

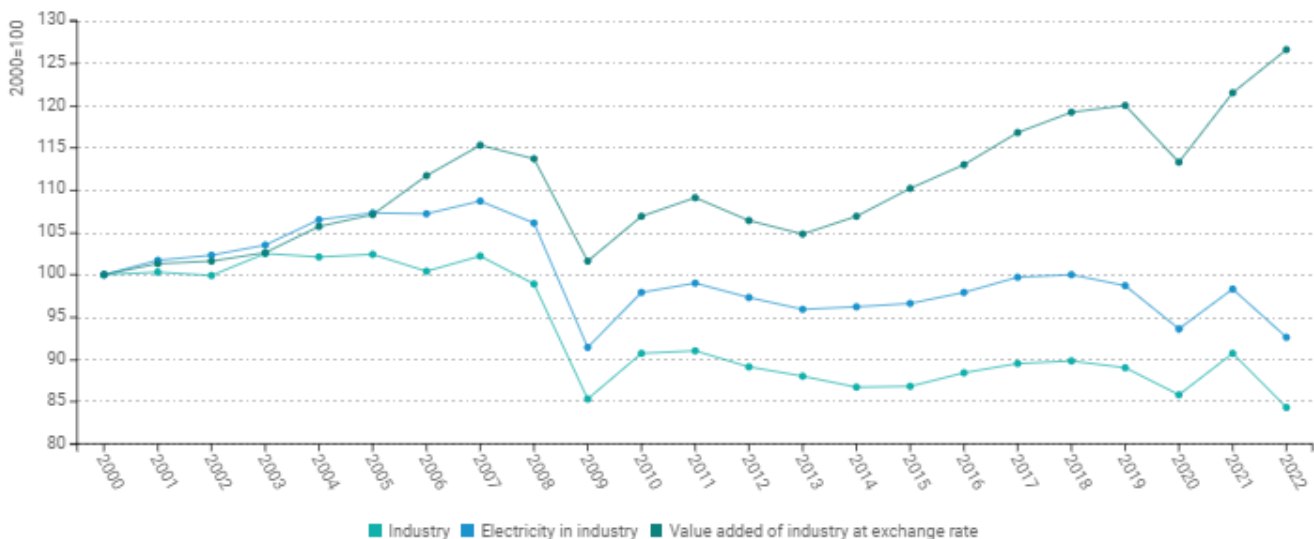
Sectoral Profile – Industry

Energy consumption

Energy consumption trends in EU

- The energy consumption of industry has been fluctuating since 2010, after a sharp decline between 2007 and 2009 following the financial crisis: it was in 2022 around 16% lower than in 2000, almost at the same level as in 2009.
- It decreased 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. Following a rebound in 2021 (+6%), a subsequent decline (-7%) occurred in 2022 with the surge of energy prices, despite a notable growth in value added (+4%). It can be explained by more efficiency in energy use due to the surge of energy prices.
- Electricity followed the same trend as total consumption.

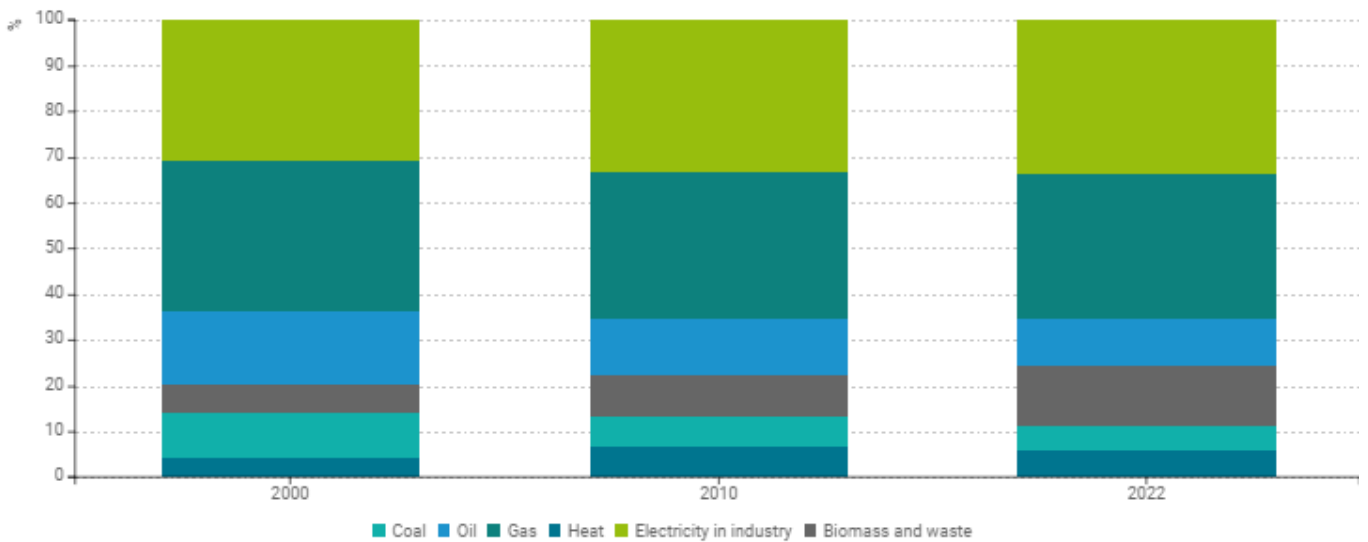
Energy consumption and activity in industry (2000 = 100)



Change in fuel mix in EU industry

- Electricity has the highest share in industry consumption (34% in 2022), closely followed by gas (32%). The share of electricity has increased by 3 points since 2000 (+2.4 over 2000-2010 and +0.6 points after), while the share of gas has roughly remained constant (33% in 2000).
- The shares of oil and coal have been decreasing since 2000 (-5.9 points and -4.5 points respectively). The largest reduction occurred before 2010 (-3.9 and -3.3 points respectively).
- The shares of biomass and heat have been increasing (+6.8 points and +1.8 points respectively). The share of heat increased before 2010 (+2.7 points), and then decreased by 0.9 points, while the share of biomass increased significantly since 2010 (+3.8 points).

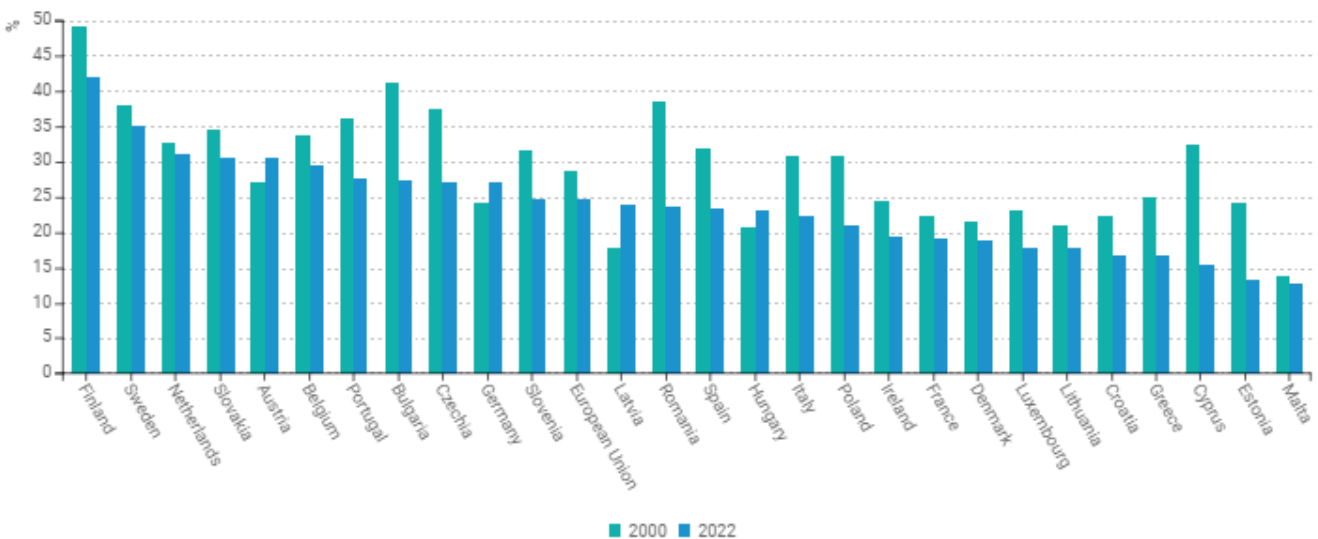
Change in fuel mix in industry (EU)



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 points at EU level since 2000 to 25% in 2022). This decline was very significant in Cyprus, Romania, Bulgaria, Estonia and Czechia (by 10 to 17 points).
- This share has however increased in 4 countries, namely Hungary, Germany, Austria and Latvia, by 2.6 to 6 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 42% in Finland.

