



Energy efficiency trends in EU industry

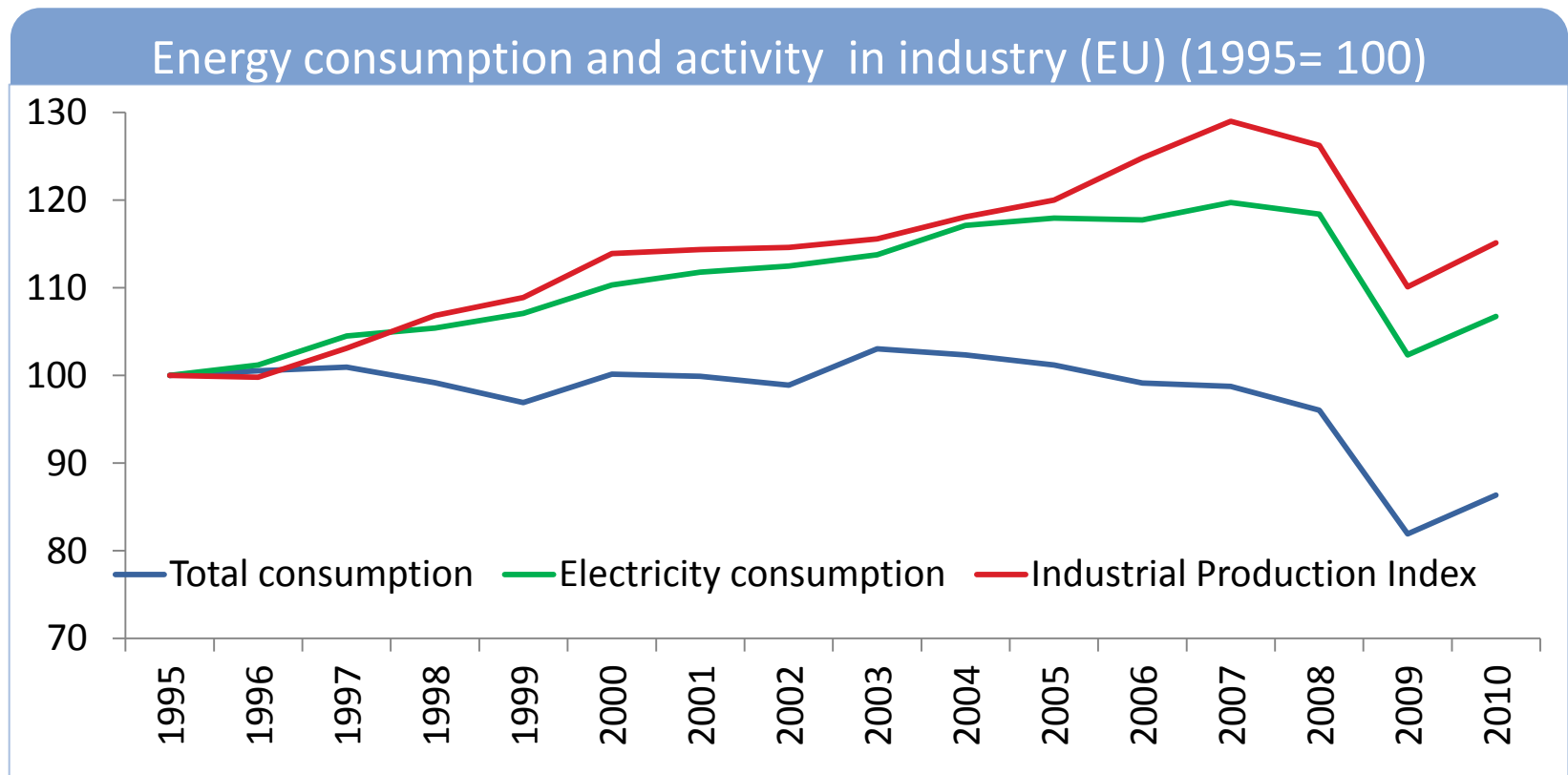
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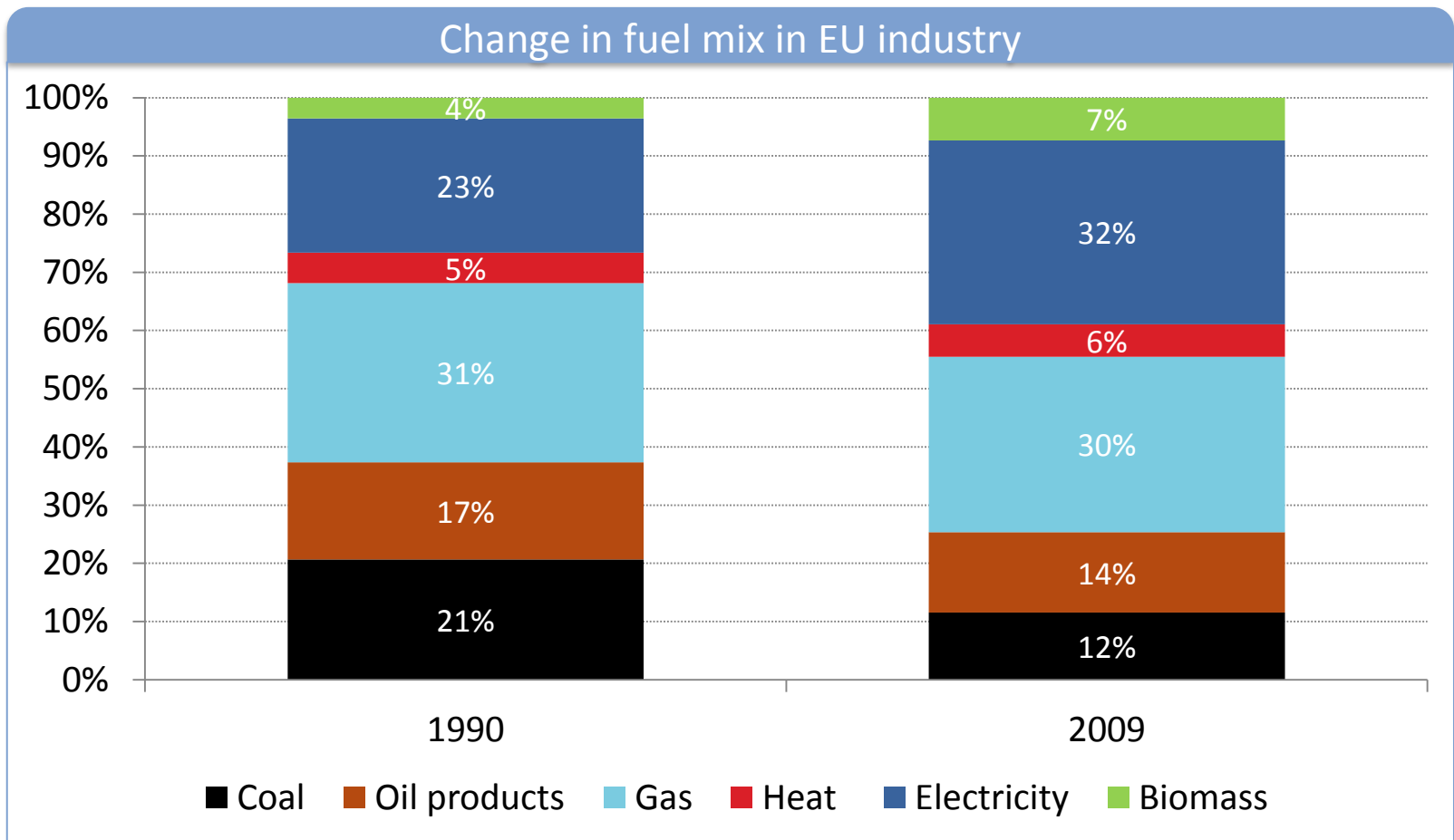


- ▶ **1. Trends in energy consumption**
- 2. Energy intensity trends
- 3. Comparison of energy intensities: adjusted intensities
- 4. Trends and comparison of specific energy consumption
- 5. Energy efficiency trends
- 6. CO2 emissions and indicators

- Deep industrial recession in 2009 (-13%) after already a recession in 2008 (- 2%)
- Slightly higher drop of the energy consumption in 2009 than of the activity (- 15% for the total; -14% for electricity) after -3% in 2008 and ~-1%/yr between 2004 and 2007;
- In 2009 industrial consumption 20% below its 1995 level
- Electricity consumption quite correlated with industrial production: no decoupling as for the total.
- Significant rebound in 2010 (4.5% for production and ~5% for the consumption)

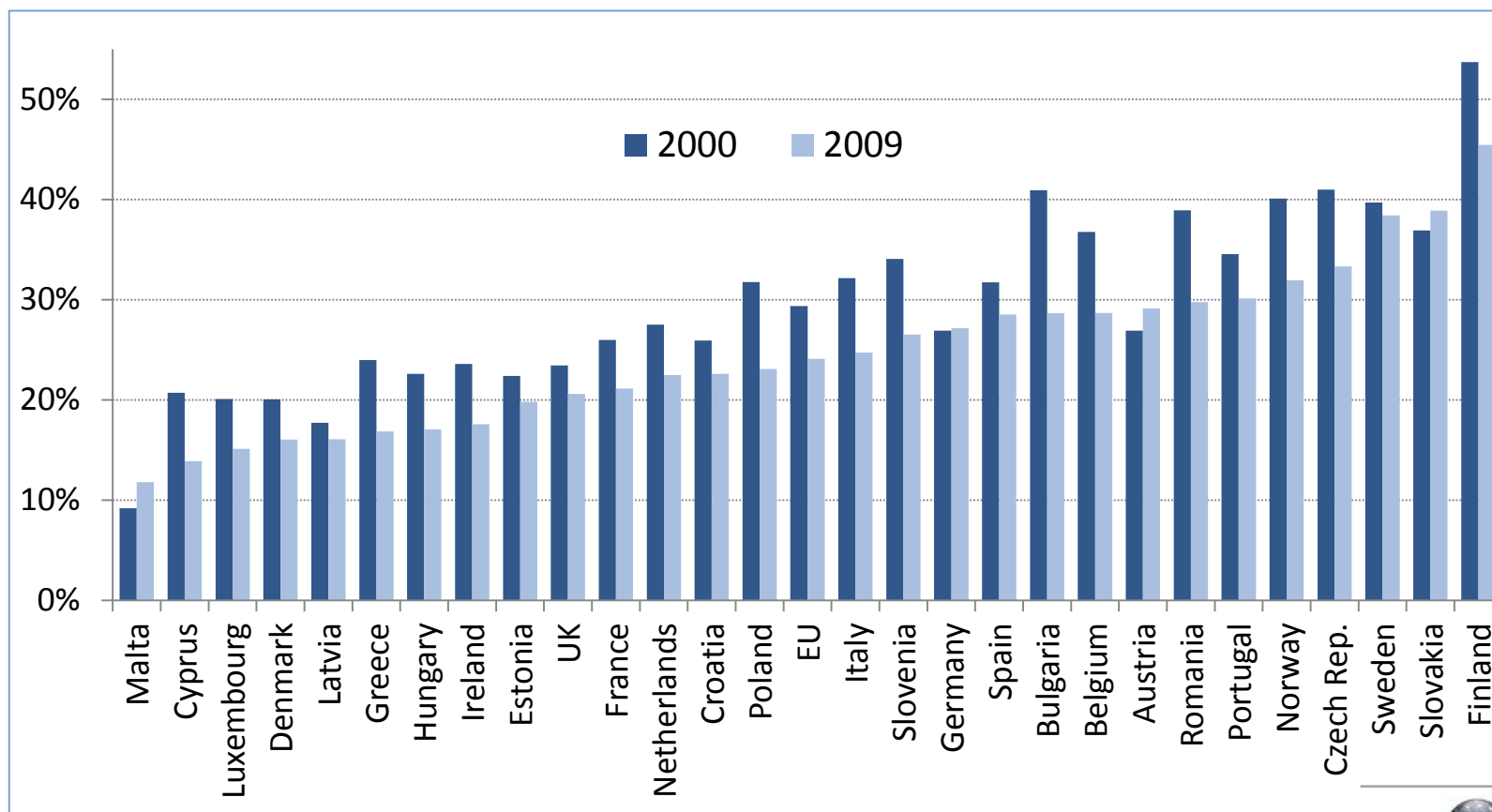


- Increasing share of electricity in industry consumption in the EU (32% in 2009 against 23% in 1990);
- Stability of gas (~31%)
- Recession of coal (from 21% to 14%)
- Three points progression for biomass and wastes

