

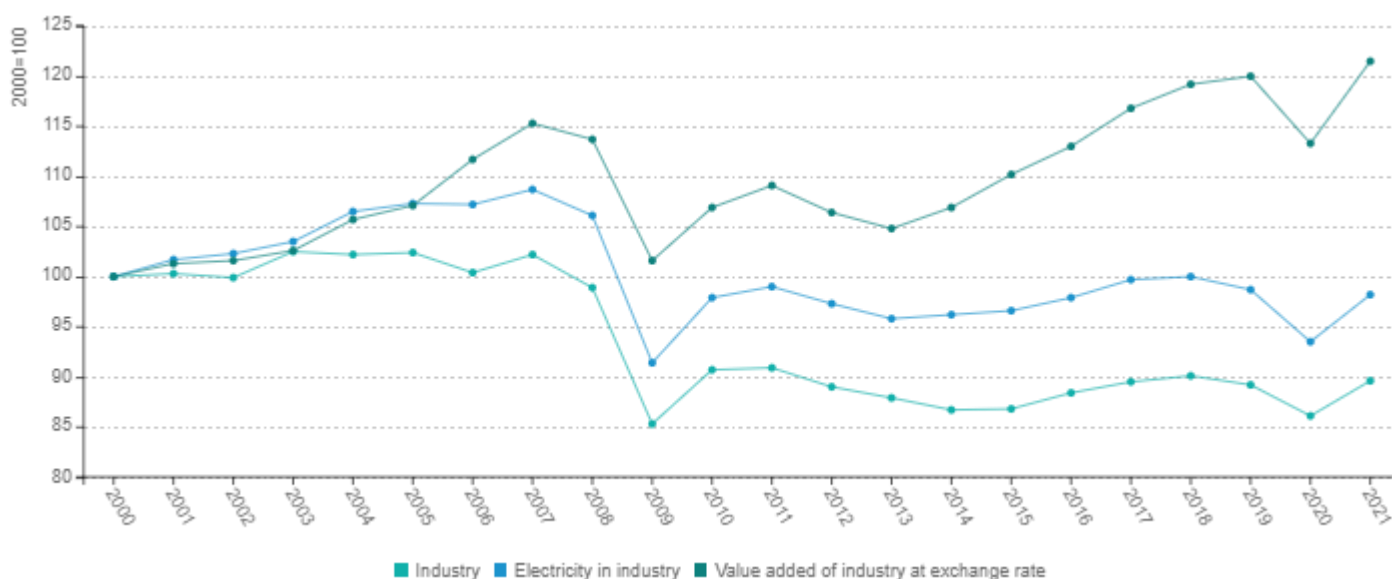
Sectoral Profile - Industry

Energy consumption

Energy consumption trends in EU

- The energy consumption of industry has been fluctuating a lot since 2000 and was in 2021 around 10% lower than in 2000 and almost at the same level as in 2010.
- It had decreased between 2007 and 2009, with the global financial crisis, and from 2011 to 2014, with a reduction in industrial activity. It then rose between 2014 and 2018, following a strong growth in industrial activity, and decreased again between 2018 and 2020 due to a slowdown in industrial growth and the Covid crisis, and rebounded in 2021 (+5%).
- Electricity followed the same trend as total consumption.

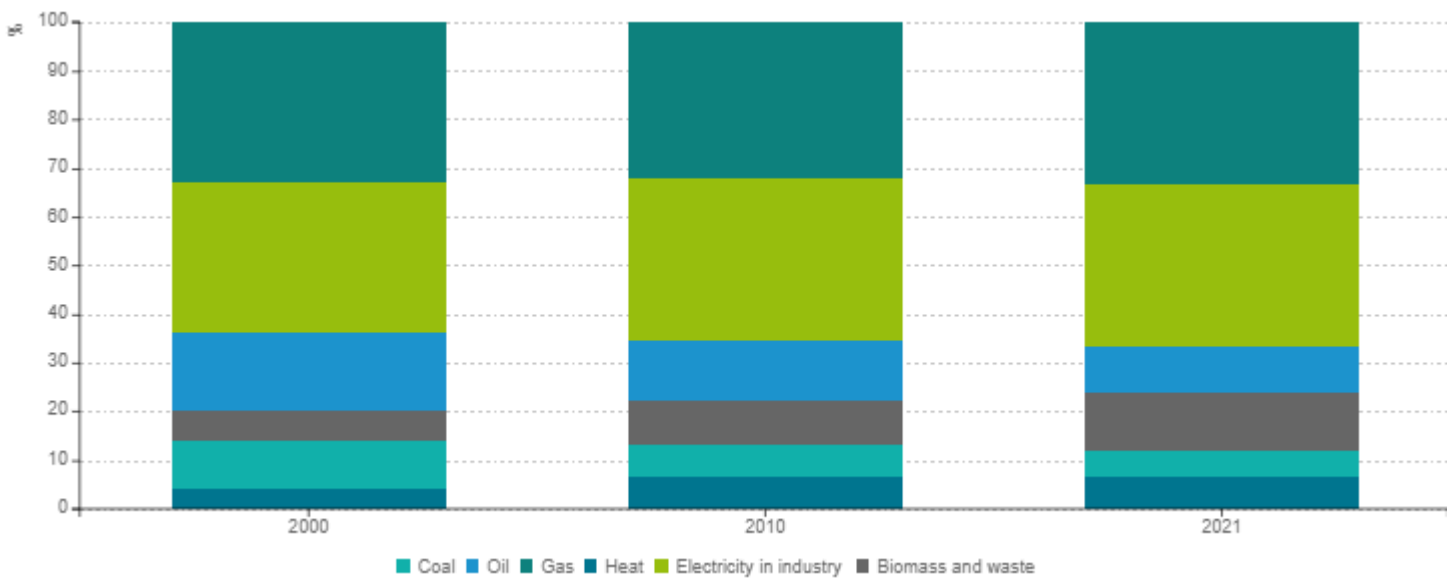
Energy consumption and activity in industry (2000 = 100)



Change in fuel mix in EU industry

- Electricity has the highest share in industry consumption (34% in 2021), closely followed by gas (33% in 2021). The share of gas has roughly remained constant (33% in 2000) and the share of electricity has increased by 3 points since 2000.
- The shares of oil and coal have been decreasing since 2000 (-6.8 points and -4.2 points respectively).
- The shares of biomass and heat have been increasing (+5.7 points and +2.4 points respectively).

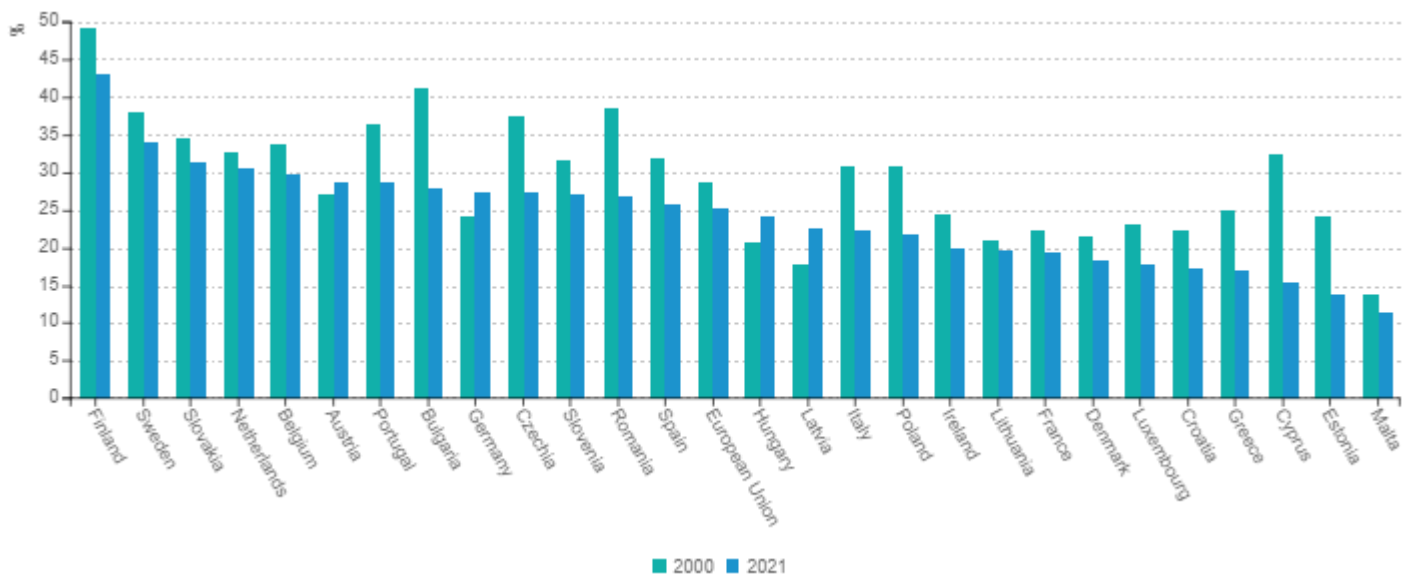
Change in fuel mix in industry (EU)



Industry absorbs a declining share of final consumption

- In most EU countries, the share of industry in the final energy consumption is declining (by 3.5 points at EU level since 2000). This decline was very significant in Bulgaria, Romania, Czechia, Greece, Cyprus, and Estonia (by 8 to 17 points).
- This share has however increased in 4 countries, namely Germany, Austria, Latvia and Hungary, by 1.7 to 4.8 points.
- There are large discrepancies in the share of industry in final consumption among countries: from 15% or less in Cyprus, Estonia and Malta to 43% in Finland (25% for EU on average).