Share of industry in the final consumption

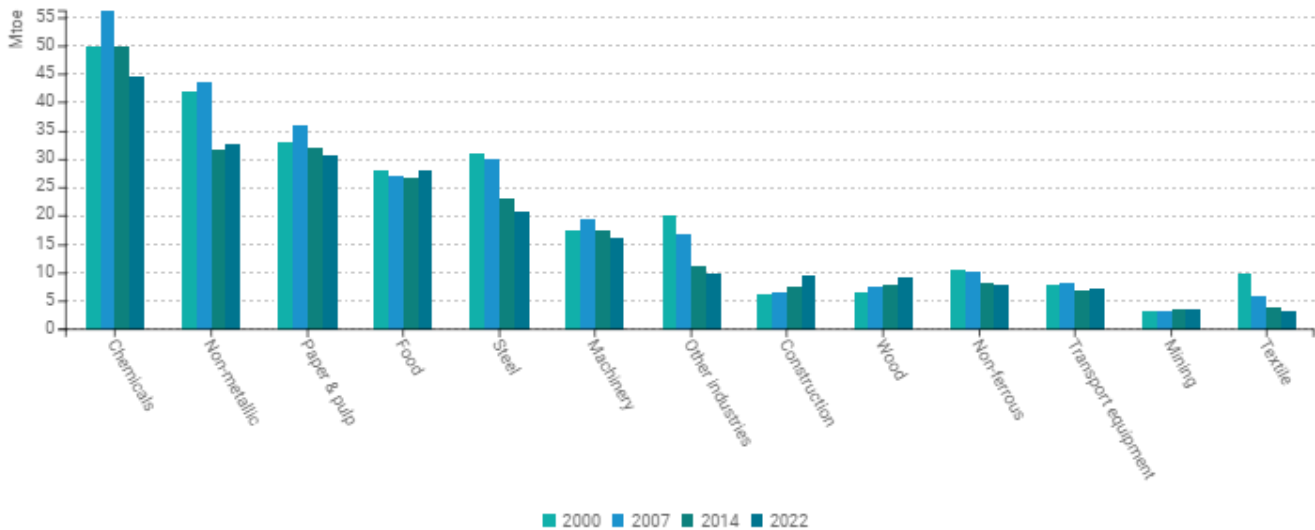


Energy consumption trend by industrial branch

- Chemicals, non-metallic, paper and food industries contribute to almost 2/3 of industry energy consumption in the EU. Chemicals is the largest consumer (20% in 2022), followed by non-metallic (15%), paper (14%) and food (13%).

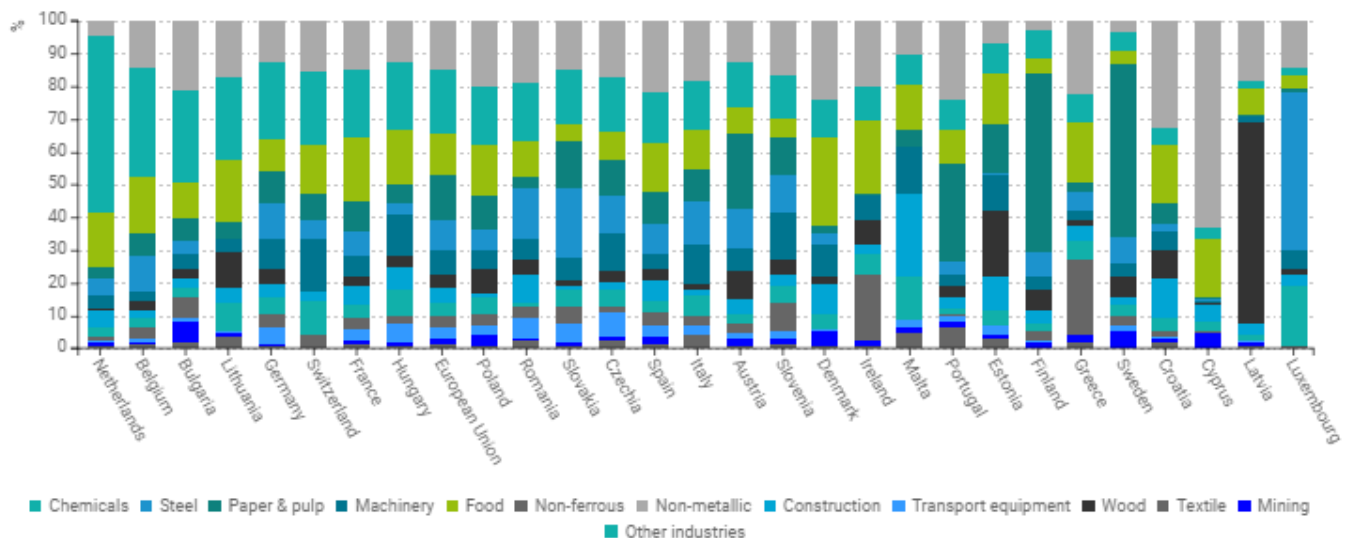
- Energy consumption of steel and non-metallic minerals have strongly decreased since 2000 (-34% and -23% respectively).

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 7 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 (2022)

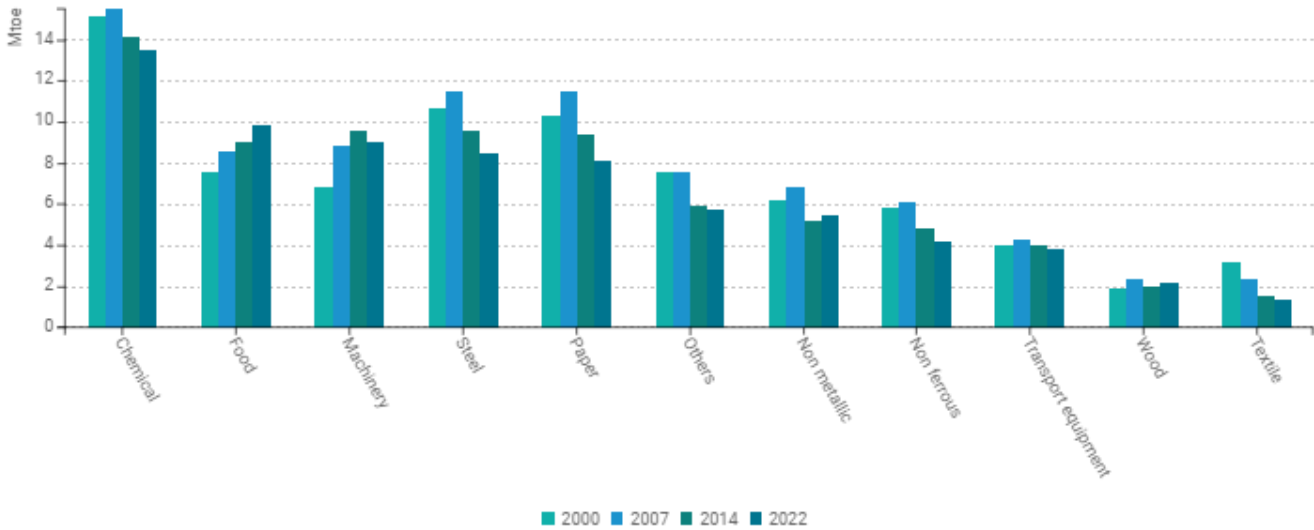


Variation of electricity consumption of industry by branch

- Chemicals is the largest electricity intensive branch (18%) followed by food (13%), machinery (12%), steel and paper (11% each). These 5 branches absorb 2/3 of the electricity used in industry.