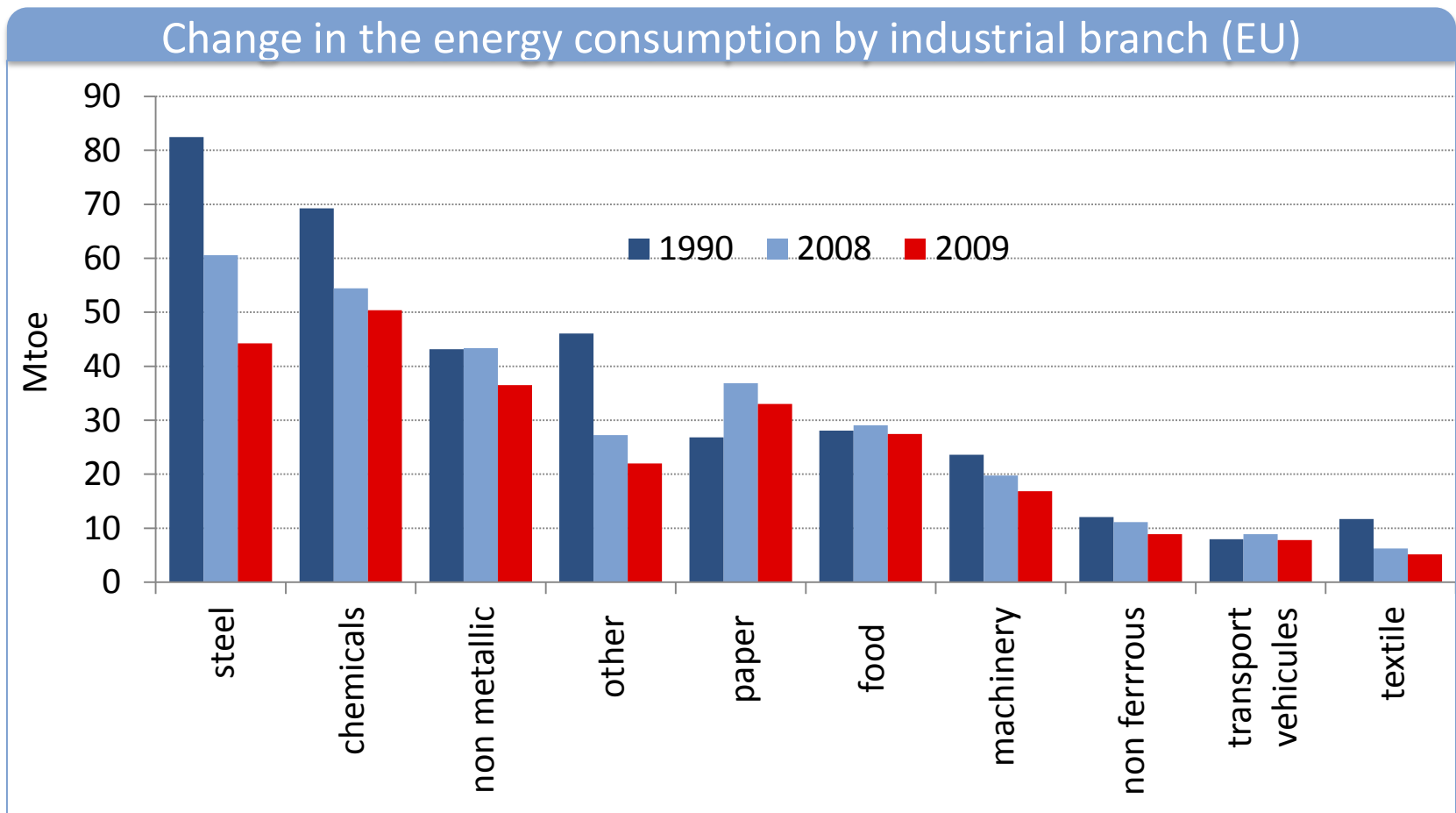


- In most EU countries, the share of industry in the final energy consumption is declining (by 5.3 points at EU level between 2000 and 2009, of which 2.7 points for 2009). In 3 countries it is increasing (Germany, Austria, Slovakia).
- Large discrepancies among countries: half of the consumption in Finland, around 15-20% in UK, Greece, Hungary, Ireland, Denmark, Latvia or Cyprus; 24% in the EU

Share of industry in the final energy consumption

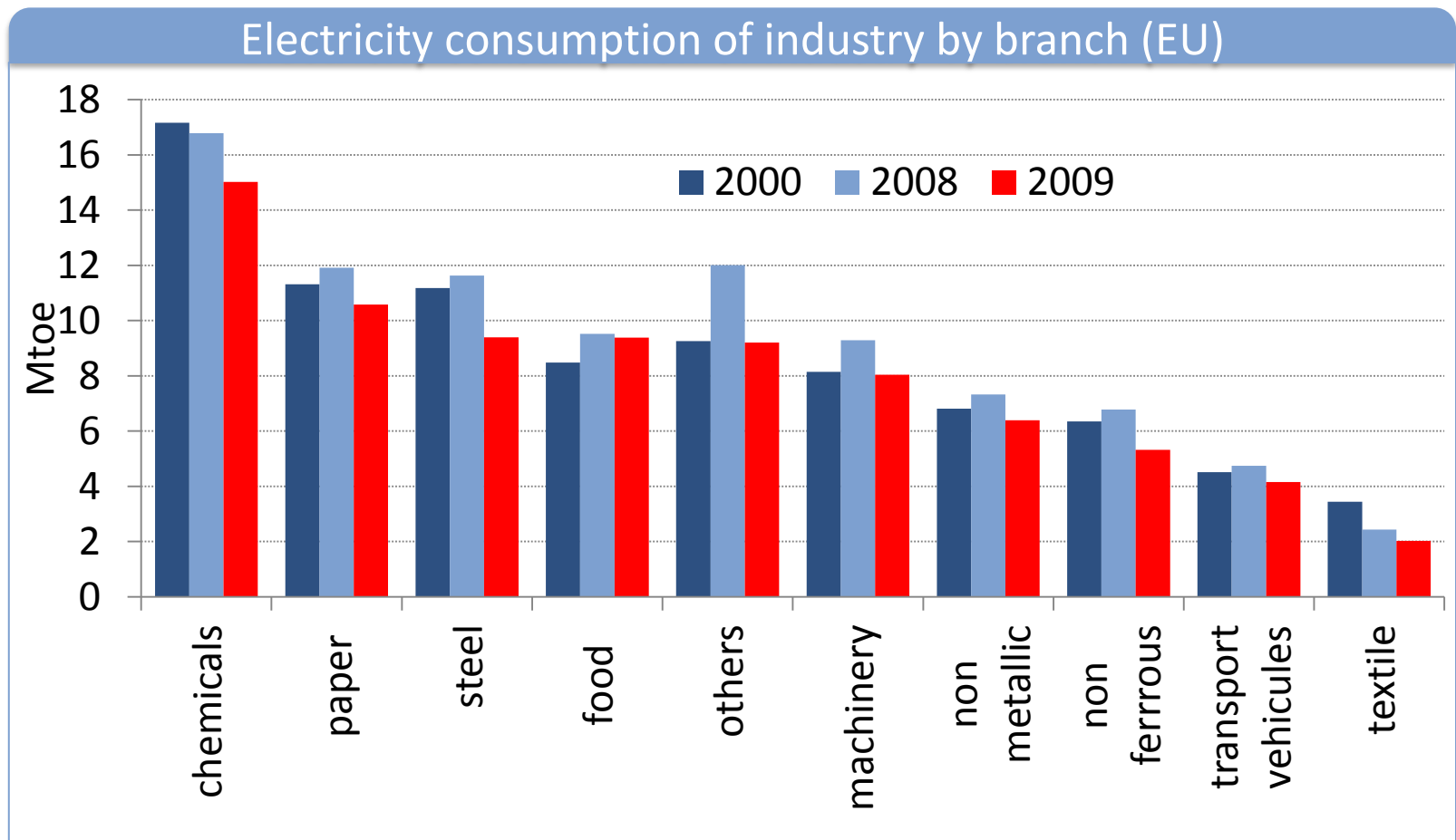


- Stable share of energy intensive branches (steel, non metallic minerals, paper, chemicals & non ferrous) with 2/3 of total consumption
- Steel is no longer the largest energy consumer; its consumption has dropped by almost 50% since 2000
- Consumption of food, transport vehicles and non metallic has increased until 2008



Source: Eurostat ; others include other manufacturing, wood, construction and non energy mining

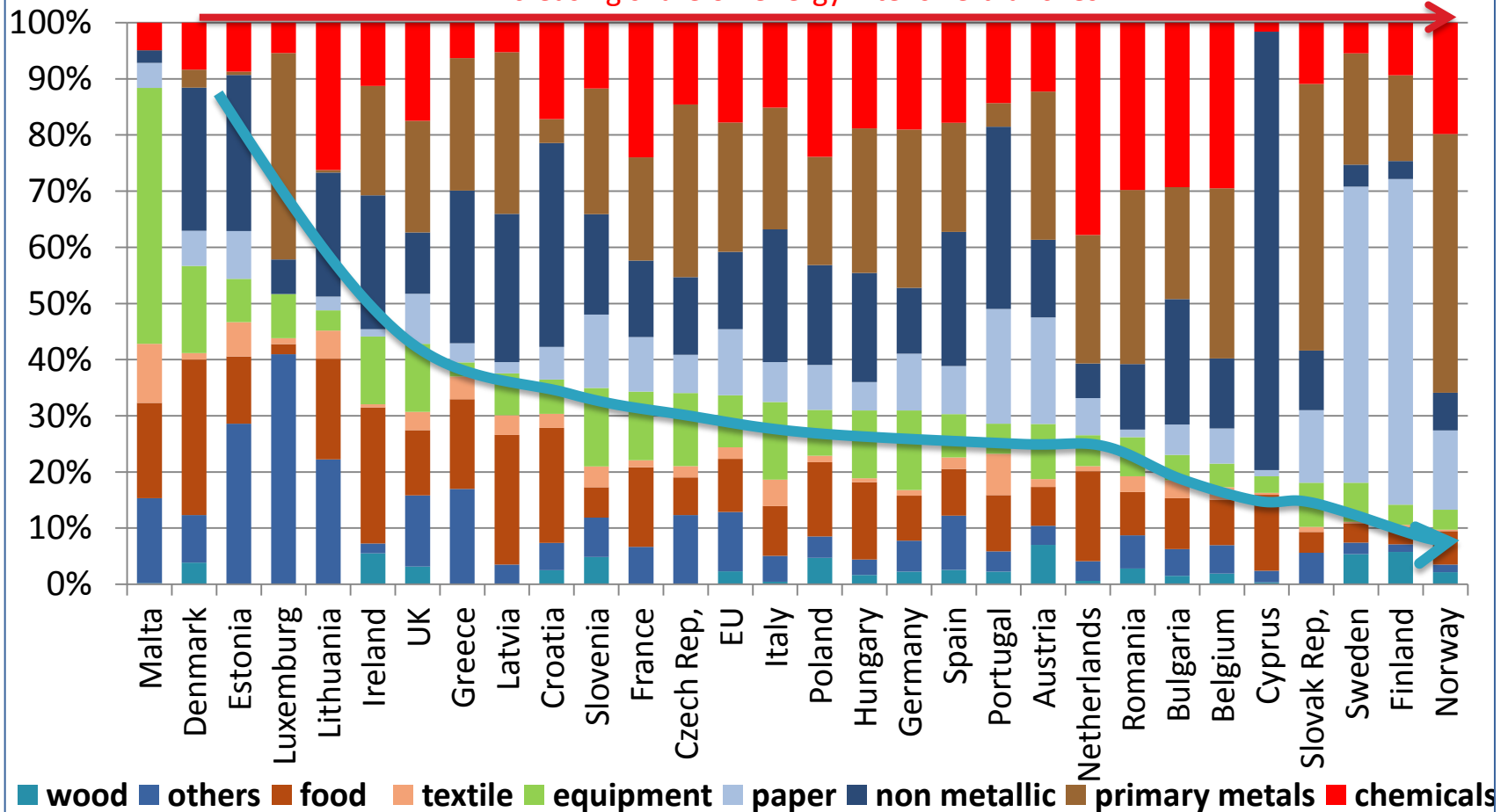
- Increase of the electricity consumption for all branches until 2008, except textiles, partly linked to substitution of electricity for fuels.
- Paper has become the second largest electricity intensive branch after chemicals
- In 2009, decrease of the electricity consumption in all branches.