Share of industry in the final consumption

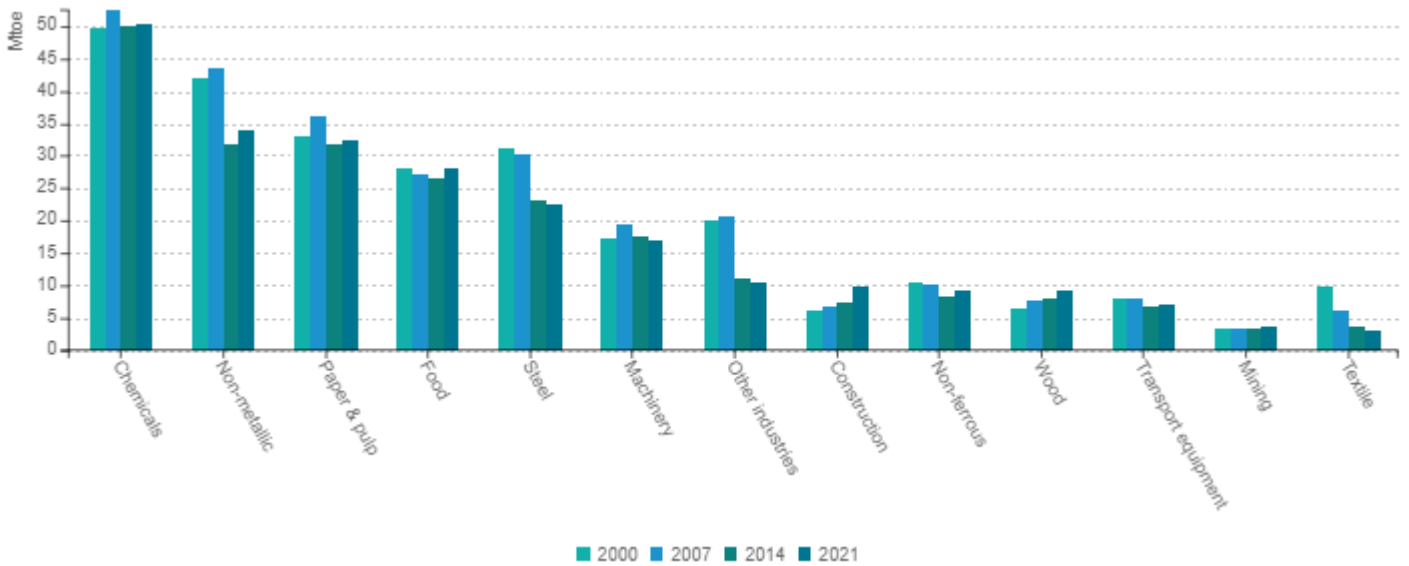


Energy consumption trend by industrial branch

- Chemicals, non-metallic, paper and food industries contribute to more than 2/3 of industry energy consumption in the EU. Chemicals is the largest consumer (22% in 2021), followed by non-metallic (18%), paper (15%) and non-metallic minerals (12%).

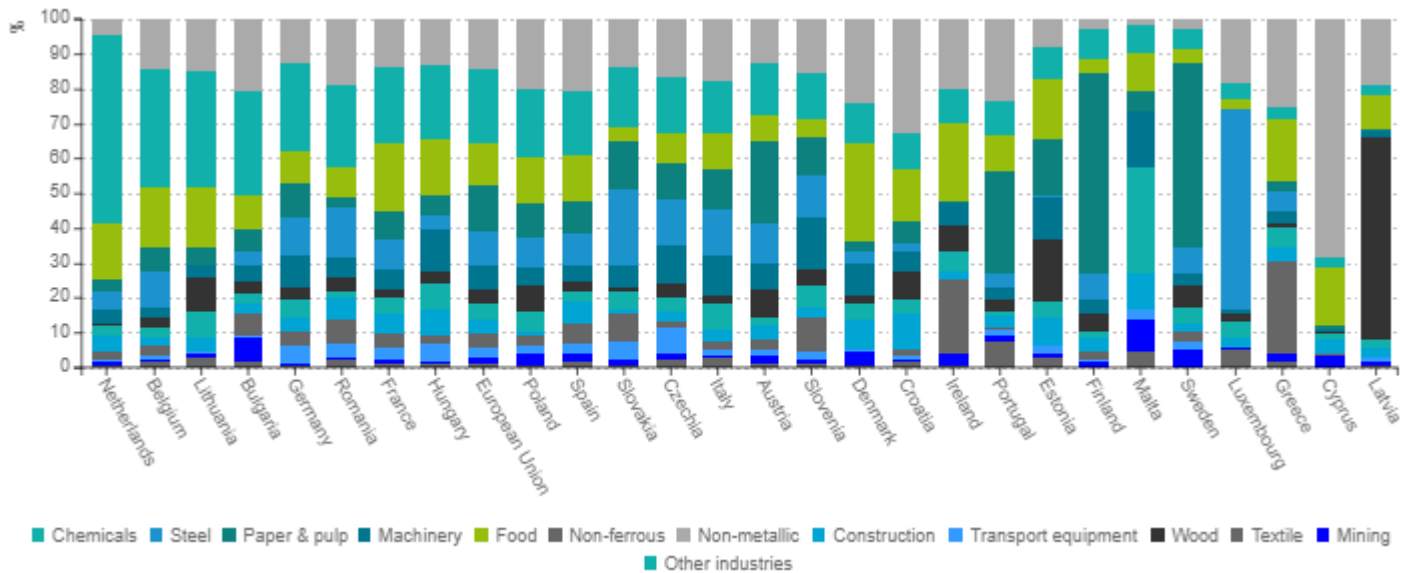
- Energy consumption of steel and non-metallic minerals have strongly decreased since 2000 (-28% and -19% respectively). Textile energy consumption has dropped by 68%.

Energy consumption of industry by branch (EU)



- At country level, the situation is very different from one country to another. Chemicals is the main industrial consumer in 9 EU Member States. Paper and pulp is the most important branch in Scandinavian countries (Sweden and Finland), Portugal, and Austria.