- In several branches, electricity consumption has been decreasing since 2007: this reduction has been quite significant for paper (-2.4%/year) and steel (-2.0%/year), and, to a lesser extent, for chemicals (-0.9%/year). In the food and non-metallic industries, electricity consumption has been rising since 2014, (+1%/year and +0.6%/year, respectively).

Electricity consumption of industry by branch - EU

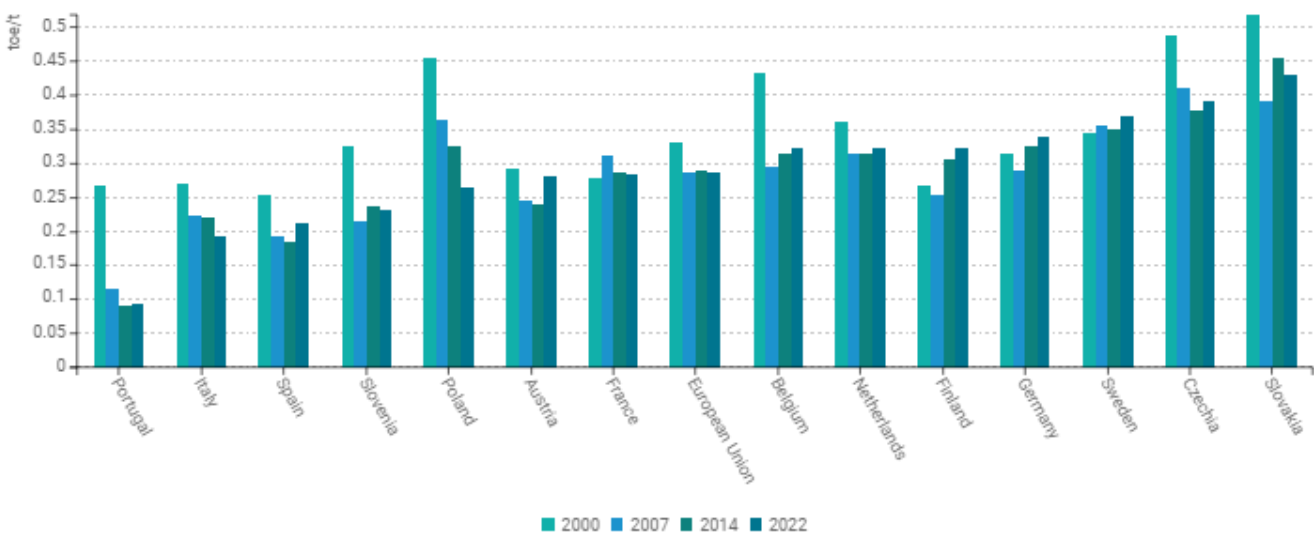


Specific consumption

Energy efficiency trends in steel industry

- There is an apparent deterioration of energy efficiency in steel production since 2007 in 10 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 after the financial crisis. At EU level, the specific consumption of steel has slightly increased since 2007 (+0.8%).
- The specific consumption of steel has however regularly decreased in 2 countries (Poland and Italy).

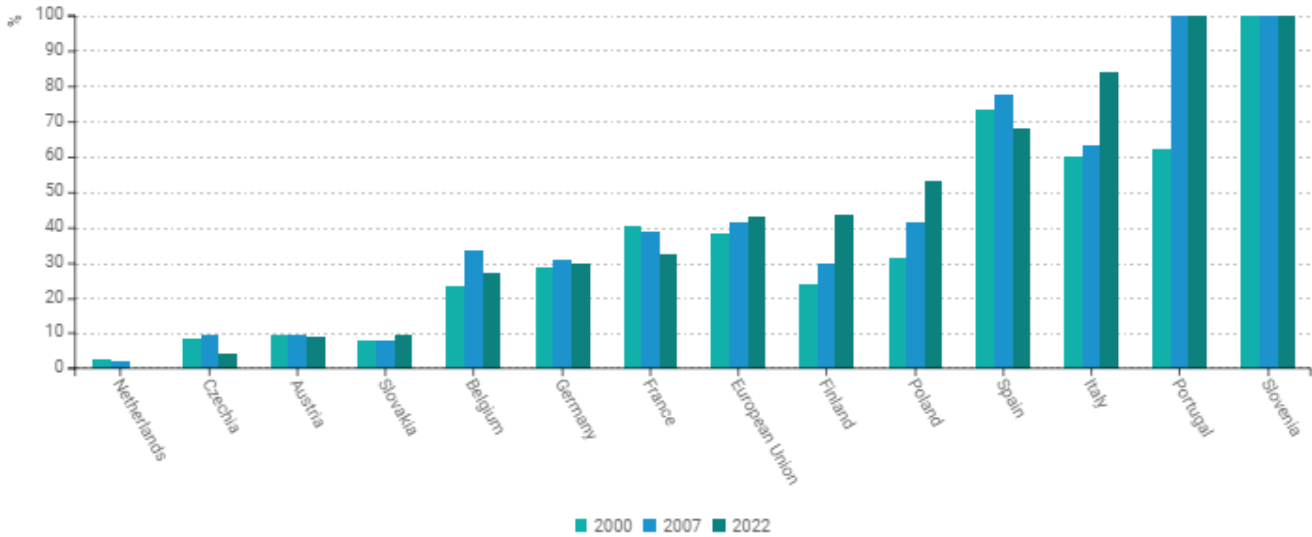
Specific consumption of steel



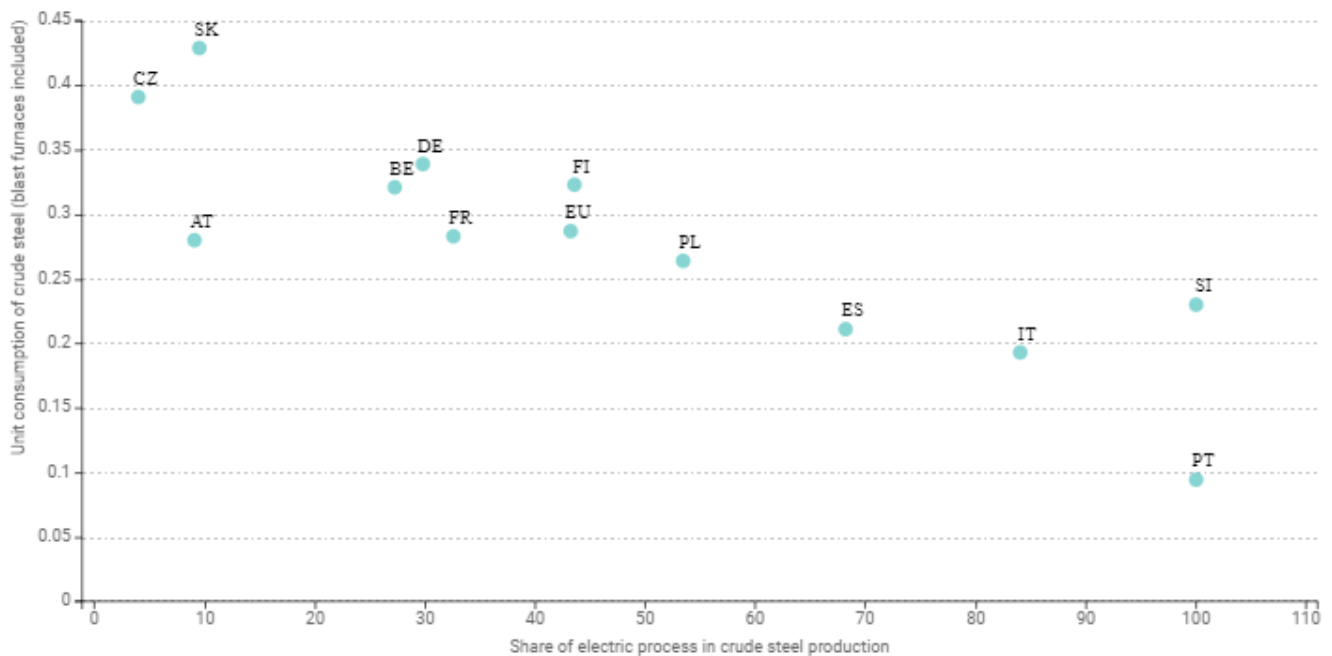
- The energy performance of the steel industry should be considered in relation to the share of electric steel, the less energy intensive process: the higher this ratio, the lower the specific consumption. In Slovenia and Portugal, all the

steel is produced from the electric process, while in Italy and Spain, the share of this process is around 70-85%, which explains the lower specific consumption. In Slovakia and Czechia, where electric steel share is lower than 10%, the specific consumption is 4 times higher than in Portugal.