- More than 70% of the consumption in 4 energy intensive branches in 8 countries and between 70% and 60% in 15 countries

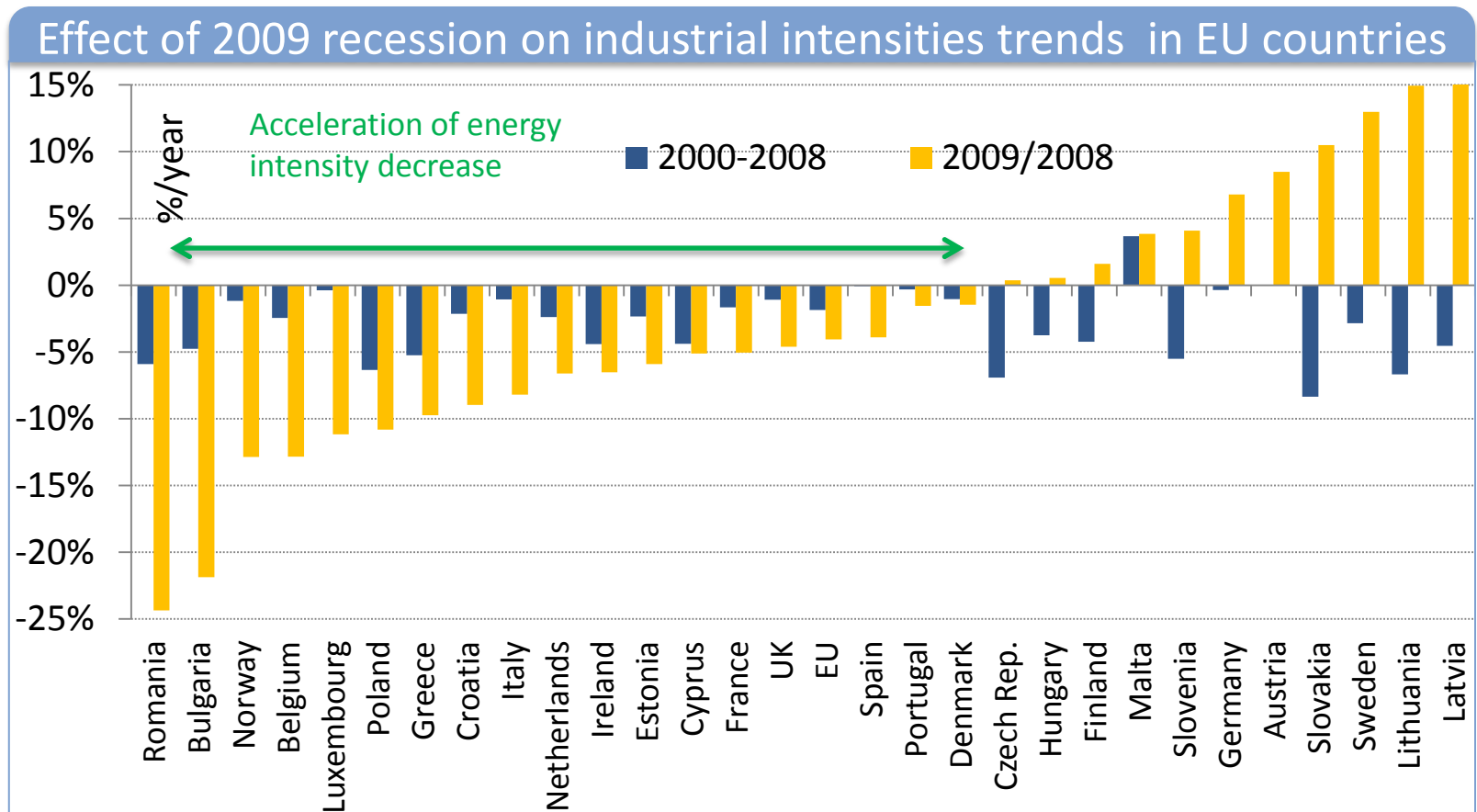
Energy consumption of industry by branch (2008)

Increasing share of energy intensive branches



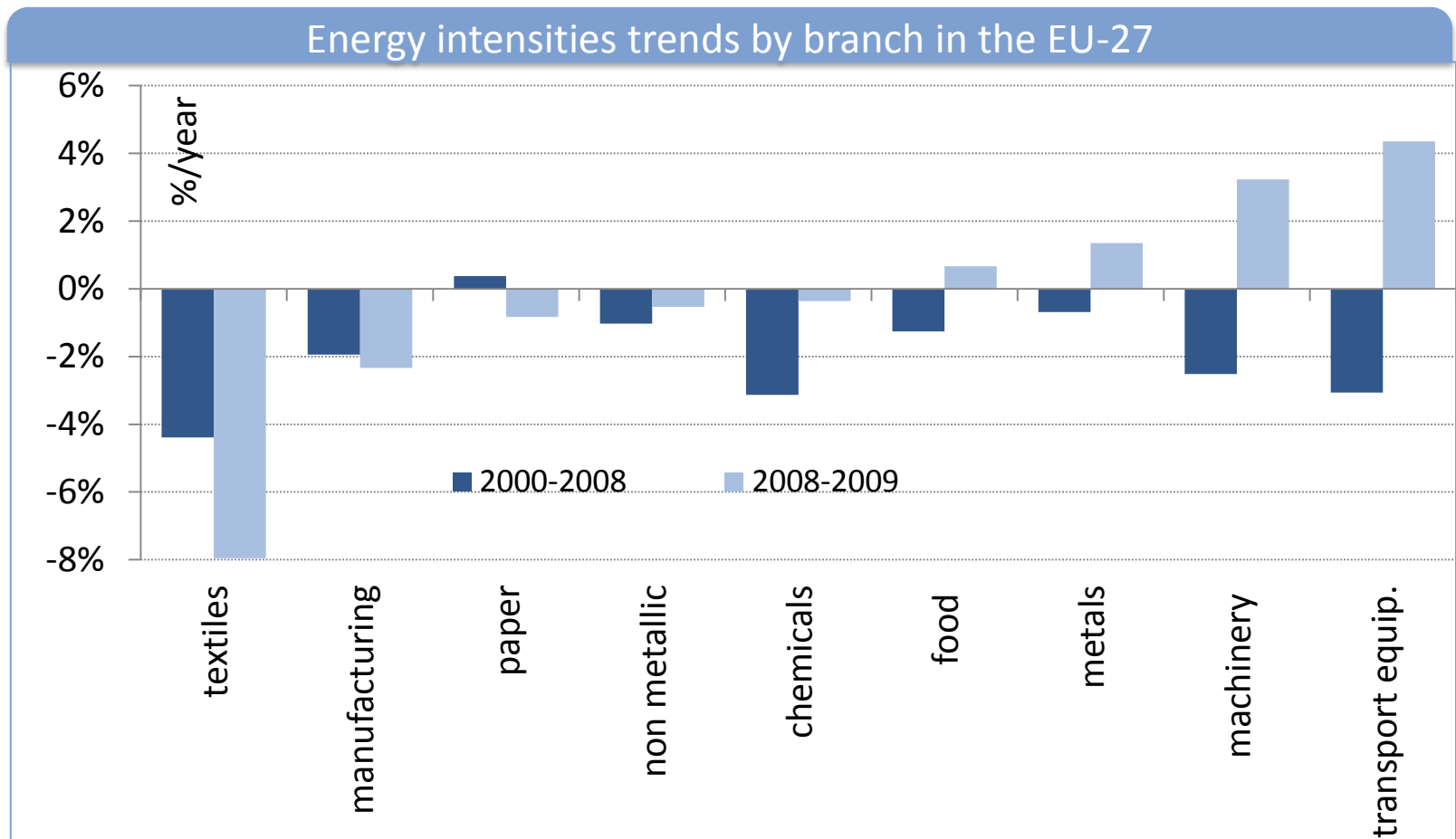
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- Diverse reactions to the recession in 2009: acceleration of the energy intensity decrease in 17 EU countries and in the EU as a whole;
- In other countries, strong increase in the intensity, i.e. the energy consumption did not follow the reduction in the energy consumption, due to lower efficiency

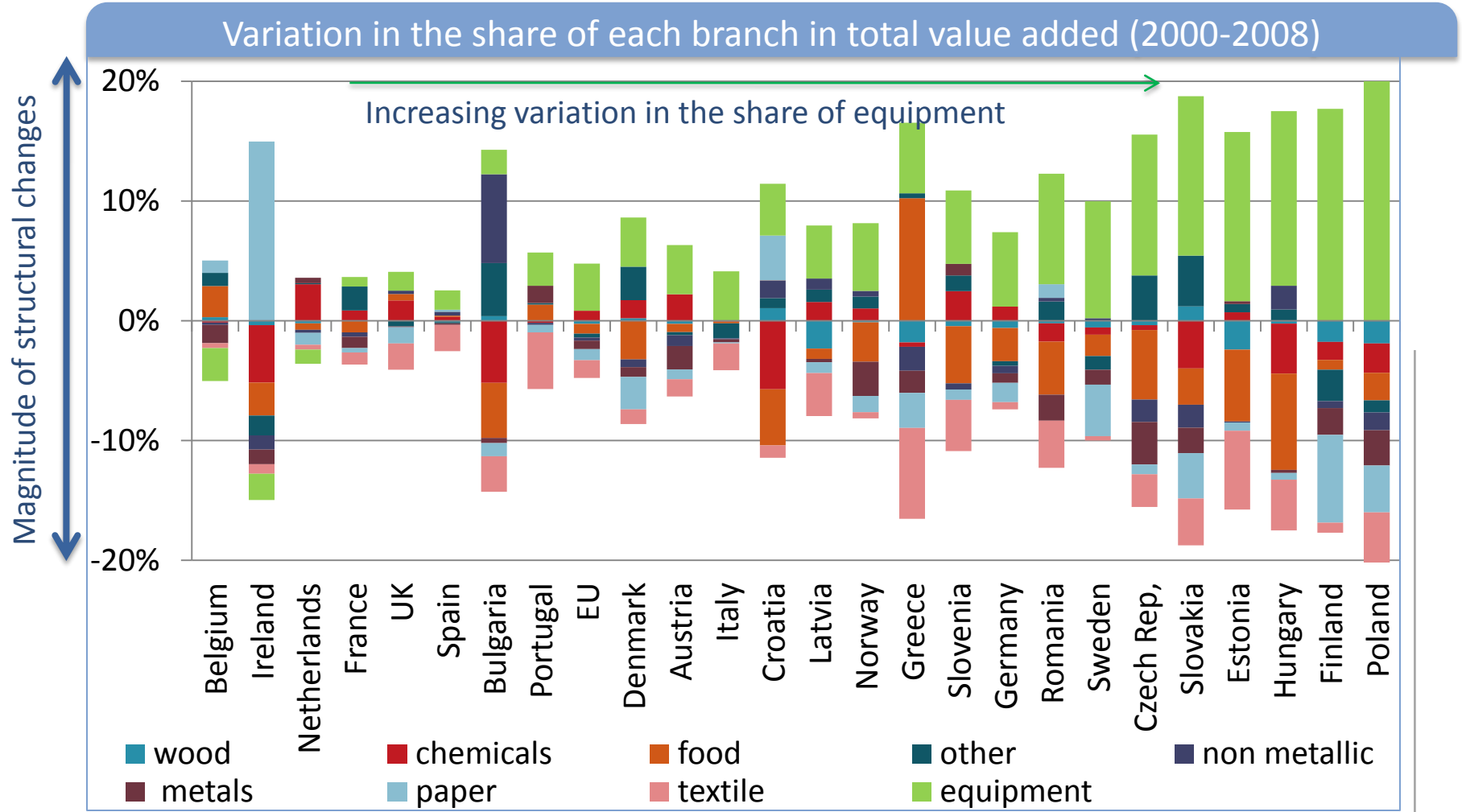


Industry: manufacturing+ construction and mining

- Rapid decrease from 2000 to 2008 for chemicals, transport equipment, machinery and textile. Slower reduction for non metallic minerals, food and primary metals and in contrary increasing trends for paper.
- In 2009 drop for textile, paper and non metallic. Increasing intensities for food, primary metals, machinery and transport equipment (+4%)