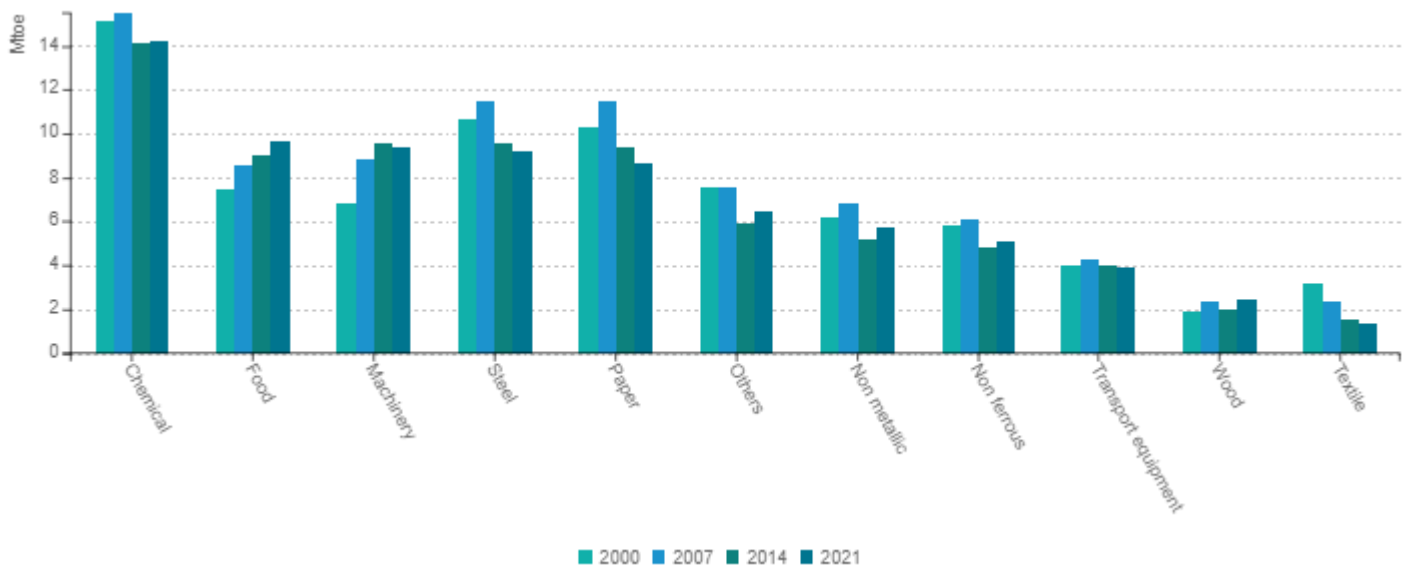
Energy consumption by industrial branch (2021)



Variation of electricity consumption of industry by branch

- Chemical is the largest electricity intensive branch (18%) followed by machinery, steel (12% each) and paper and food (11%)
- In several branches, electricity consumption has been decreasing since 2007: this is the case of steel (-1.6%/year) and paper (-2%/year). In the food industry, electricity consumption has been rising regularly since 2000 since 2014, especially food (+1.2%/year). In the non-metallic branch consumption has increased since 2014 (+1.3%/year).

Electricity consumption of industry by branch - EU

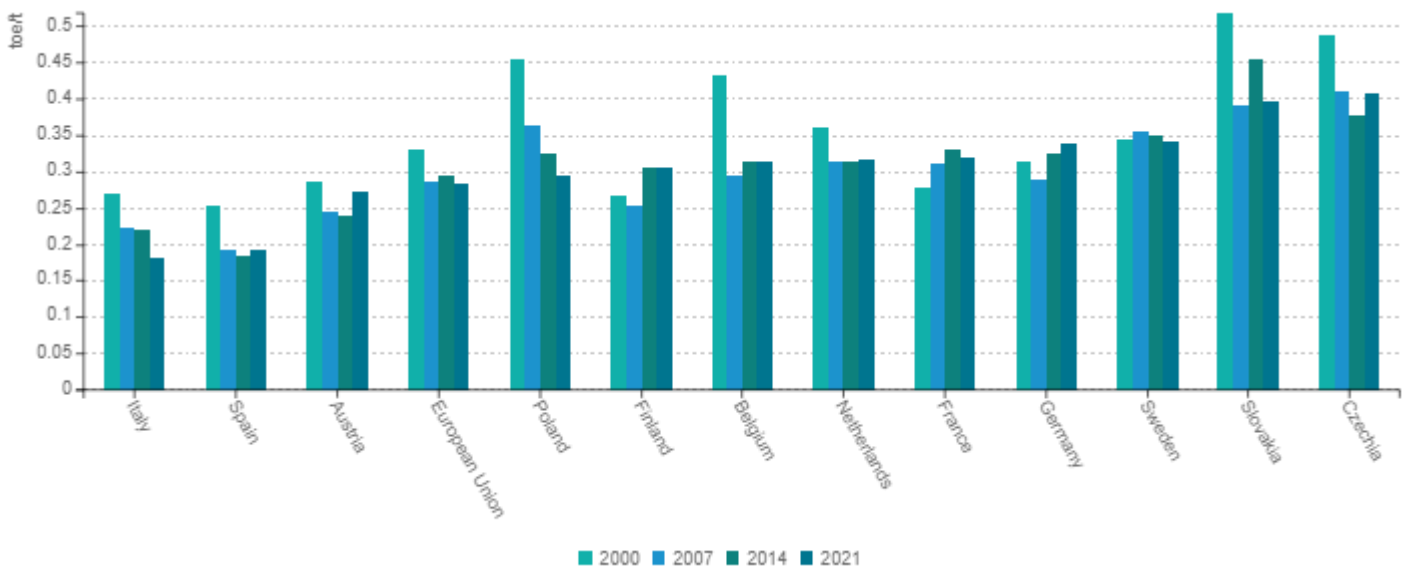


Specific consumption

Energy efficiency trends in steel industry

- There is an apparent deterioration of energy efficiency in steel production since 2007 in 7 EU 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 has slightly decreased since 2007.
- Decrease in the specific consumption of steel over years in 5 EU MS (Poland, Austria, Italy, Spain, Czechia, Sweden).
- Different performances, partly explained by the share of the electric process, the less intensive process, in steel production are visible across countries.