Ratio electric steel / total steel production in EU countries



Specific energy consumption of crude steel (2022)

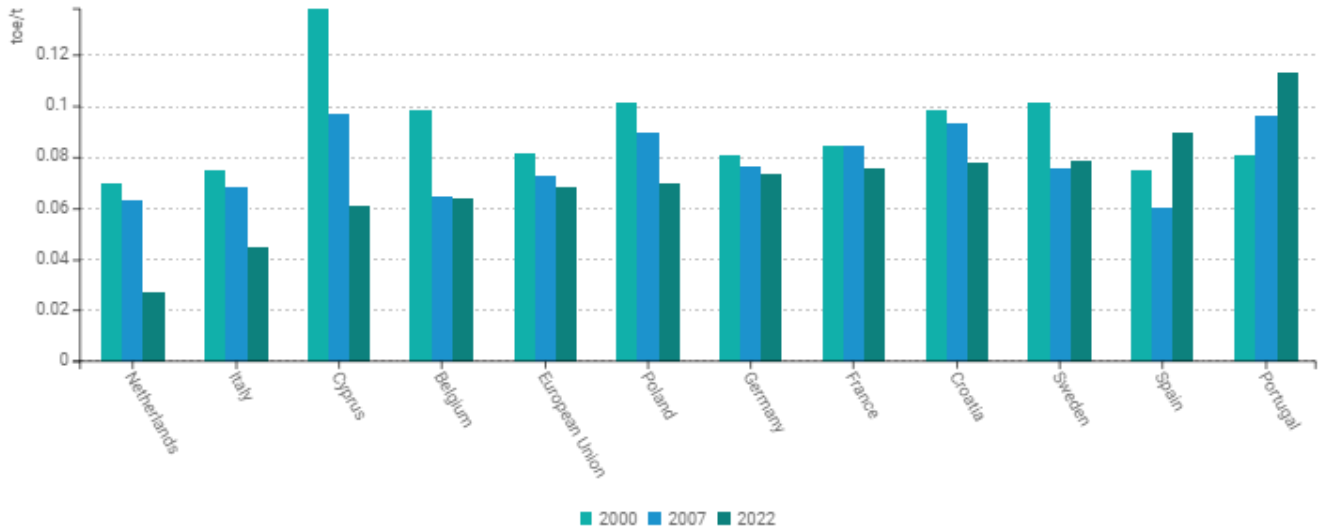


Energy efficiency trends in cement industry

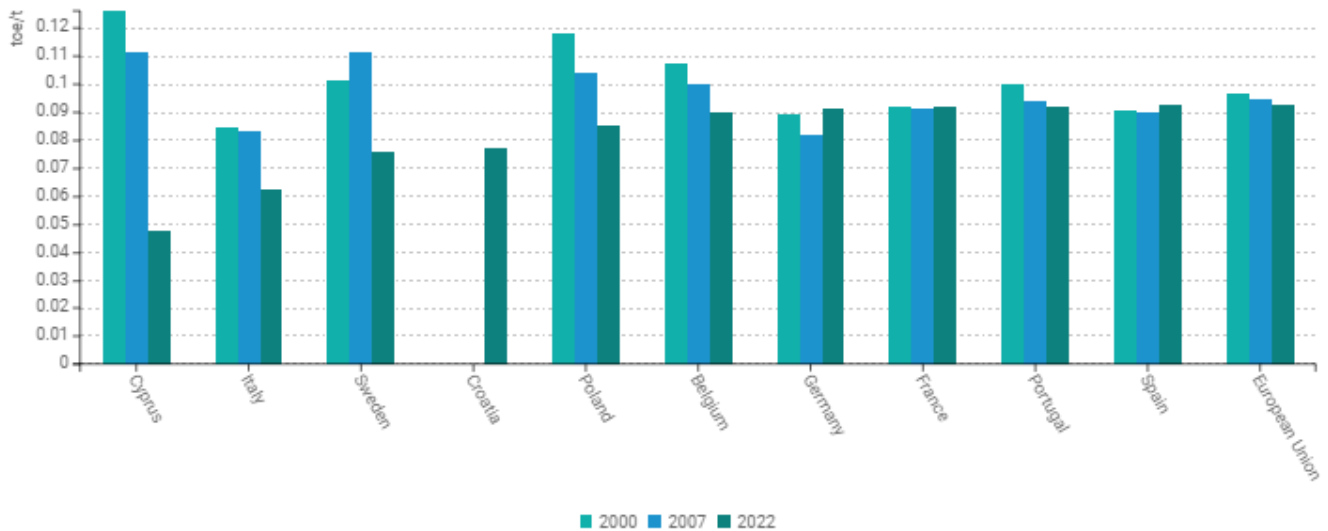
- The specific consumption of cement has decreased since 2000 in 9 EU MS (Belgium, Italy, Sweden, France, Cyprus, Estonia, Croatia, Netherlands and Poland).
- Since 2007, this specific consumption has increased in countries strongly affected by the economic crisis (e.g. Portugal and Spain). It slightly 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.