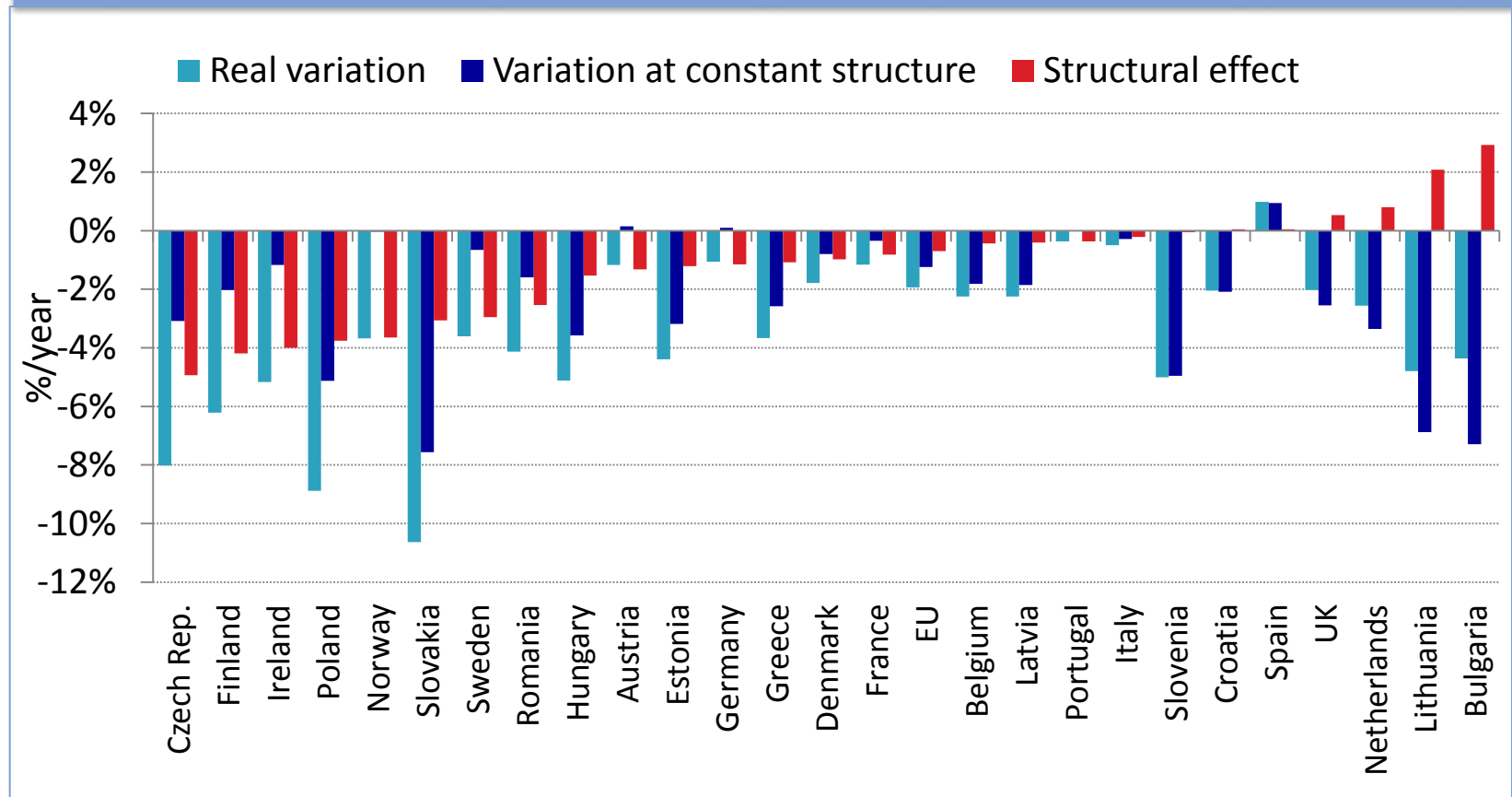


Manufacturing: a growing share of equipment, the less energy intensive branches, in most countries between 2000 and 2008



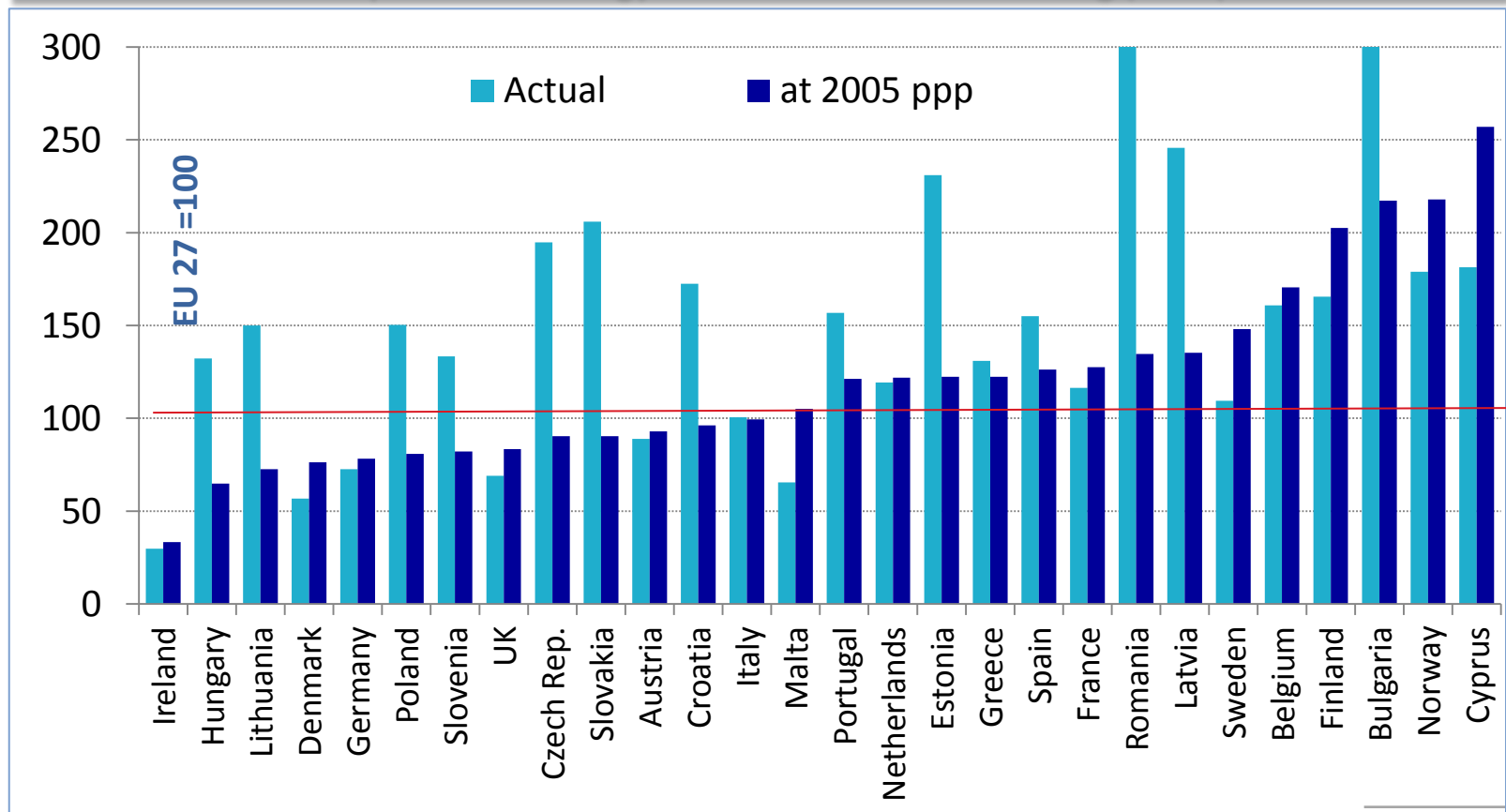
- A faster growth of equipment branch contributed to the energy intensity reduction of manufacturing in most countries;
- Structural changes explain most of the reduction (>60%) in 11 countries (Czech Rep, Ireland, Finland, Norway, Sweden, Romania, Austria, Germany, Denmark & France) and about 40% in 2 countries (Poland & Italy)

Impact of structural changes on the energy intensity of manufacturing (2000-2008)

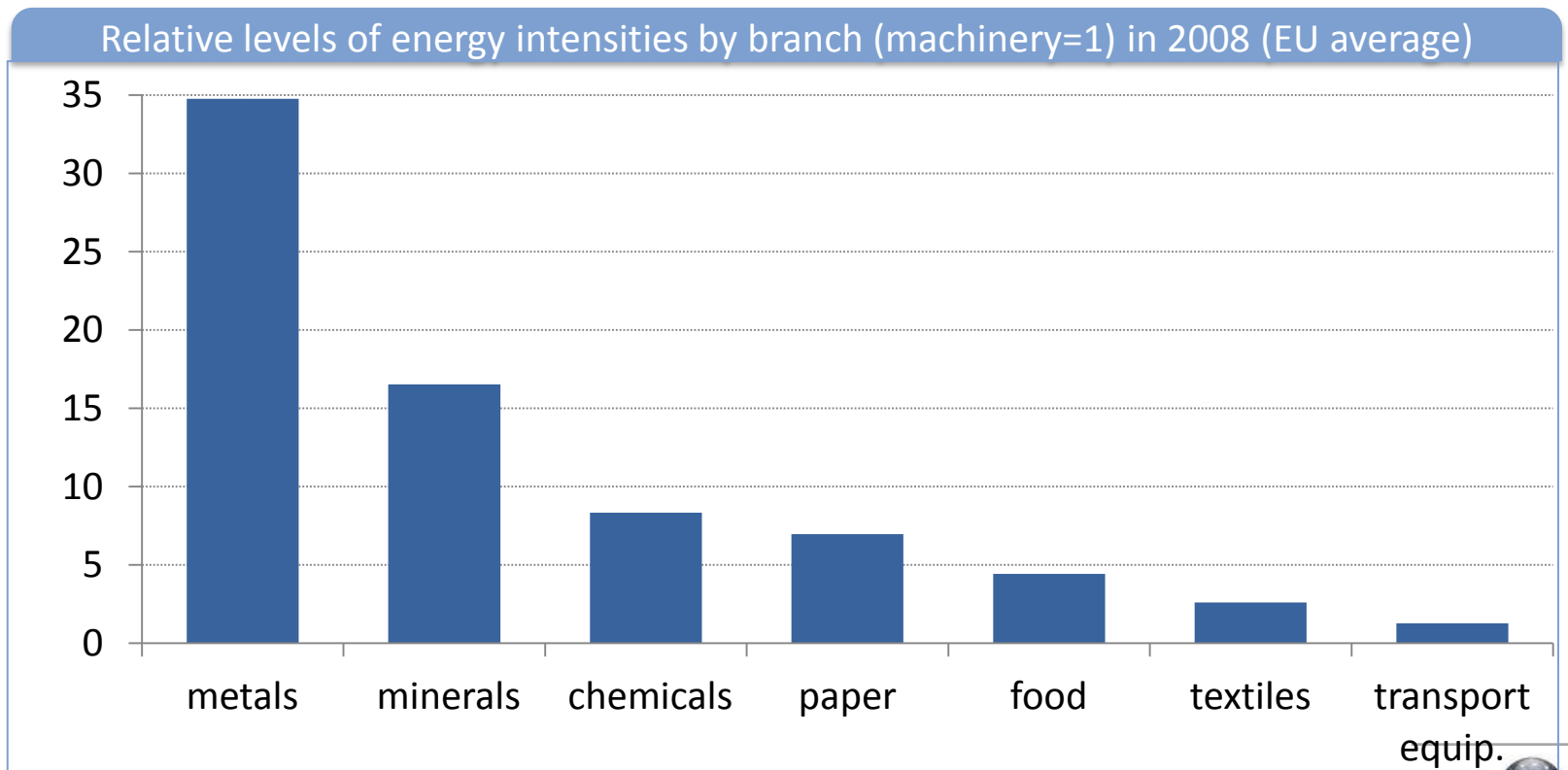


- Very large differences in the energy intensity of manufacturing industry based on market exchange rates
- Comparison at purchasing power parities is more relevant as closer to technical energy efficiency as most of value added is made of salaries, and is thus function of relative values of living costs (i.e. purchasing power parities)

Comparison of energy intensities in manufacturing (2008)



- Primary metals, the most energy intensive branch, require 35 times more energy to produce one unit of value added than machinery, the branch with the lowest intensity.
- Non metallic minerals (15 times more intensive) and chemicals (8 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.