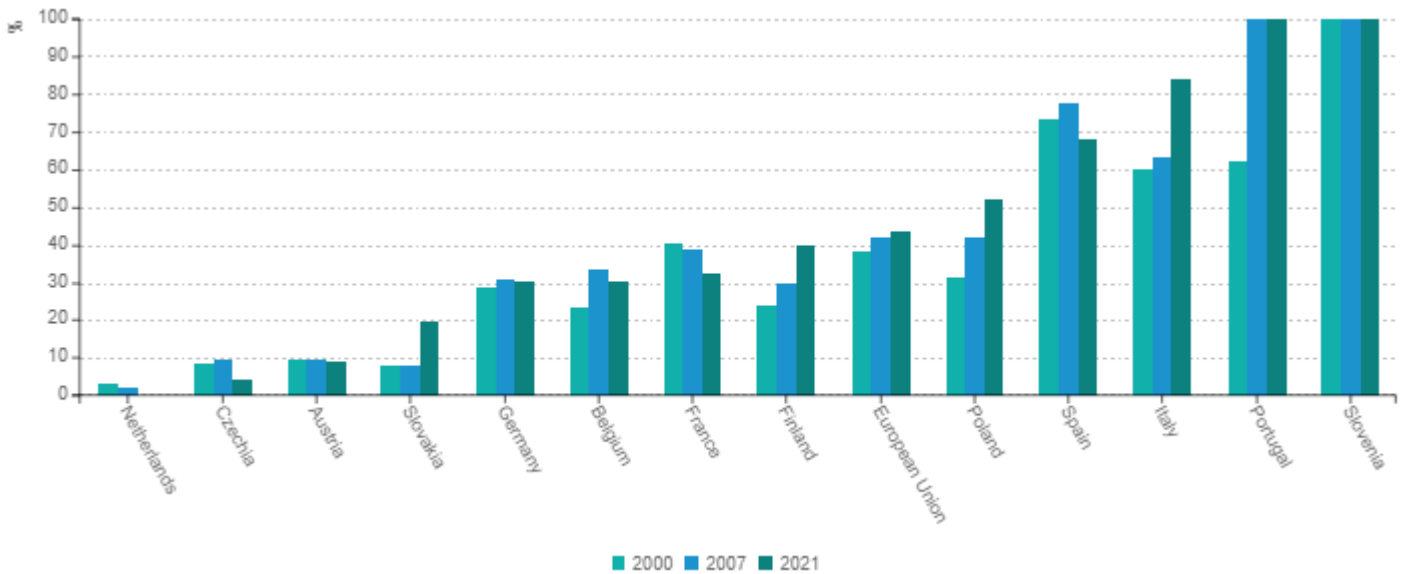
Specific consumption of steel



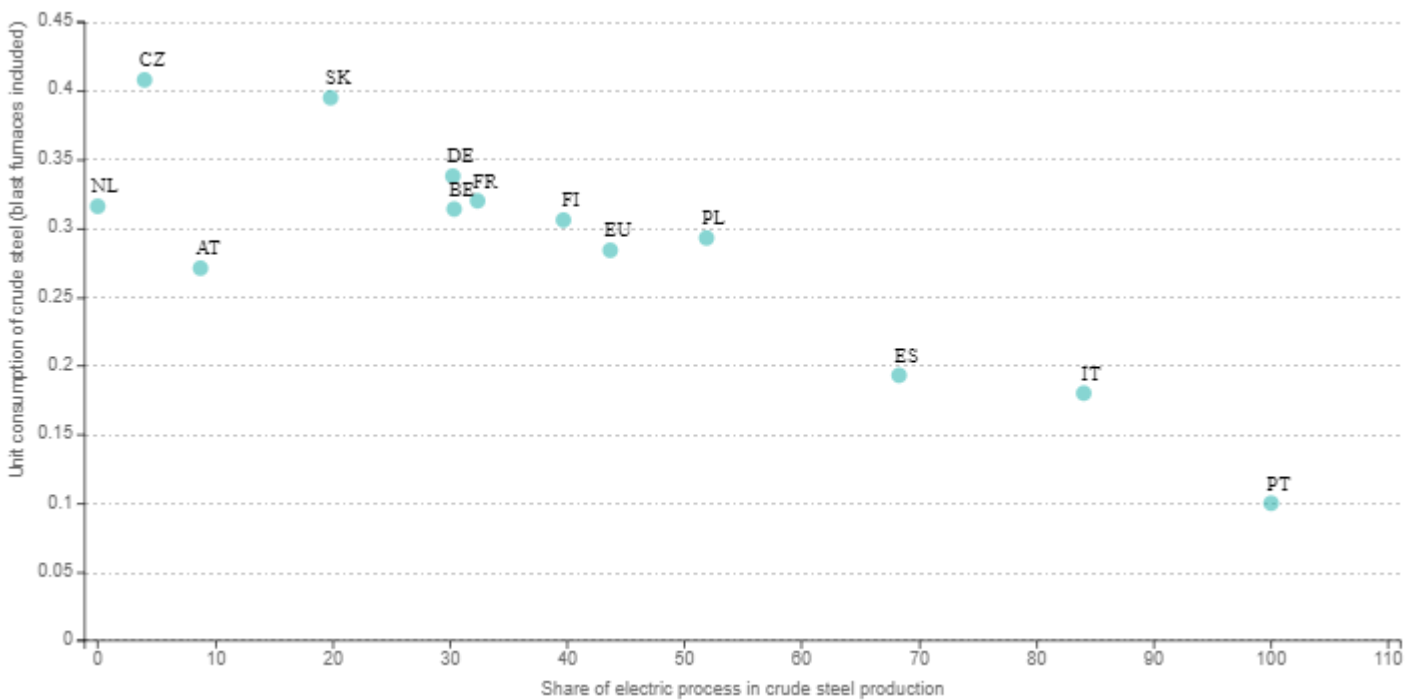
- The energy performance of the steel industry should be considered in relation to the share of electric steel: the higher this ratio, the lower the specific consumption. In Slovenia and Portugal, all the steel is produced from the electric

process, while in Italy and Spain, the share of this process is around 70-80%, which explains the low specific consumption.

Ratio electric steel / total steel production in EU countries



Specific energy consumption of crude steel (2021)

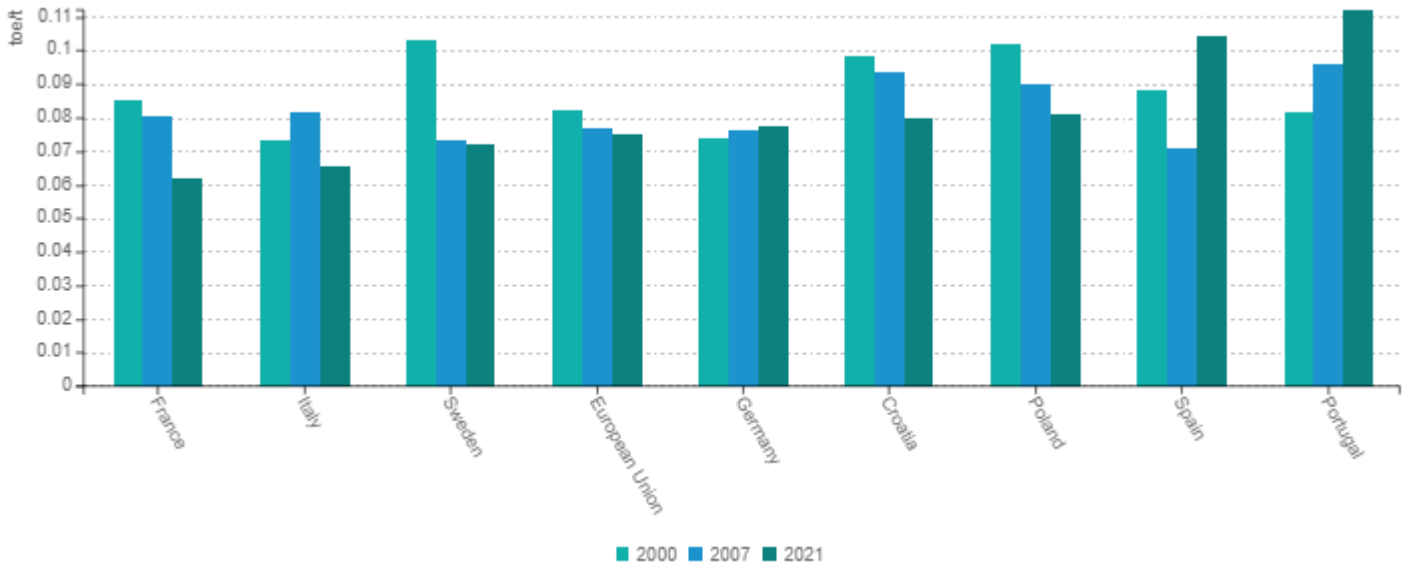


Energy efficiency trends in cement industry

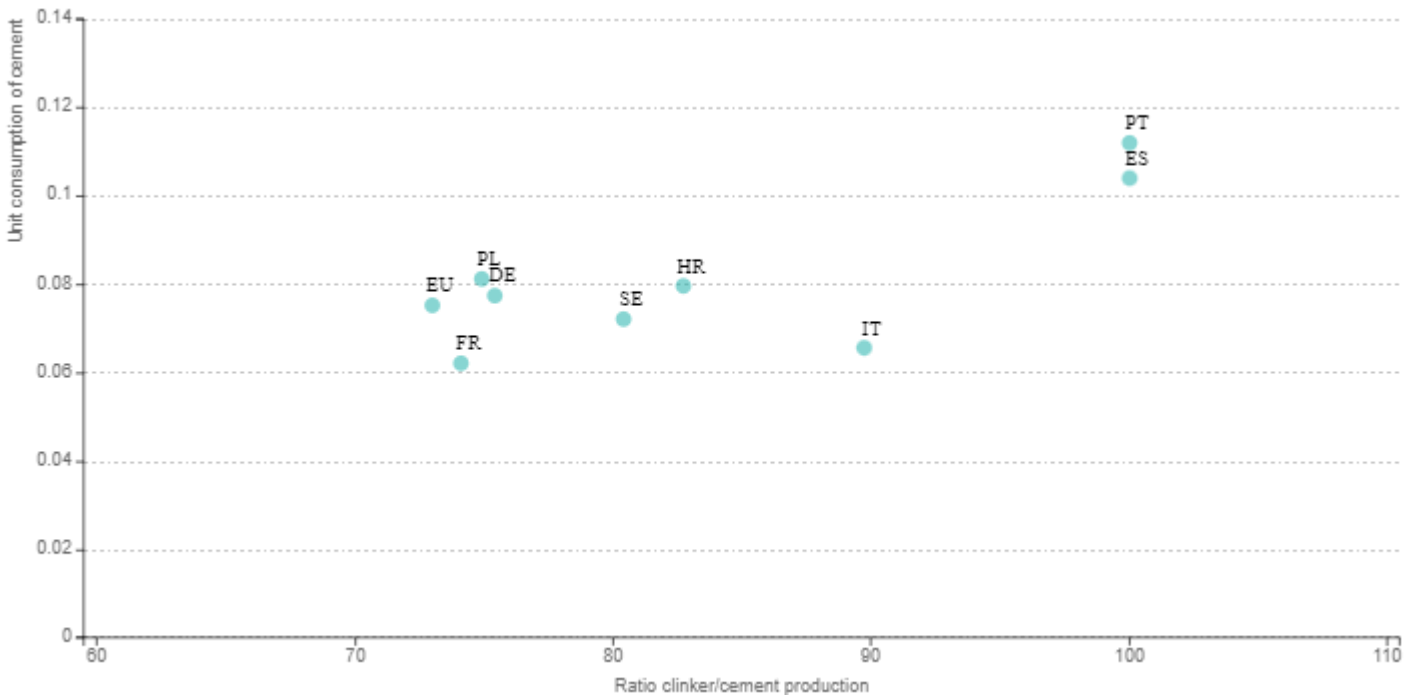
- Decrease of the specific consumption of cement since 2000 in 5 EU MS (Italy, Sweden, France, Croatia and Poland).
- Since 2007, this specific consumption has increased in countries strongly affected by the economic crisis (e.g. Portugal and Spain). It slightly decreased at EU level.