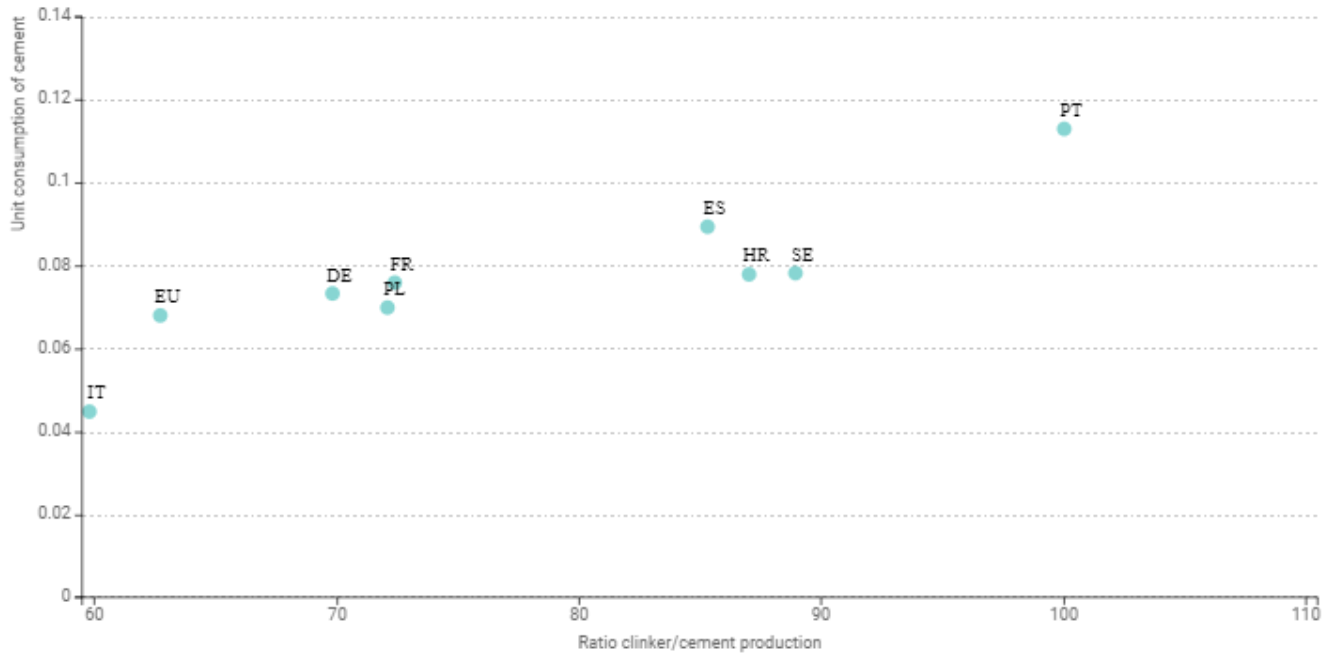
Specific consumption of cement



Specific consumption of clinker



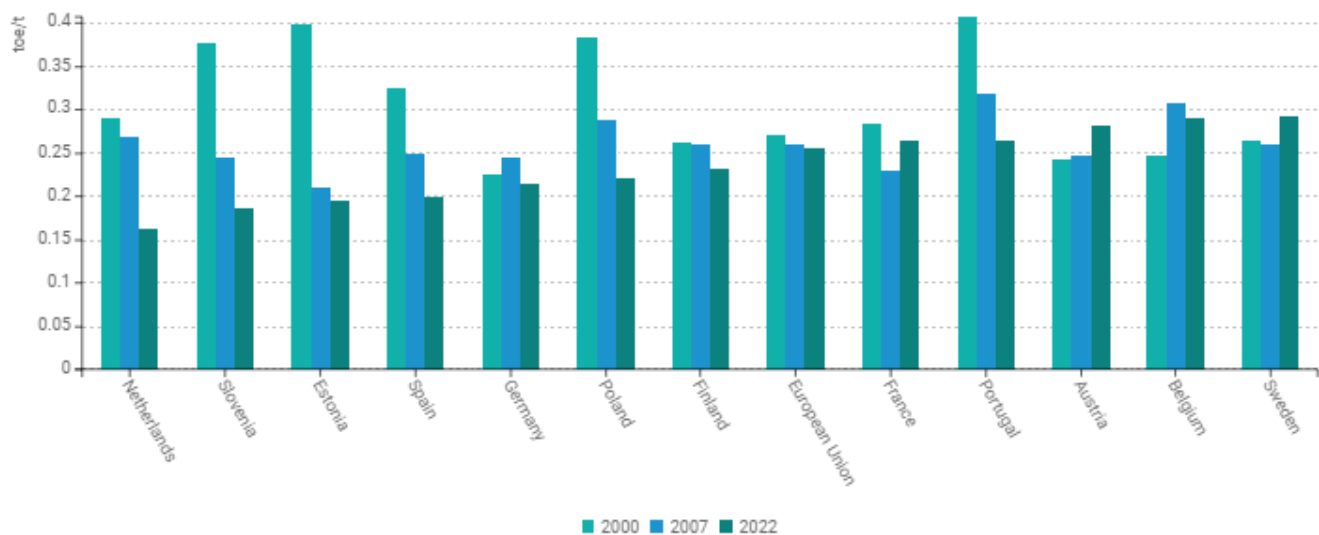
Specific energy consumption of cement (2022)



Energy efficiency trends in paper industry

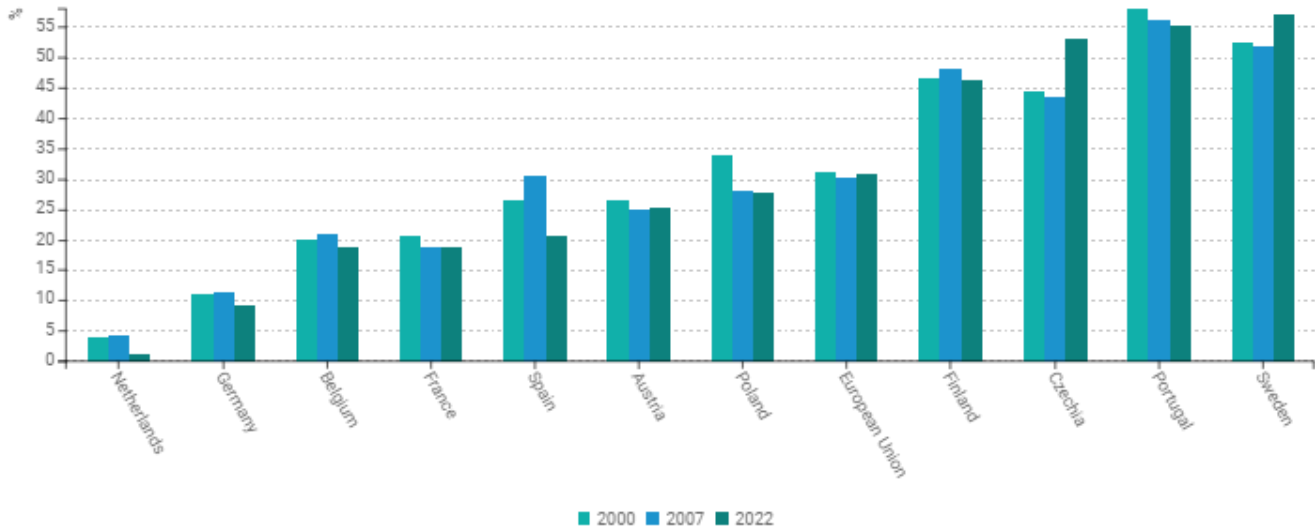
- Most of the EU MS have seen a decrease in the specific consumption per ton of pulp and paper. Only 5 MS have seen an increase (Slovakia, Belgium, Austria, Sweden and Czechia). At EU level, the level is slowly decreasing (-0.3%/year over 2000-2022).
- The largest reduction is observed in Estonia and Slovenia (respectively 3.2% and 3.1%/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



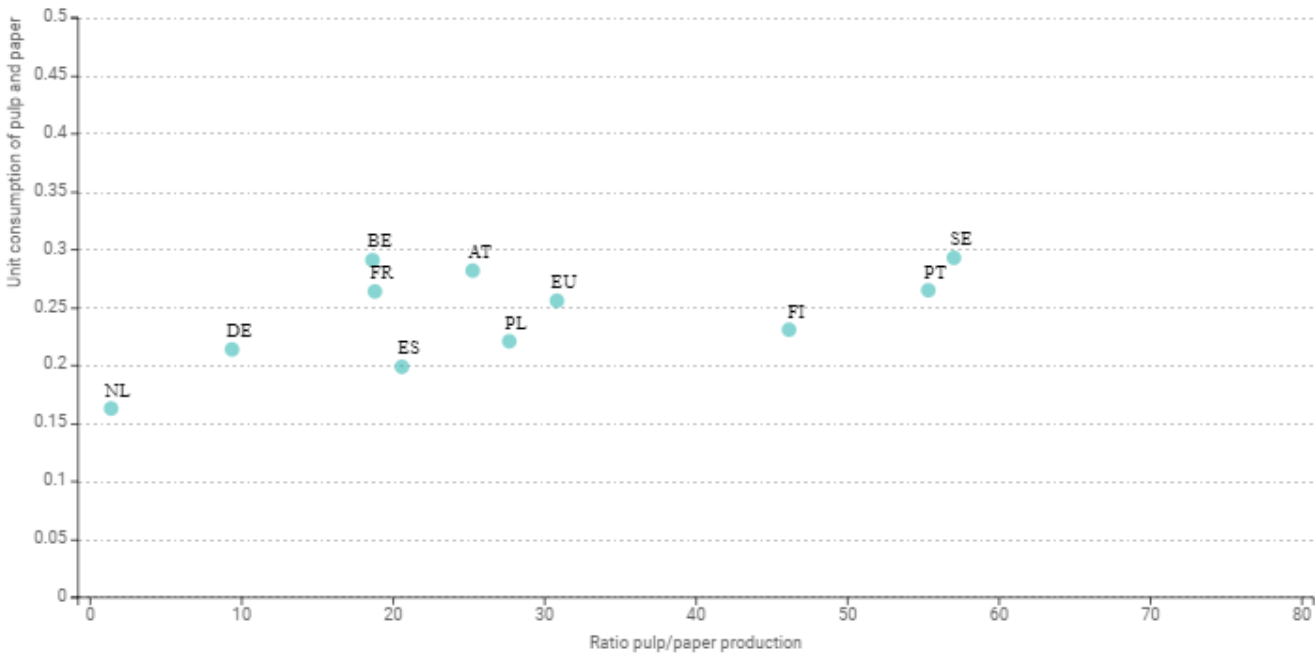
- There are huge differences among countries in the share of pulp production over total paper and pulp production: from 1% for the Netherlands or 10% in Germany to more than 45% in Sweden, Portugal, Czechia and Finland.