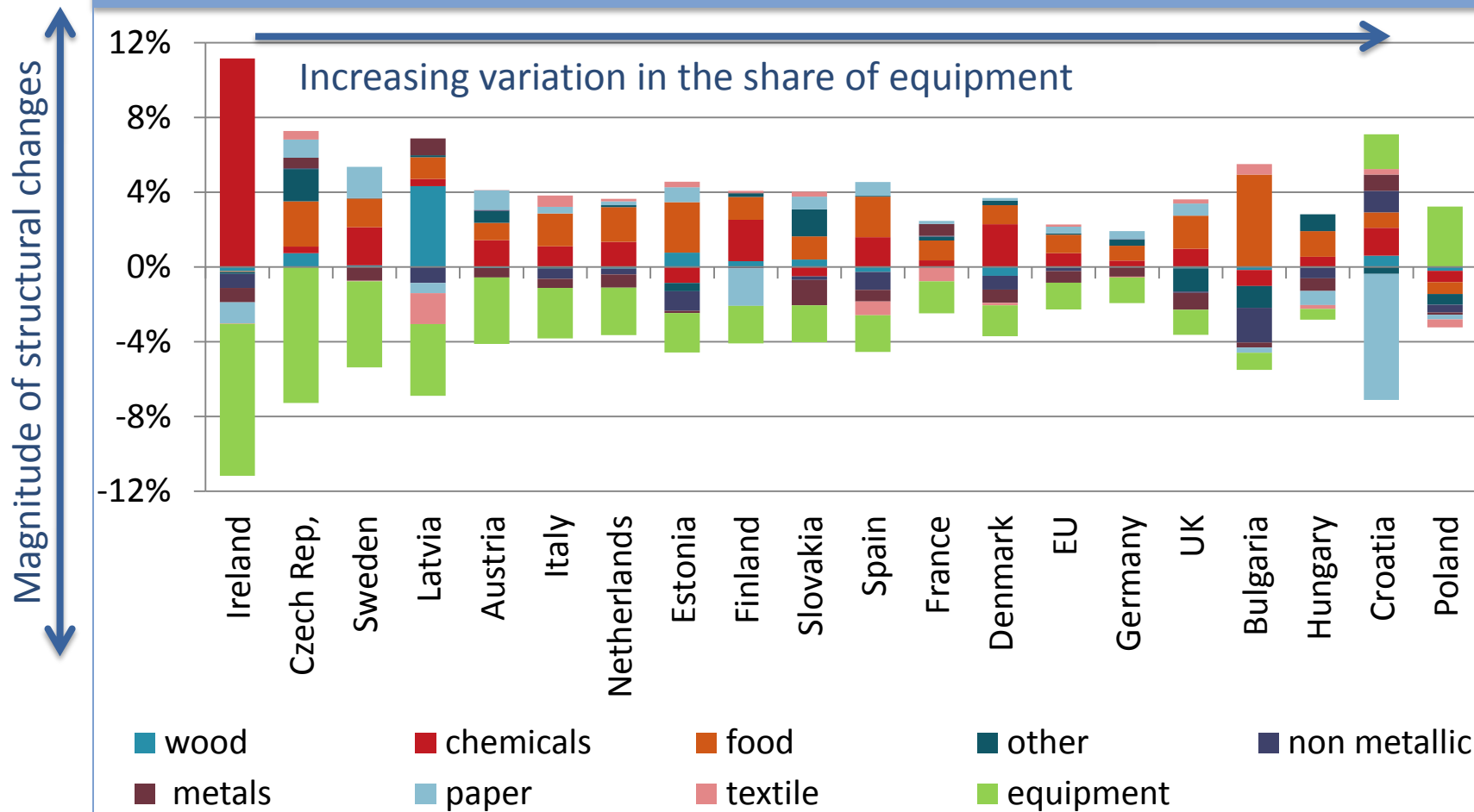
Focus on 2009: what happens in a recession?

- At branch level, usually a loss of efficiency: the consumption does not follow the reduction of activity, for two reasons:
 - Equipment do not operate at full capacity → they are less efficient
 - Part of the consumption is not linked to the level of production

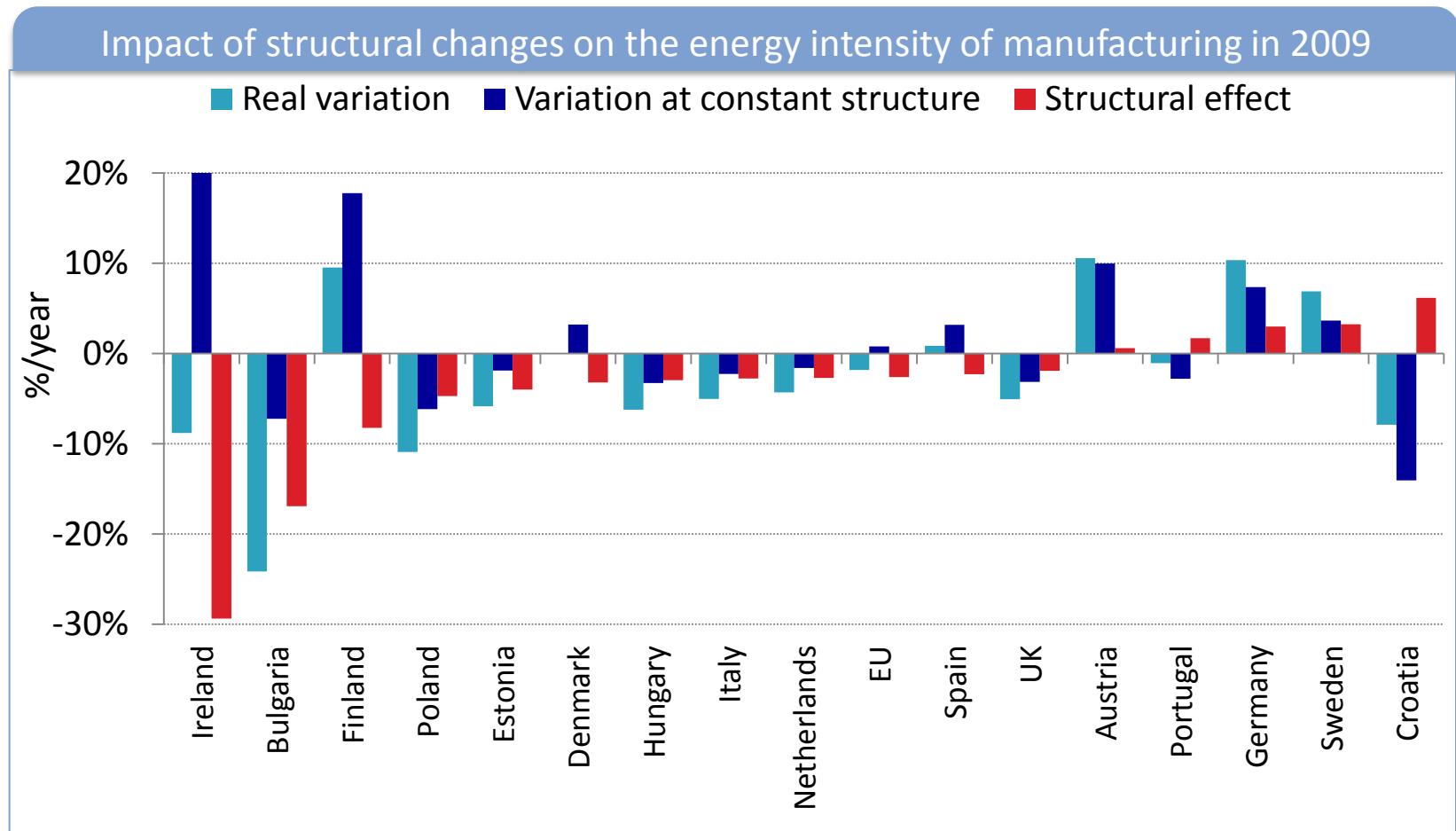
- At industry level, all branches are not hit the same way by the recession and there are strong structural changes

- In 2009, increasing share of chemicals and food in manufacturing value added and decreasing share of equipment in almost all countries, except for Croatia and Poland, and metals in many countries

Variation in the share of each branch in total value added in 2009



- In 2009, structural changes contributed to decrease the energy intensity of manufacturing in most countries; and in the EU as a whole.
- They even offset the effect of an increase in sectoral intensities in 3 countries (Czech Rep, Ireland, Finland & Denmark)



Overview of the impact of the 2009 crisis on industrial energy intensities: no simple answer!

Decrease in the energy intensity

Countries

Very strong reduction (>10%)

Romania, Belgium, Norway, Luxembourg, Bulgaria, Poland

Above 4% reduction

Croatia, Italy, Netherlands, Ireland, Estonia, Greece, Cyprus, France,

Reduction below 4%

Spain, UK, EU Denmark, Portugal

In red: main driver are structural changes to less intensive branches

In green: decrease in intensity driven by a decrease in sectoral intensities

Increase in the energy intensity

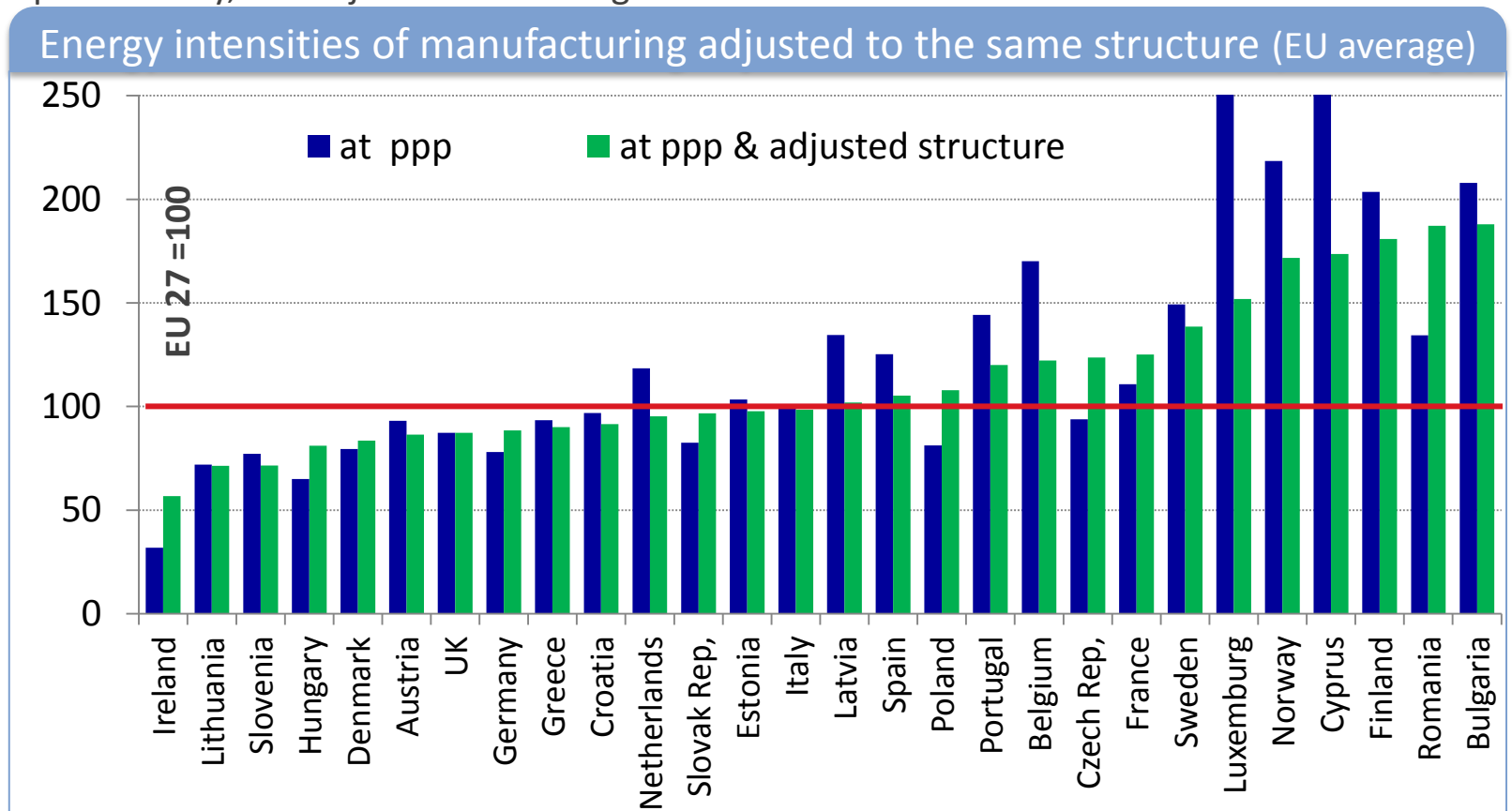
Hungary, Finland, Germany, Austria, Sweden, Latvia, Czech Rep, Malta, Slovenia, Slovakia