- 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



Specific energy consumption of cement (2021)

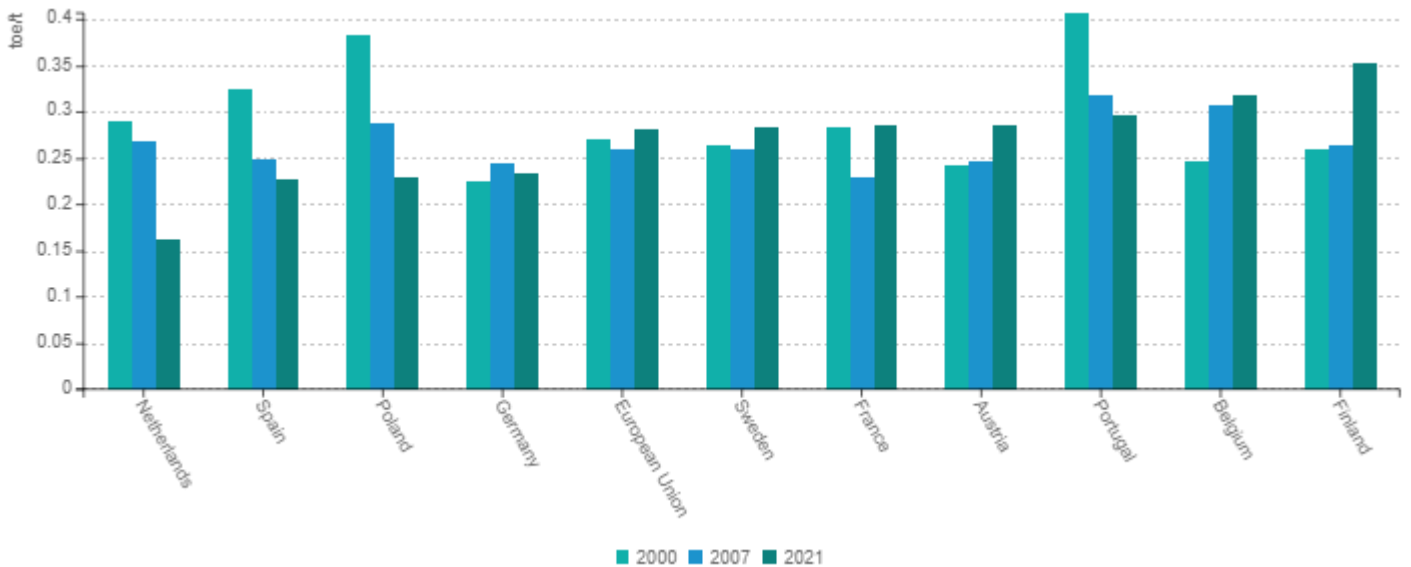


Energy efficiency trends in paper industry

- Around half of the EU MS have seen a decrease in the specific consumption per ton of pulp and paper and other half have seen an increase. At EU level, the level is roughly stable.
- The largest reduction is observed in The Netherlands and Spain (respectively 2.5% and 2.2%/year since 2000).
- These trends are influenced by energy efficiency but also by variation of the share of pulp produced in the country.

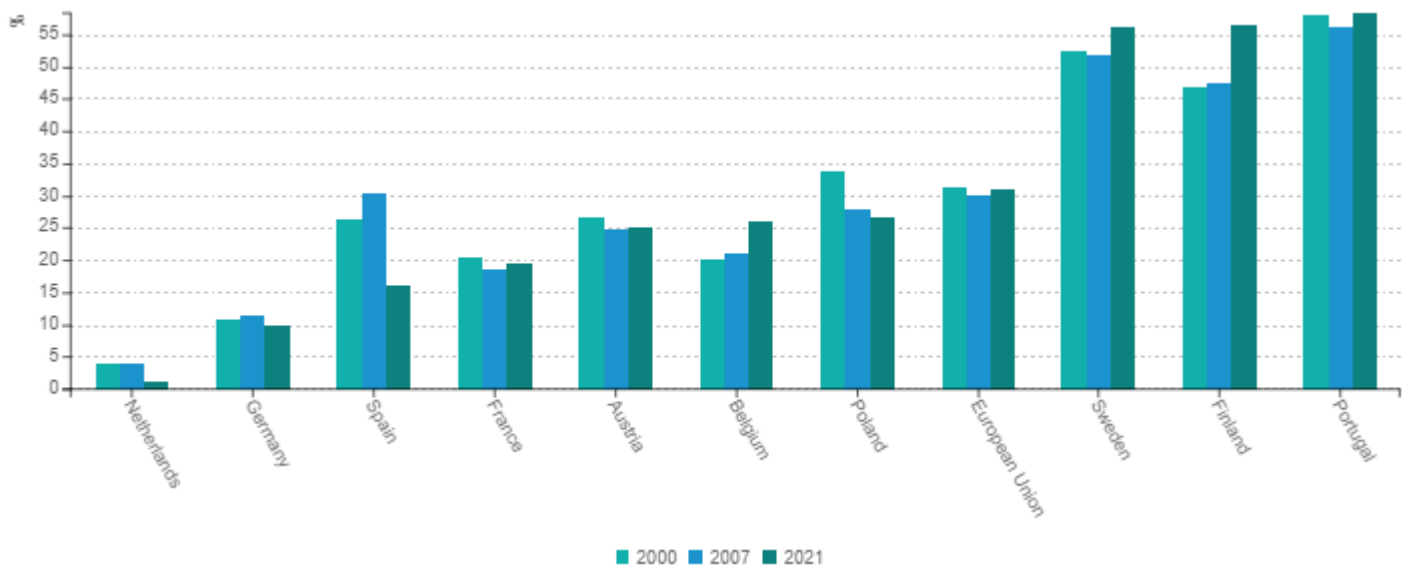
- Differences among countries also depend on the level of pulp production.

Specific consumption of paper and pulp



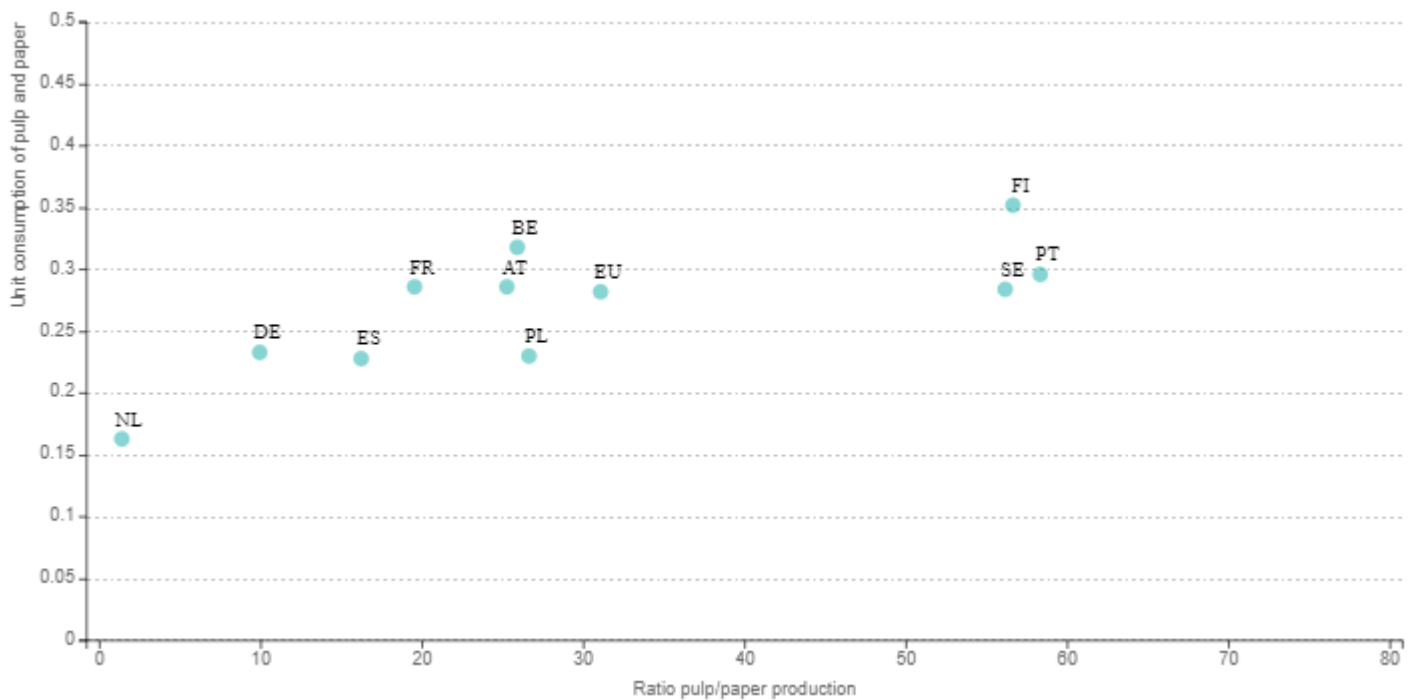
- There are huge differences among countries in the share of pulp production over total paper and pulp production : from 1% for Netherlands to more than 55% in Scandinavian countries (Finland, Sweden) as well as in Portugal and Czechia.