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 (2022)

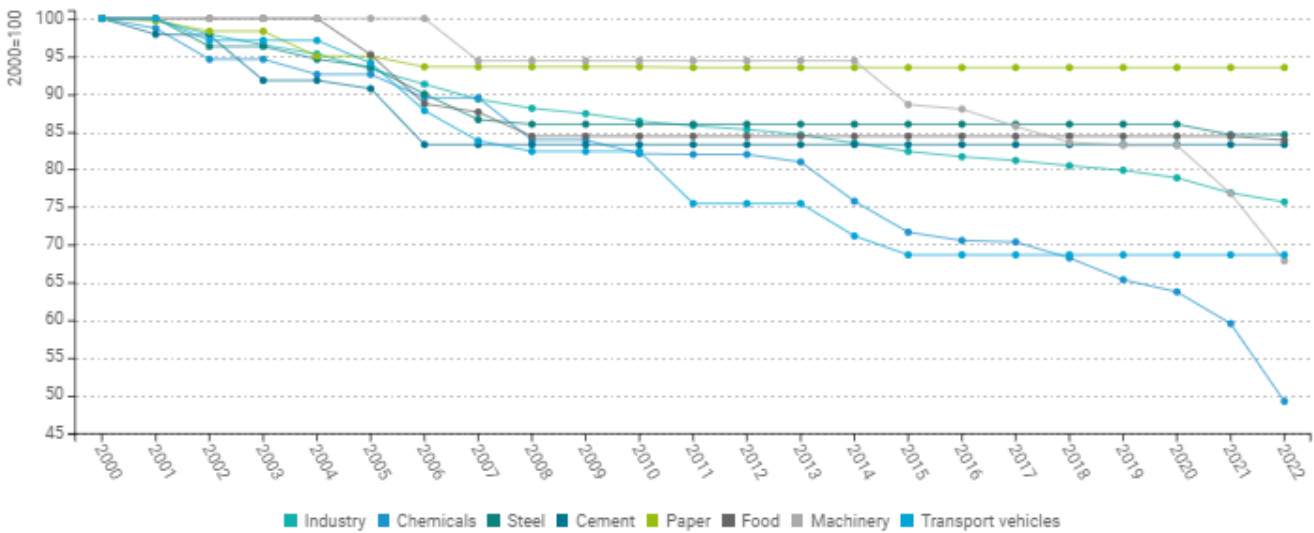


Energy efficiency and savings

Slower energy efficiency progress in industry since 2007

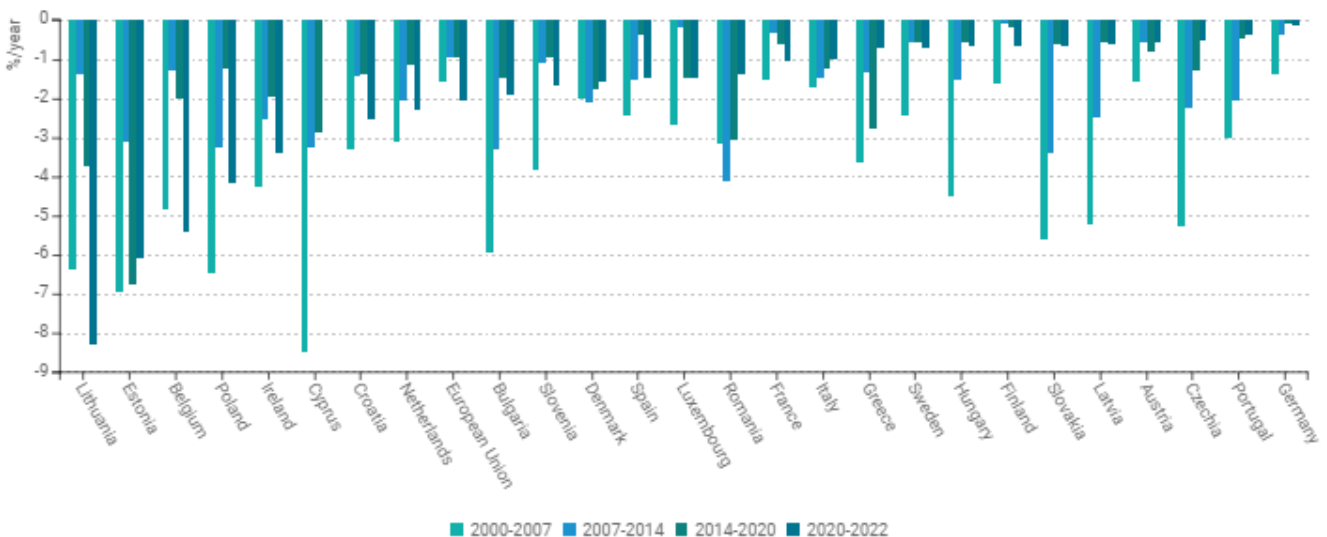
- Energy efficiency in EU industry improved by 1.3%/year on average since 2000, as measured with the energy efficiency index.
- The energy efficiency improvement rate has slowed down from 2007 to 2020 (0.9%/year compared to 1.6%/year between 2000 and 2007) due to a slower progress in some branches and even no more energy efficiency improvement for others because of the recession following the financial crisis (in particular in most energy intensive branches, e.g. cement, steel). The trend has accelerated significantly since 2020 (2.1%/year), especially in chemicals and machinery.

Energy efficiency index by branch (EU)



- Energy efficiency in industry has been significantly improved in most countries before the economic crisis in 2008. Improvements were slowed down since then (less than 2%/year in most countries). However, the improvement rate is rising again since 2020, with 5 countries exceeding a rate above 3%/year.

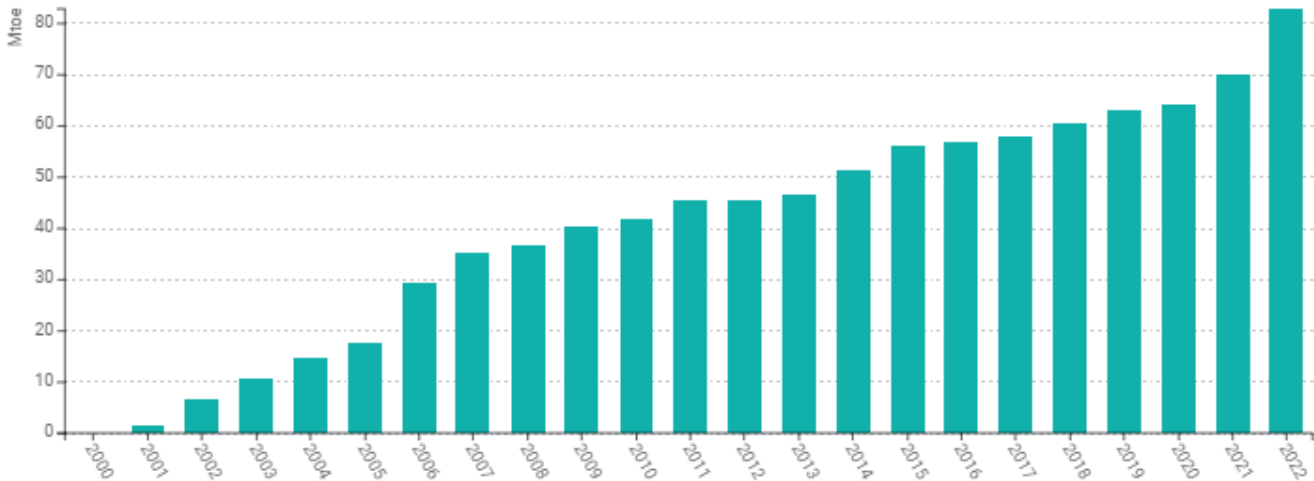
Energy efficiency trends in industry in EU countries (2000-2022)



Energy savings lower since 2007

- In 2022, energy savings reached 83 Mtoe compared to 2000. In other words, without energy efficiency improvement, energy consumption would have been higher by 83 Mtoe.
- Annual additional energy savings were the highest until 2007 (around 5 Mtoe/year on average) and since 2021 (13 Mtoe/year). They have been twice slower between 2007 and 2020 (around 2.2 Mtoe/year).