In purple: intensity increase driven both by structural change to more intensive branches and an increase in sectoral intensities

In orange: main driver : increase in sectoral intensities

In italics: data by branch not available → impossibility to assess structural changes

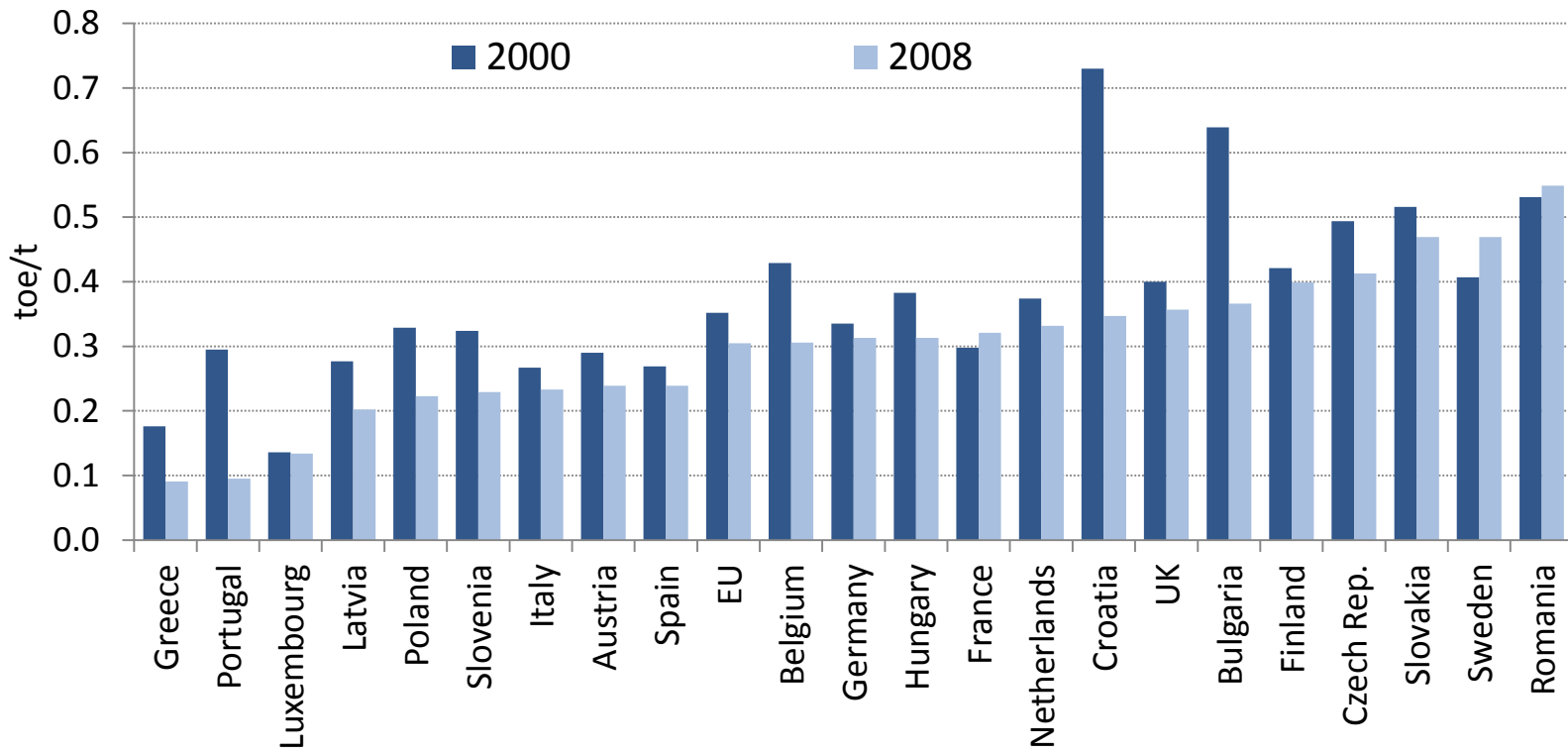
- Comparisons of energy intensity are more relevant with energy intensities adjusted to the same value added structure
- For countries with a share of energy intensive branches lower than the EU average, the adjusted intensity is higher (e.g. Ireland, France, Germany, Slovakia, Hungary, Poland, Czech Rep, Romania); for countries with a higher share of energy intensive branches, the adjustment reduces the intensity; for Finland, countries with a very high share of pulp and paper industry, the adjustment through value added is not sufficient.



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- Decrease in the specific energy consumption per ton of steel in all countries: - 1.8 %/year on average in the EU; part is due to a an increased penetration of electric steel.
- Differences among countries also partly explained by different share ratios of electric steel

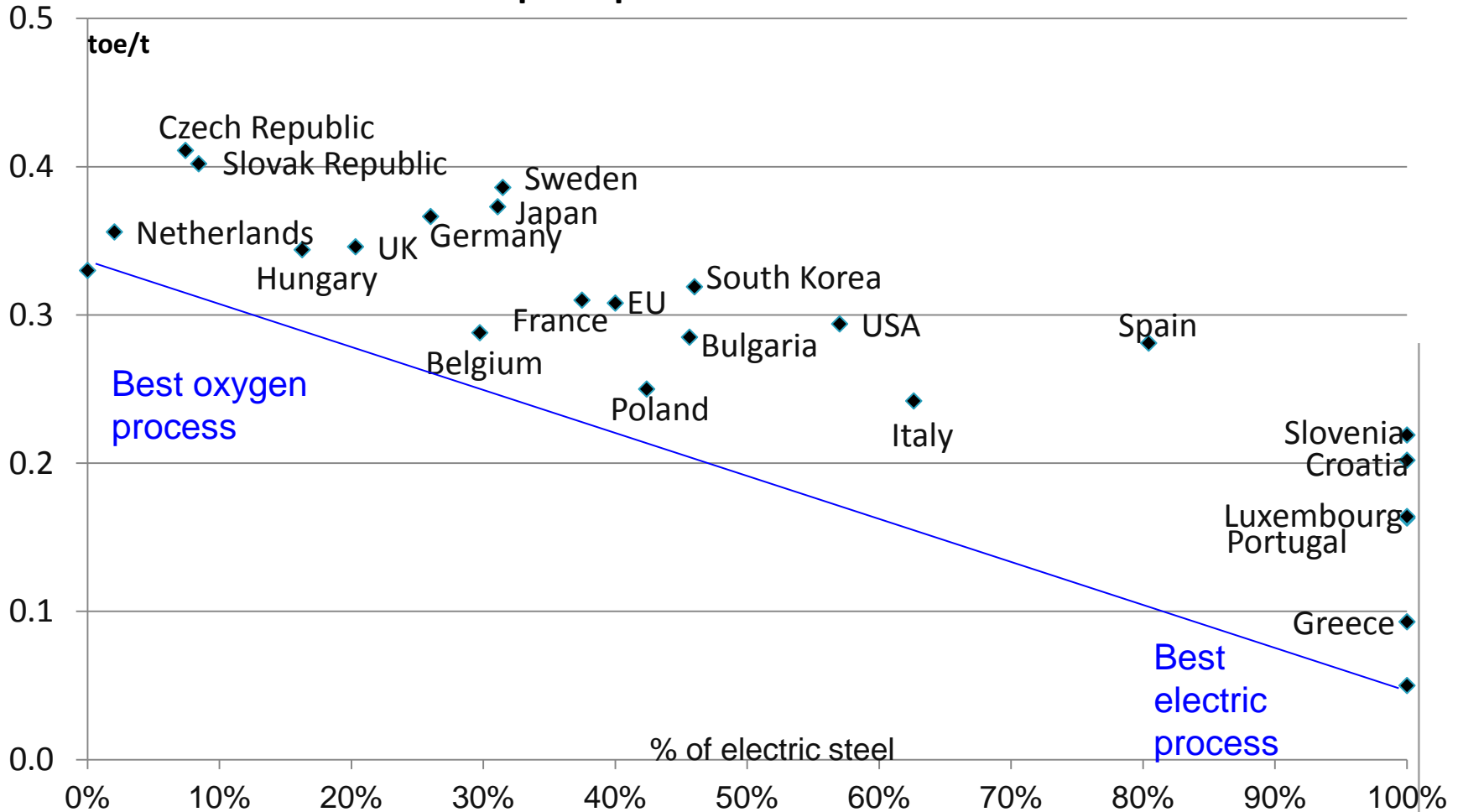
Specific consumption per ton of steel in EU countries



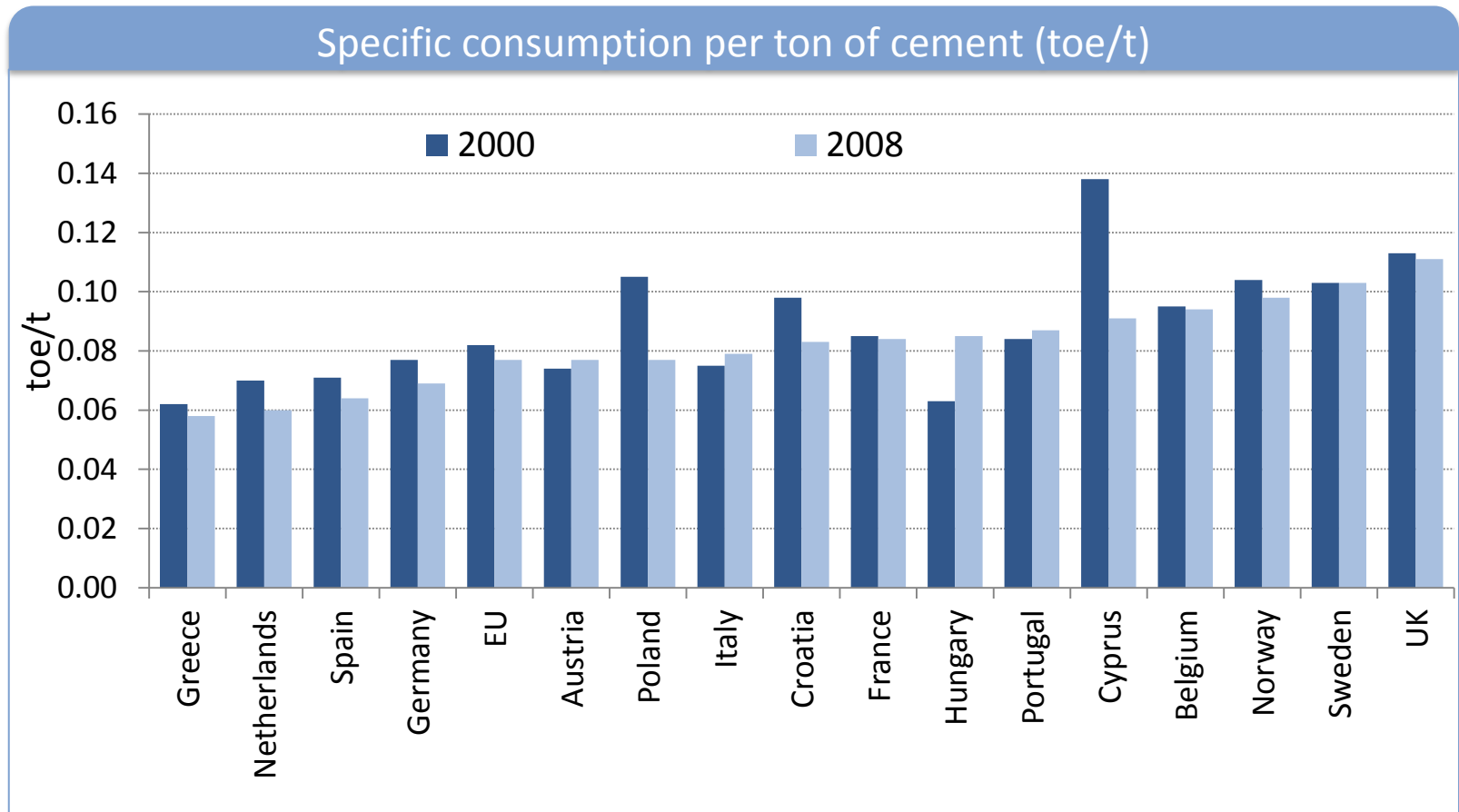
2008 is more relevant to present the specific consumption as 2009 is an unusual year due to the crisis