Ratio pulp/paper production in EU countries



- The lower the share of pulp is, the lower the average energy consumption per ton of pulp and paper production is, on average.

Specific energy consumption per tonne of pulp and paper (2021)

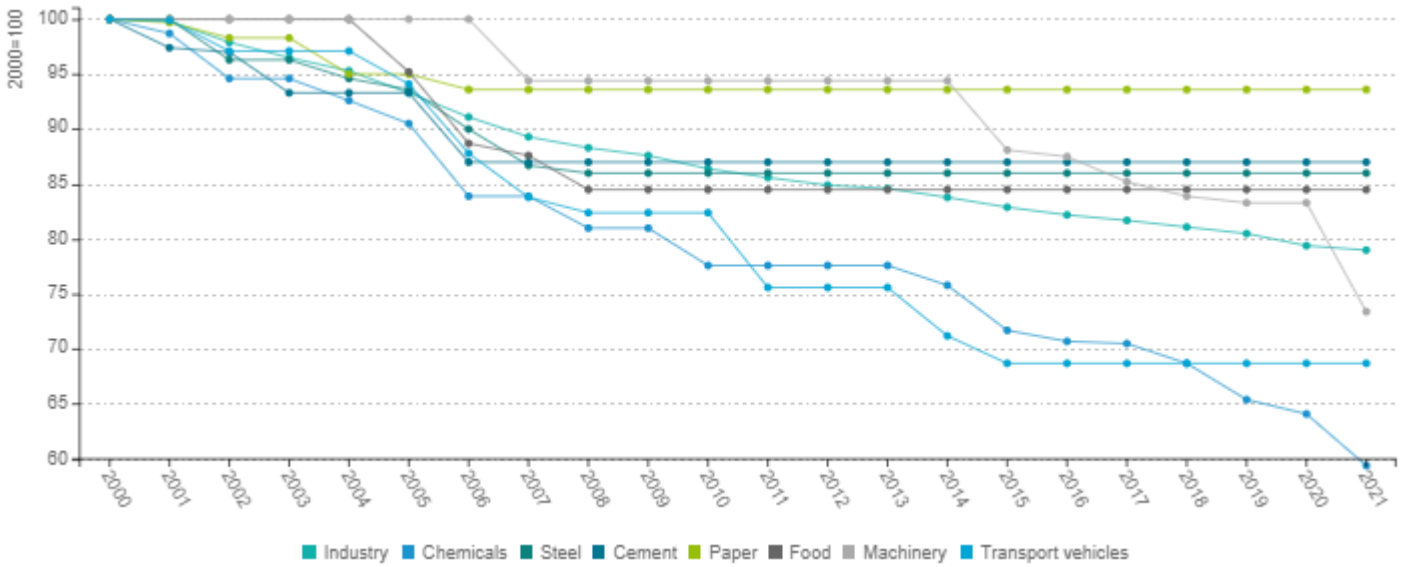


Energy efficiency and savings

Slower energy efficiency progress in industry since 2007

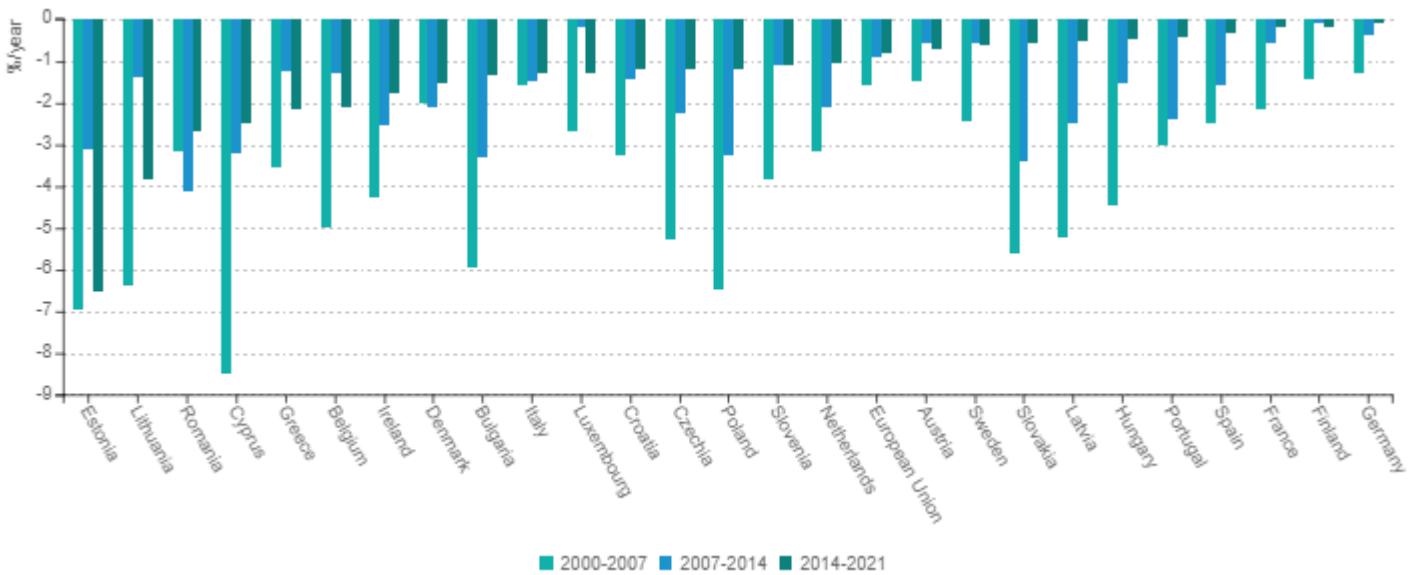
- Energy efficiency in EU industry improved by 1.1%/year on average since 2000, as measured with the energy efficiency index.
- The energy efficiency improvement rate has slowed down since 2007 (0.9%/year compared to 1.6%/year between 2000 and 2007) because of a slower progress in some branches and even no more energy efficiency improvement for others because of the recession (in particular in most energy intensive branches, e.g. cement, steel).
- The 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.

Energy efficiency index by branch (EU)



- Energy efficiency in industry has been significantly improved before the economic crisis in 2007-2008. Improvements are slowed down since then, and especially since 2014 (less than 2%/years in most countries).