Energy savings in industry - EU

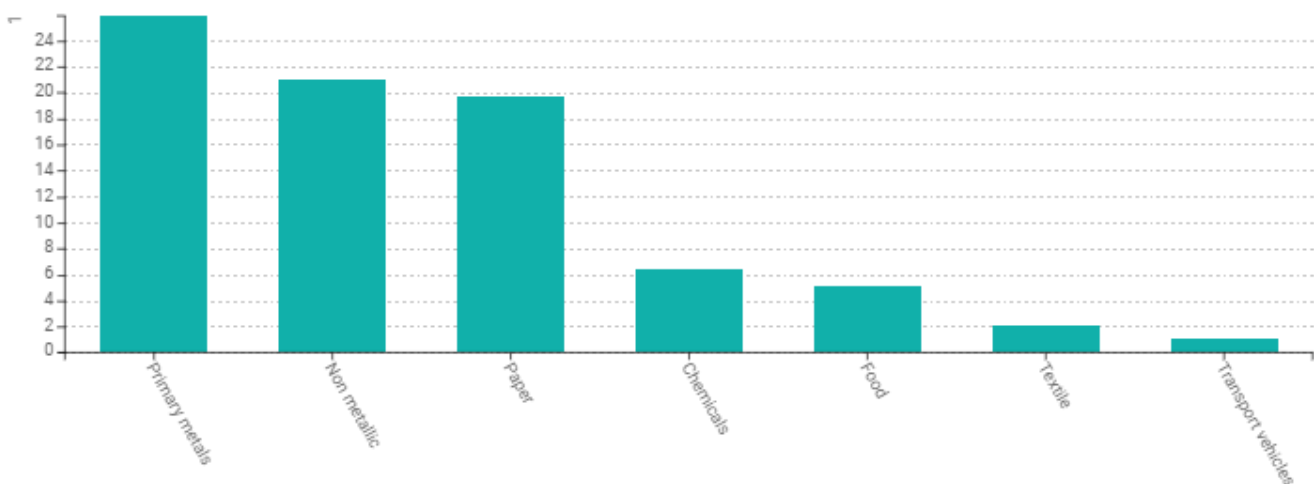


Structural changes

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

- Primary metals, the most energy intensive branch, require around 26 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 around 20 times.
- Due to that fact, a reduction in the share of these energy intensive branches in the industrial value added coupled with an increase in the share of transport equipment and machinery will result, all things being equal, in a reduction of the average energy intensity of manufacturing.

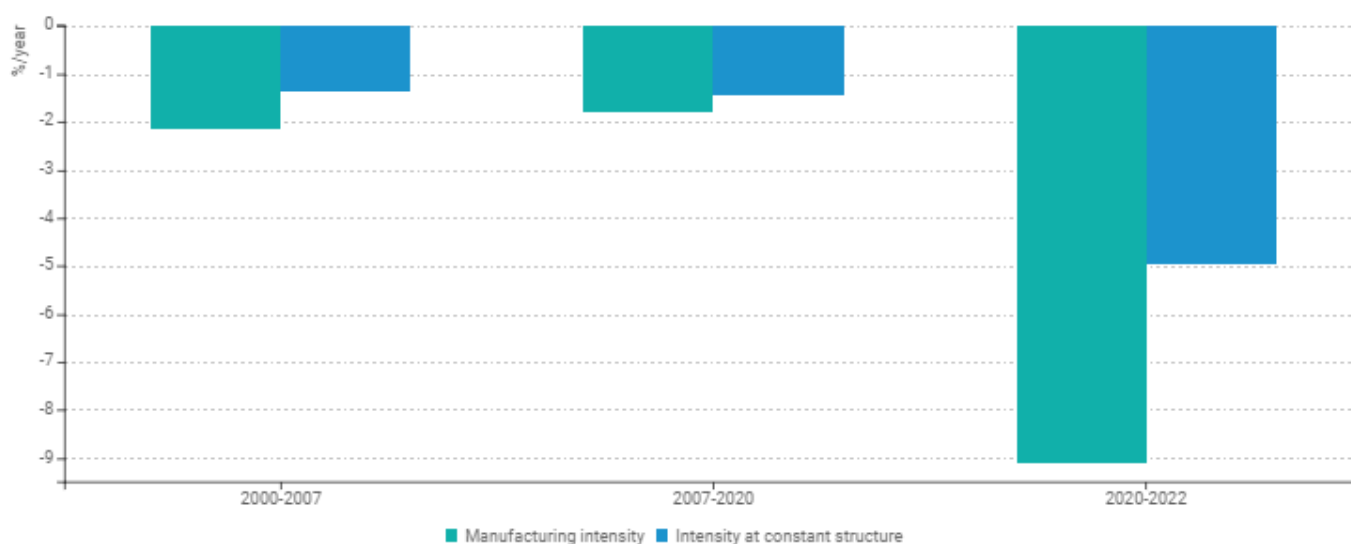
Relative levels of energy intensities by branch (machinery = 1) in 2022 (EU)



Impact of structural changes on industry intensity

- To measure the impact of structural changes, i.e. changes in the contribution of each branch in industrial value added, 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 27% of the intensity decrease. The role of structural changes was greater over 2000-2007 (35%) and since 2020 (44%), compared to 2007-2020 (18%).

Intensity trends and structural changes in manufacturing (EU)