Difference in specific consumption partly explained by differences in process mix; distance to blue line shows possible potential of energy efficiency gains

Consumption per tonne of crude steel



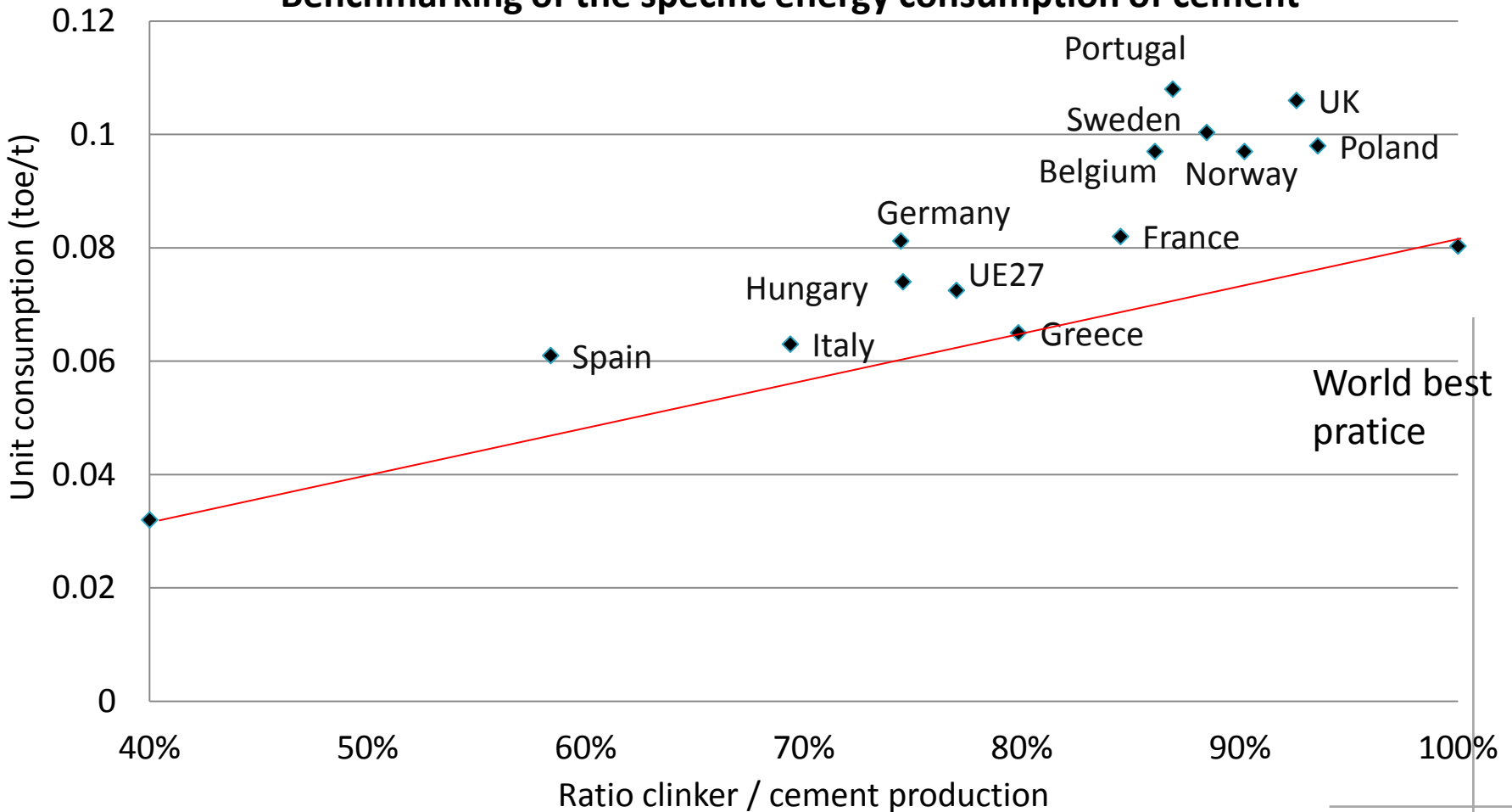
- Part is due to a reduction in the ratio clinker (the energy intensive component)/cement production (either because of clinker imports or change in the cement composition).
- Differences among countries also partly explained by different ratios clinker to cement production



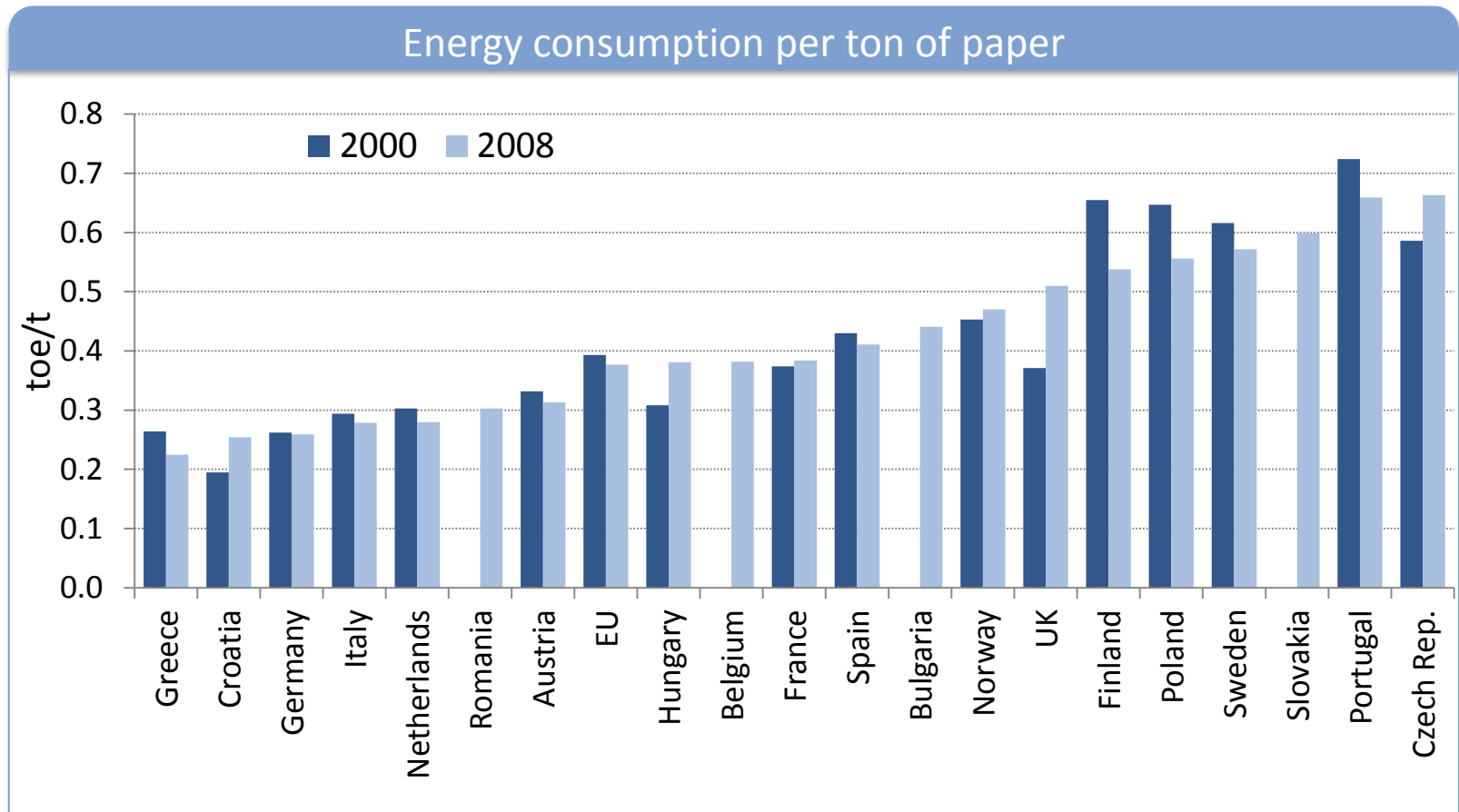
2008 is more relevant to present the specific consumption as 2009 is an unusual year due to the crisis

The energy performance of cement production is linked to the share of clinker produced in the country in relation to the cement production: the higher this ratio, the higher the specific energy consumption. Distance to the red line (best practice) indicates the potential of energy saving

Benchmarking of the specific energy consumption of cement



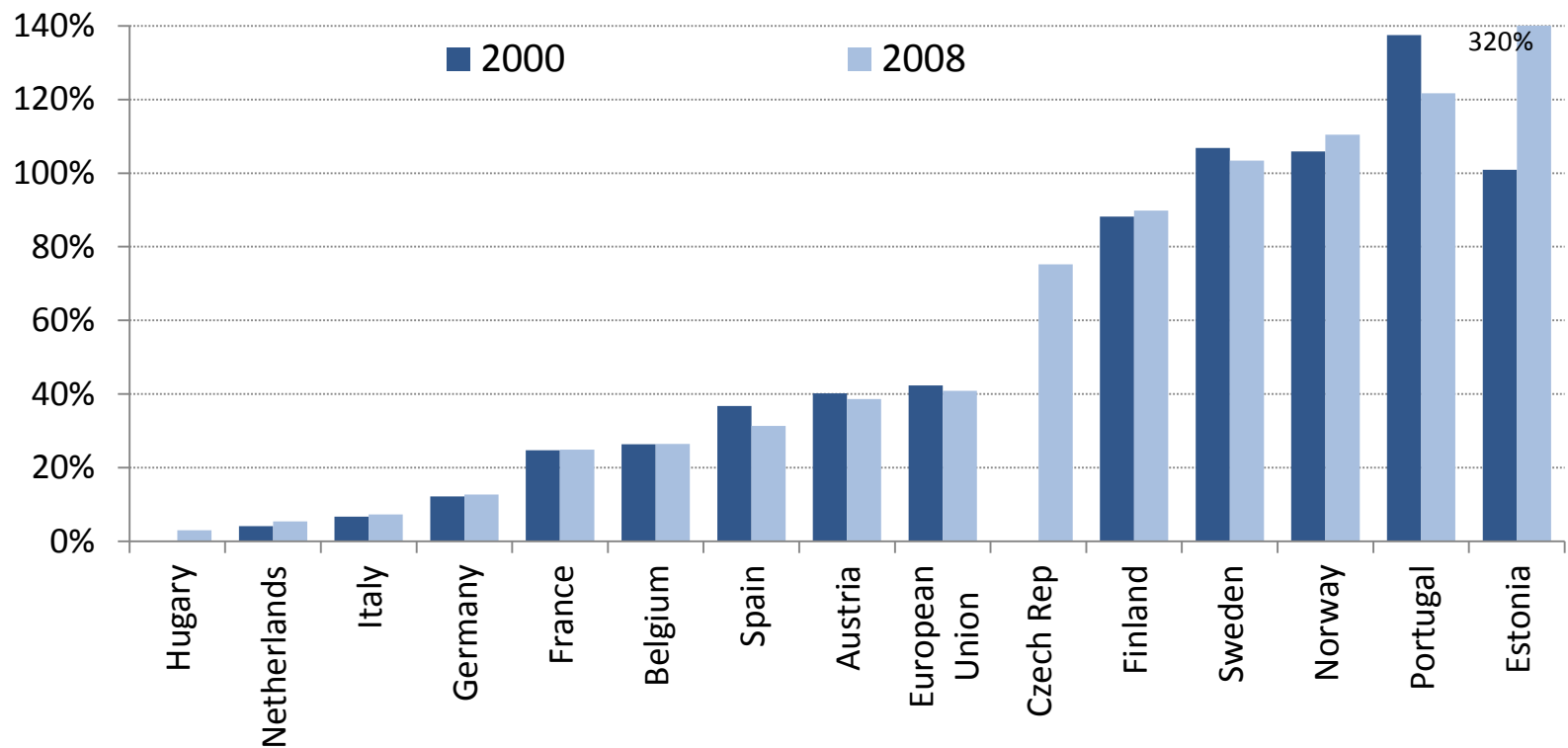
- Decrease in specific consumption in almost all the countries due to imports of pulp, except for Hungary, UK, Czech Rep, Croatia, France, Norway