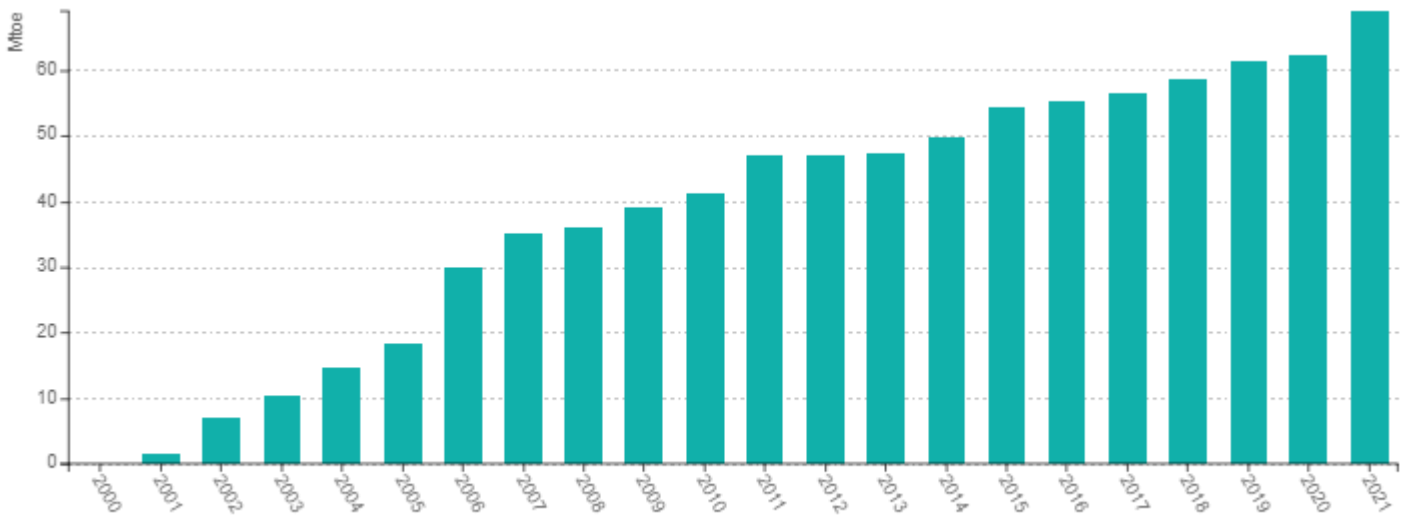
Energy efficiency trends in industry in EU countries (2000-2021)



Energy savings lower since 2007

- In 2021, energy savings reached 69 Mtoe compared to 2000. In other words, without energy efficiency improvement, energy consumption would have been higher by 69 Mtoe.
- Energy savings growth was rapid until 2007 (around 5 Mtoe/year on average). It has been twice slower since then (around 2.4 Mtoe/year), with a slight acceleration since 2014 (2.7 Mtoe/year vs 2.1 Mtoe/year over 2007-2014).

Energy savings in industry - EU

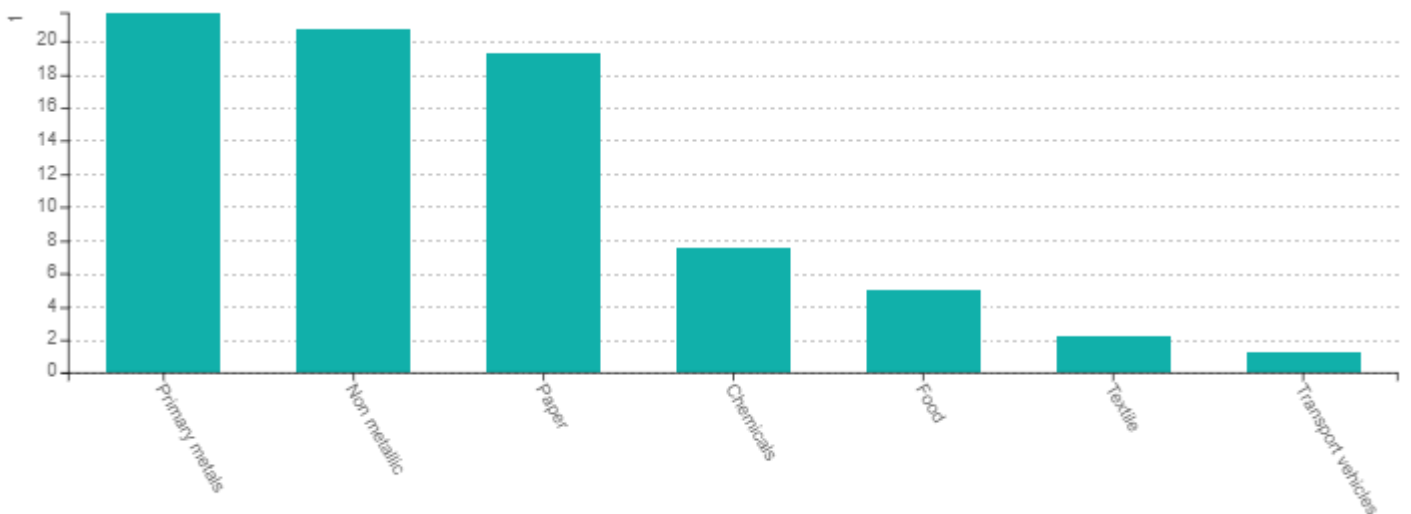


Structural changes

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

- Primary metals, the most energy intensive branch, require around 22 times more energy to produce one unit of value added than machinery, the lowest energy intensive branch.
- Non-metallic minerals are 21 times more intensive and paper 19 times.
- Due to that fact, 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.

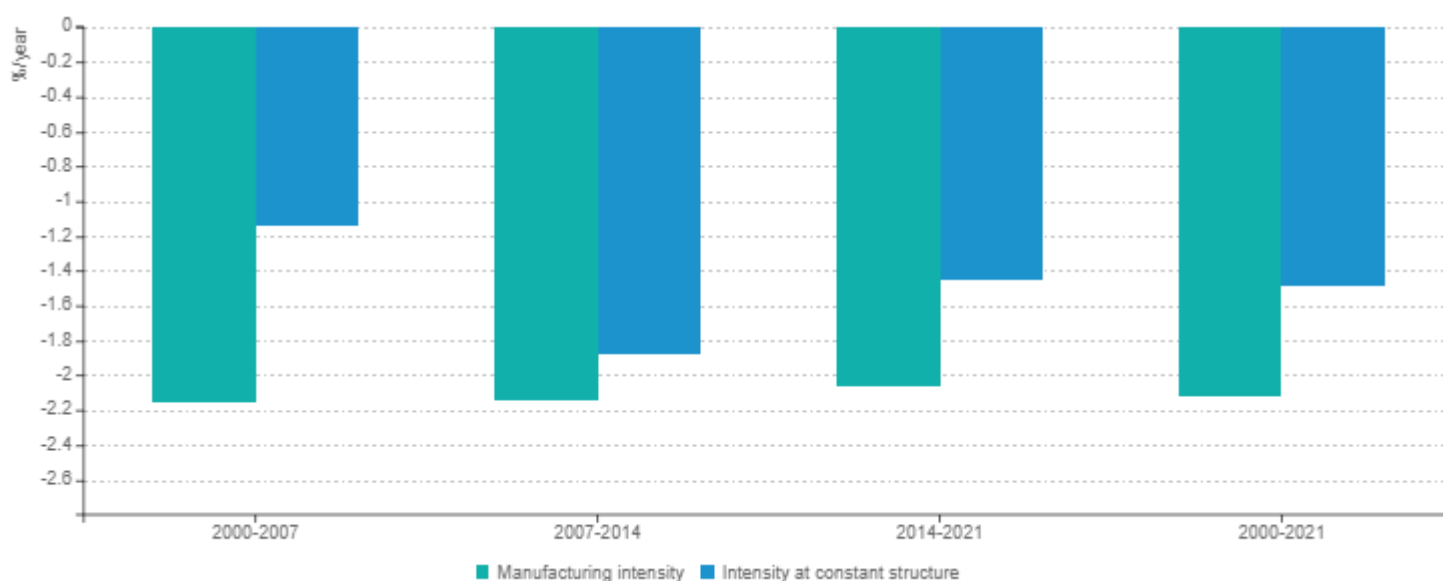
Energy intensities by branch in 2021 (EU)



Impact of structural changes on industry intensity

- Structural changes, i.e. changes in the contribution of each branch in industrial value added, have an impact on the energy intensity variation.
- To measure the impact of structural changes, an energy intensity at constant structure is calculated. It reflects the variation of the energy intensity assuming a constant structure of value added between the various 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.
- Since 2000, structural changes towards less energy intensive branches explain on average around 30% of the intensity decrease. The role of structural changes was greater over 2000-2007 (46%) and since 2014 (32%).