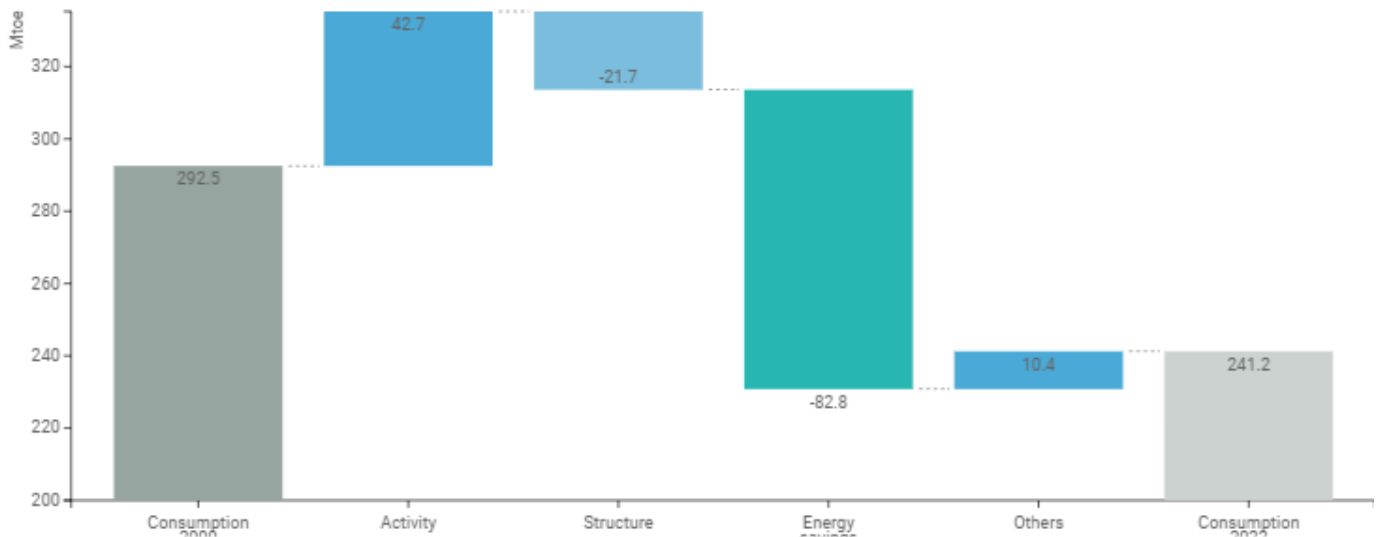


Decomposition of energy consumption

Drivers of energy consumption variation

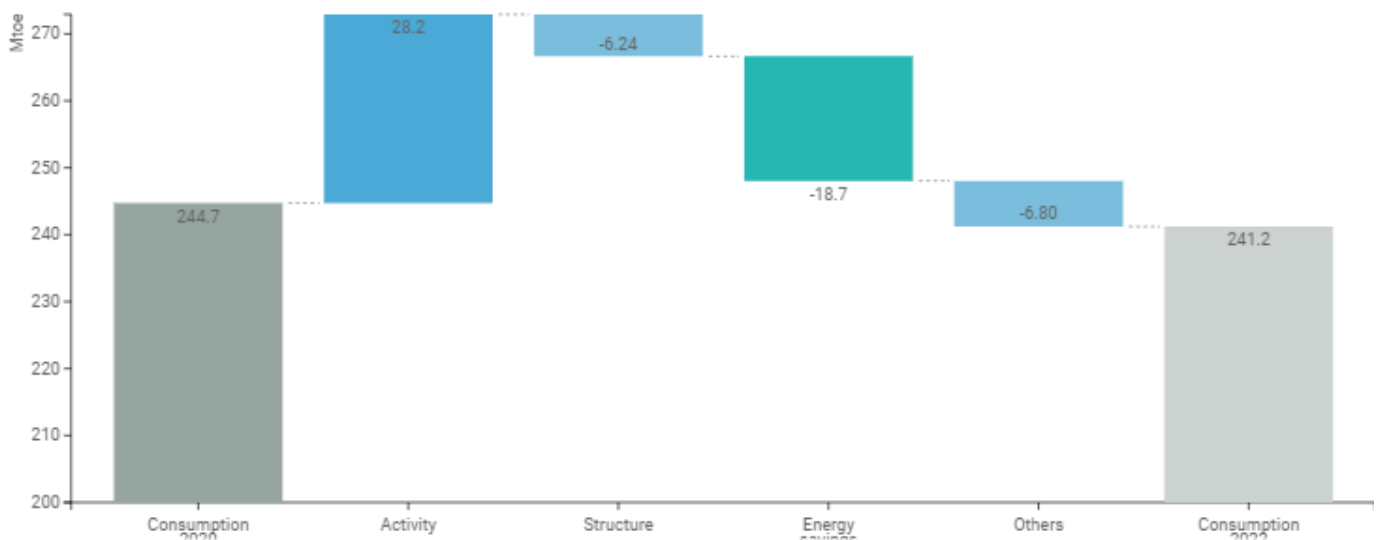
- Industrial energy consumption was around 51 Mtoe lower in 2022 than in 2000.
- This lower consumption is mainly due to energy savings (-83 Mtoe) and, to a lesser extent, to structural changes to less energy intensive branches (-22 Mtoe).
- Change in industrial activity (measured with the production index) had a relatively limited effect (43 Mtoe), because of a recession on part of the period.
- The other effects (10 Mtoe) combine the apparent loss of energy efficiency during periods of recession as well changes in product mix within each branch towards more energy intensive products.

Drivers of energy consumption variation in industry at EU level (2000-2022)



- Industrial energy consumption has slightly decreased since 2020 (-3.5 Mtoe). The main reduction of industrial energy consumption took place in years following the 2007-2008 economic crisis (-43 Mtoe in 2009).
- The activity effect reached +3.7 Mtoe/year between 2020 and 2022 (1.9 Mtoe/year between 2000 and 2022) and is the main driver of the increase of industrial consumption.

Drivers of energy consumption variation in industry at EU level (2020-2022)

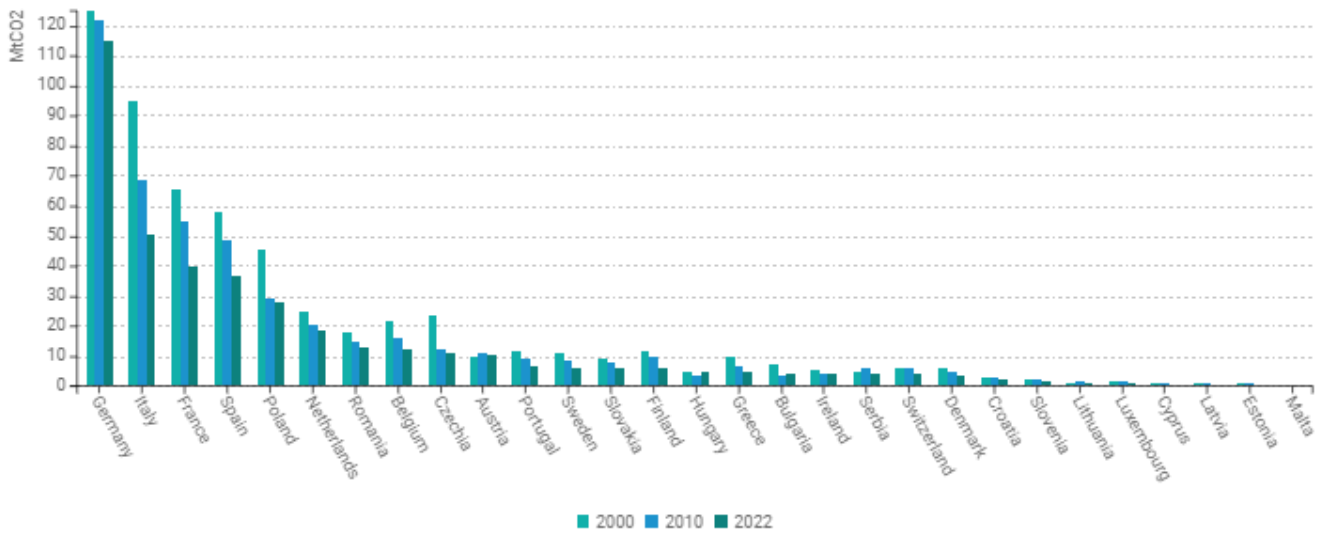


CO2 emissions

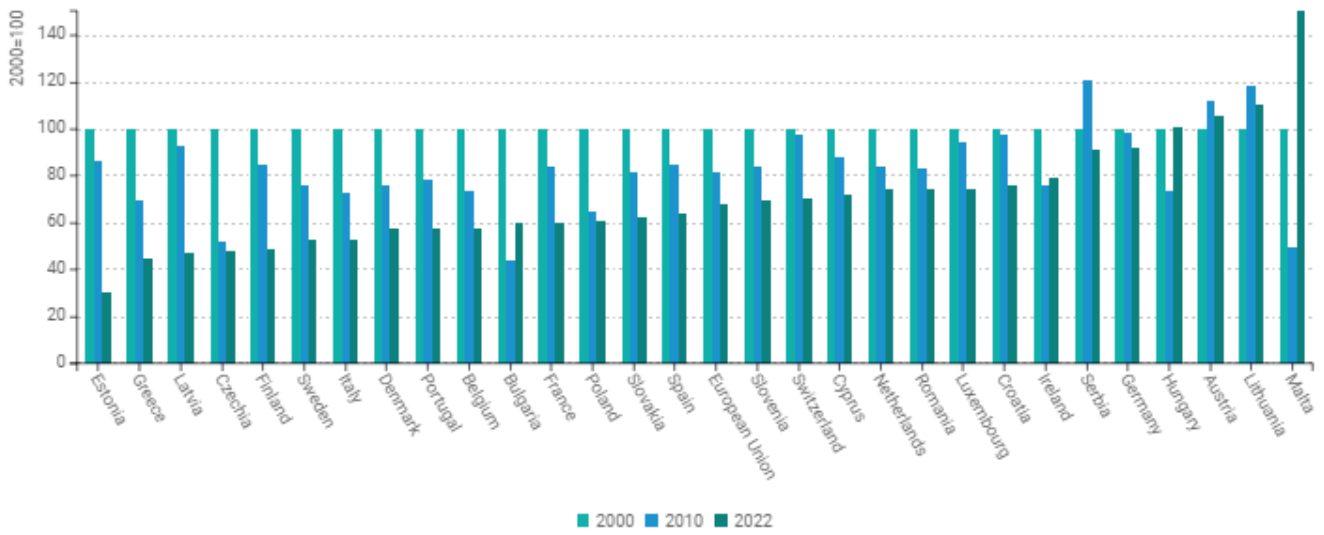
CO2 emissions from fuel combustion

CO2 emissions from fuel combustion in industry have been decreasing since 2000 in almost all countries (-33% at EU level). The exceptions are Hungary, Austria, Lithuania and Malta that have seen their CO2 emissions in industry increase over the period.

CO2 emissions from fuel combustion in industry



Variation of CO2 emissions from fuel combustion in industry



Source: EEA