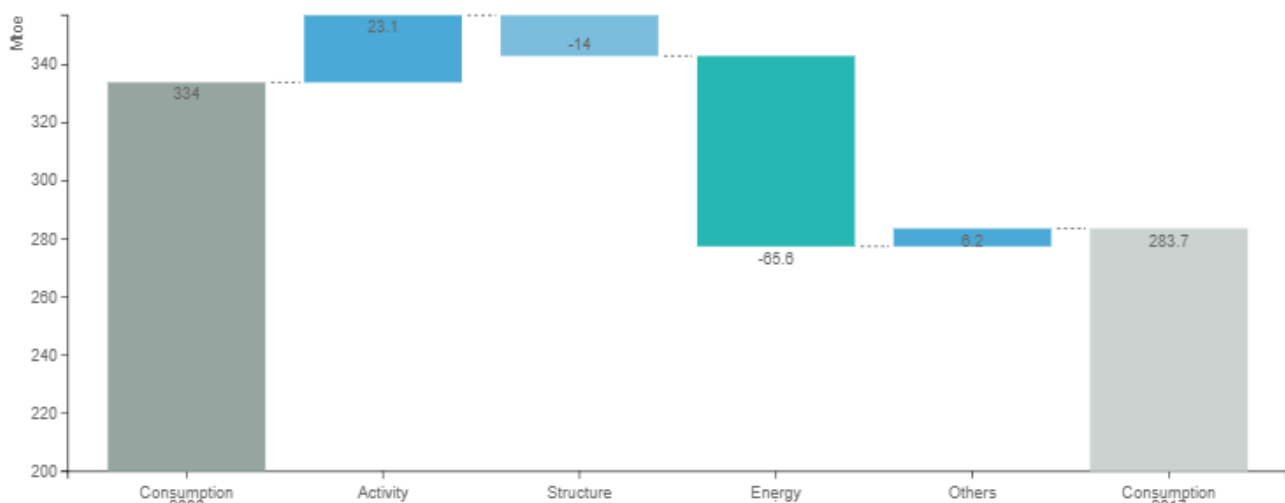


## Decomposition of energy consumption

### Drivers of energy consumption variation

- Industrial energy consumption decreased by around 50 Mtoe between 2000 and 2017.
- This is mainly due to energy savings (66 Mtoe) and to a lesser extent to a structural effect (14 Mtoe), i.e. the fact that less intensive branches increased their contribution in industrial value added.
- Change in industrial activity (measured with the production index) had a relatively limited effect (23 Mtoe).

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

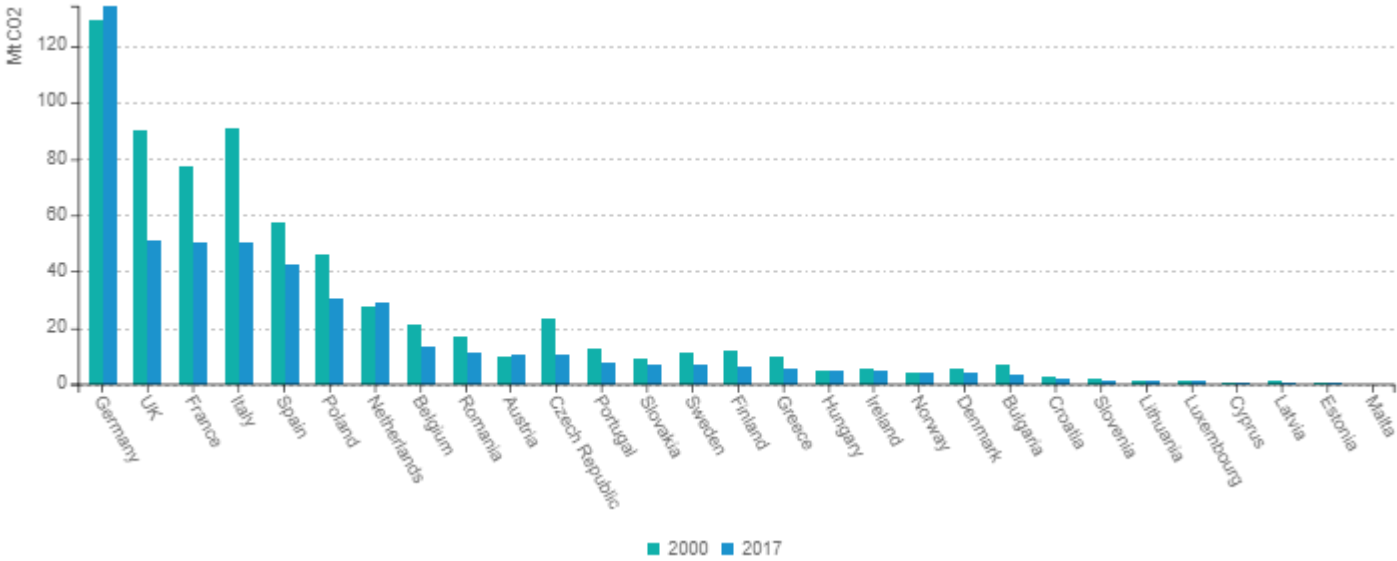


# CO2 emissions

## CO2 emissions from fuel combustion

CO2 emissions from fuel combustion have been decreasing since 2000 in almost all countries (-27% at EU level). Germany, Netherlands, Austria and Hungary have seen their CO2 emissions in industry increase over the period.

CO2 emissions from fuel combustion in industry



Source: EEA