Intensity trends and structural changes in manufacturing (EU)

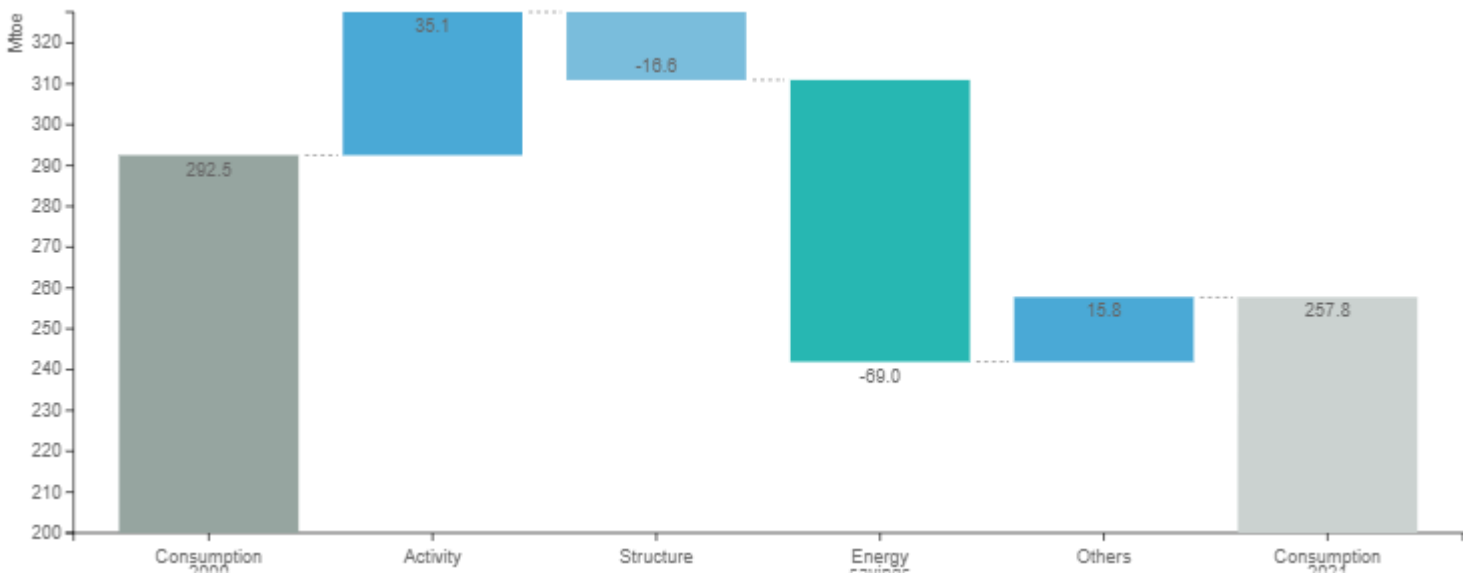


Decomposition of energy consumption

Drivers of energy consumption variation

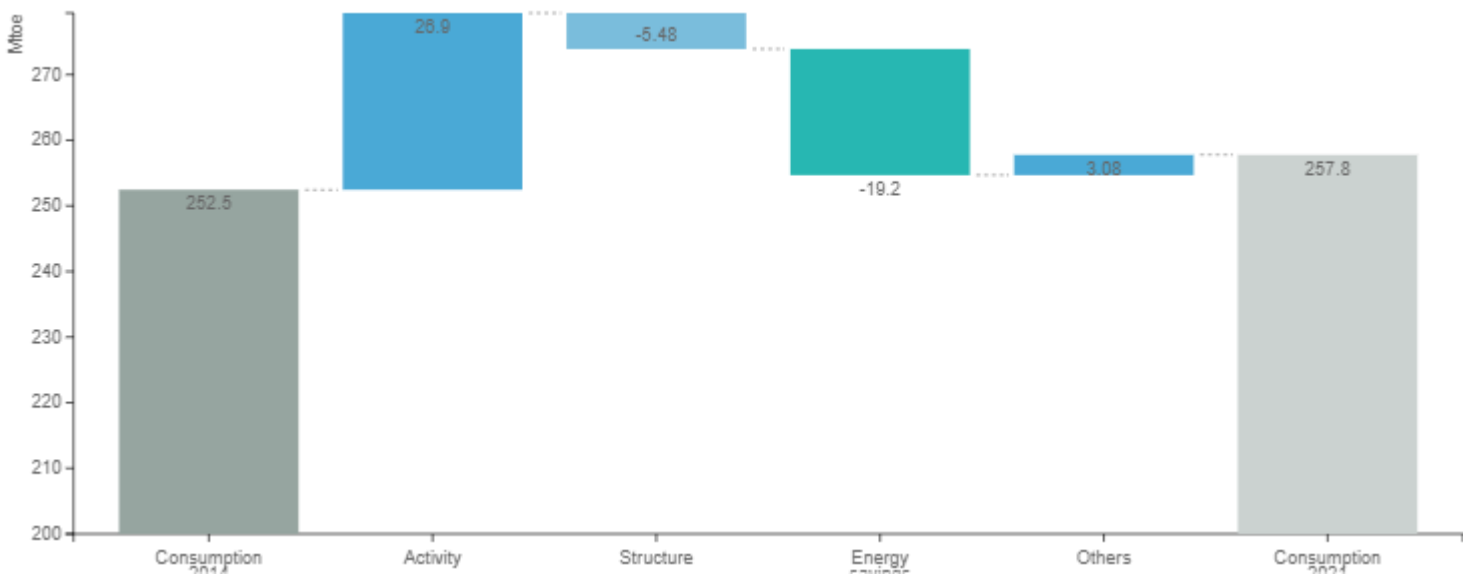
- Industrial energy consumption was around 35 Mtoe lower in 2021 than in 2000.
- This lower consumption is mainly due to energy savings (-69 Mtoe) and, to a lesser extent, to structural changes to less energy intensive branches (-16 Mtoe).
- Change in industrial activity (measured with the production index) had a relatively limited effect (35 Mtoe), because of a recession on part of the period.

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



- Industrial energy consumption has been relatively stable since 2014 (+5 Mtoe), the reduction took place in years following the 2007-2008 economic crisis.
- The activity effect reached +3.8 Mtoe/year between 2014 and 2021 (1.7 Mtoe/year between 2000 and 2021) is the main driver of the increase of industrial consumption.

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

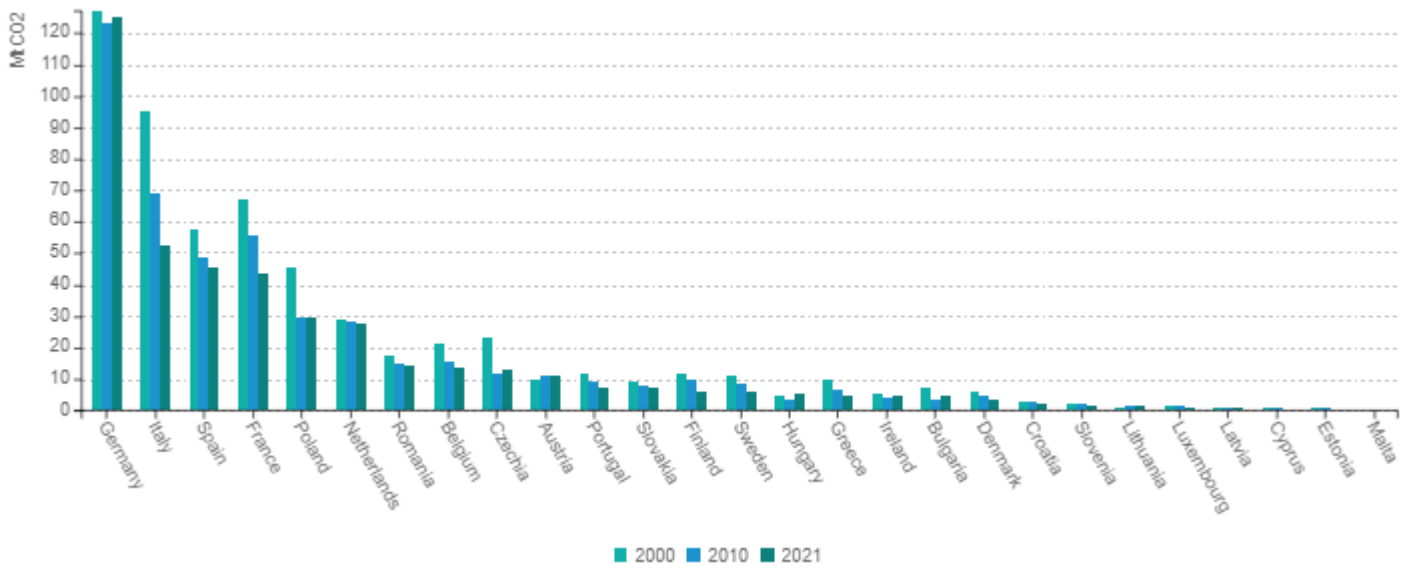


CO2 emissions

CO2 emissions from fuel combustion

CO2 emissions from fuel combustion in industry have been decreasing since 2000 in almost all countries (-25% at EU level). The exceptions are Austria, Hungary and Lithuania that have seen their CO2 emissions in industry increase over the period.

CO2 emissions from fuel combustion in industry



Source: EEA