Belgium, Romania, Bulgaria, Slovakia: data for 2000 not relevant (biomass not accounted for, or data not significant)

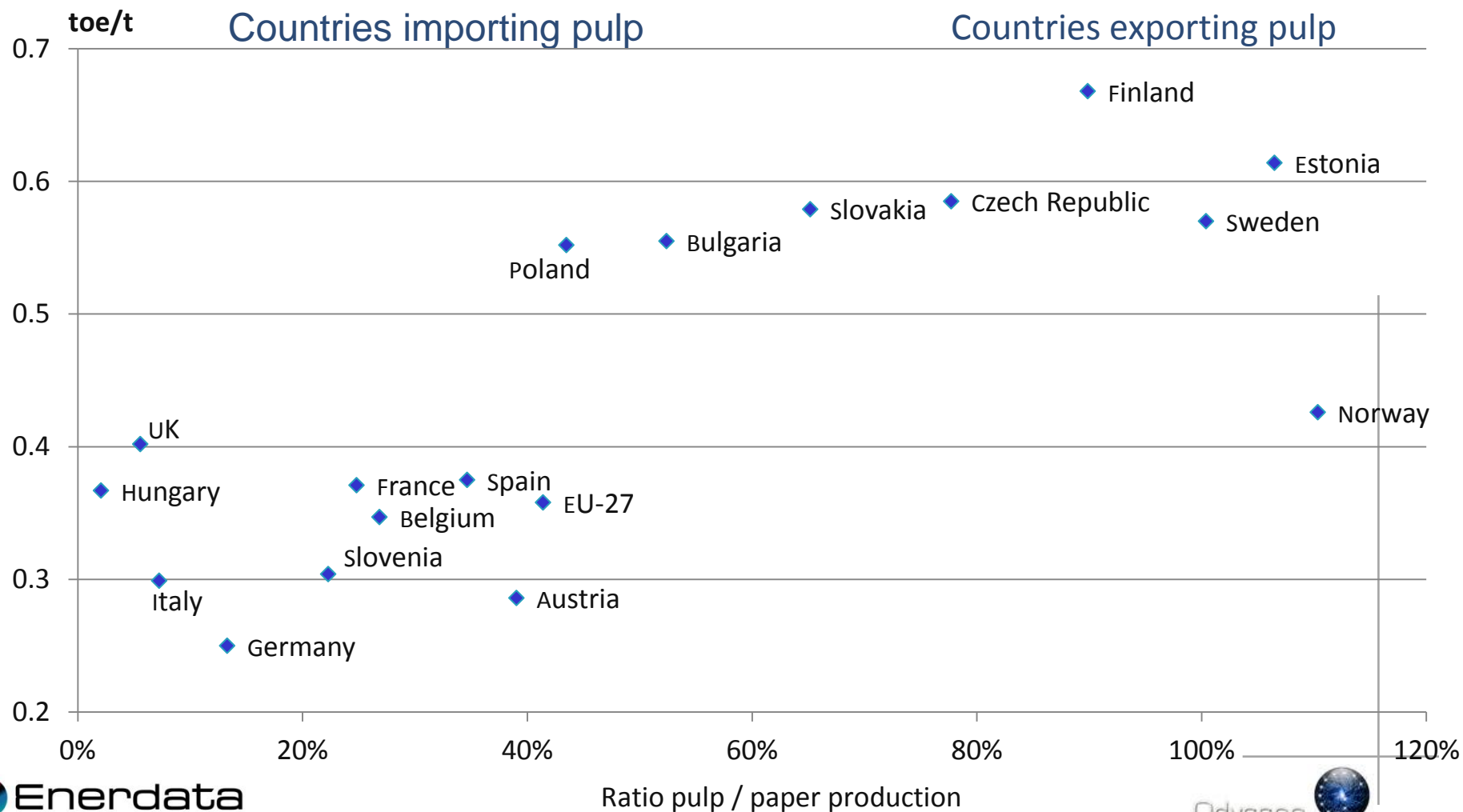
- Decreasing share of the ratio pulp production over paper production in almost all countries in 2008 compared to 2000 except for Estonia, Norway, Finland
- A ratio of 0.5 means that 50% of the paper is produced from imported pulp
- The lower the ratio, the lower should be the average energy consumption per ton of paper

Ratio pulp/paper production in EU countries



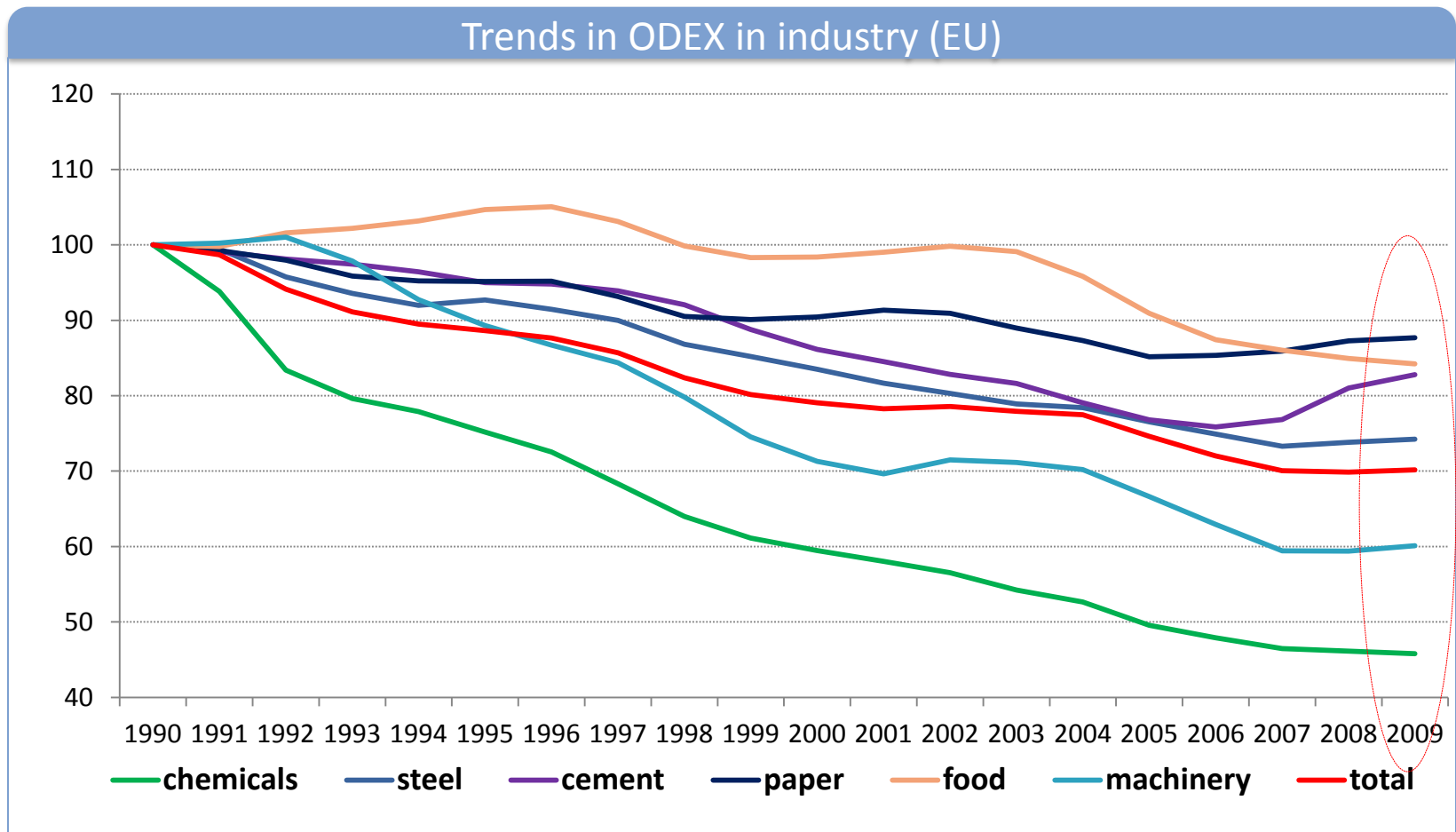
The energy performance of the paper industry is linked to the share of pulp produced in the country in relation to the paper production: the higher this ratio, the higher the unit consumption

Specific consumption per ton of paper



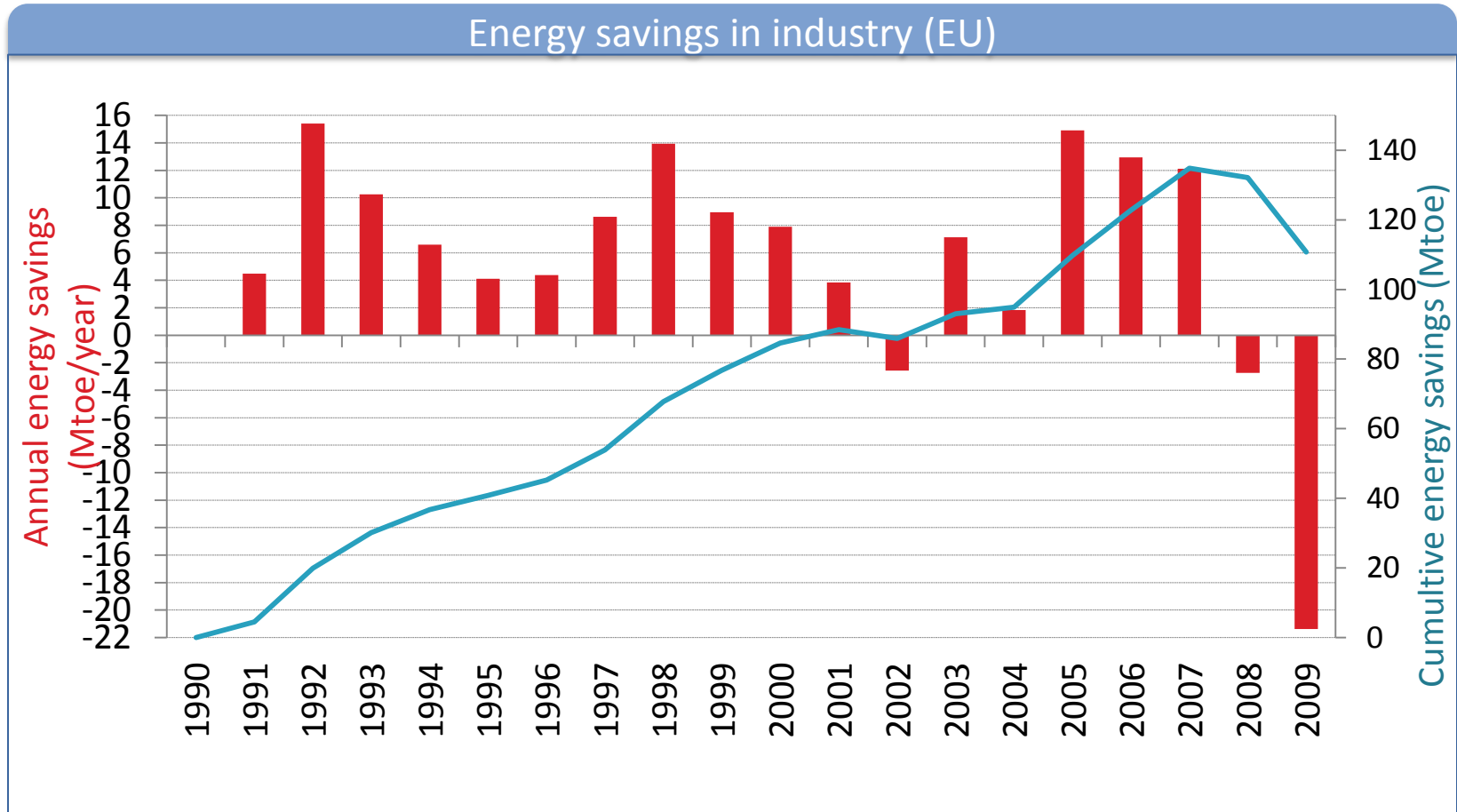
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Around 30% progress in energy efficiency in industry in the EU since 1990. Slower progression from 1998 to 2007 (1,8 %/yr compared to 2.4%/year from 1990 to 1998). No progress since 2008 with even a reverse trend in 2009 (+ 0.5% for the index after a stability in 2008)



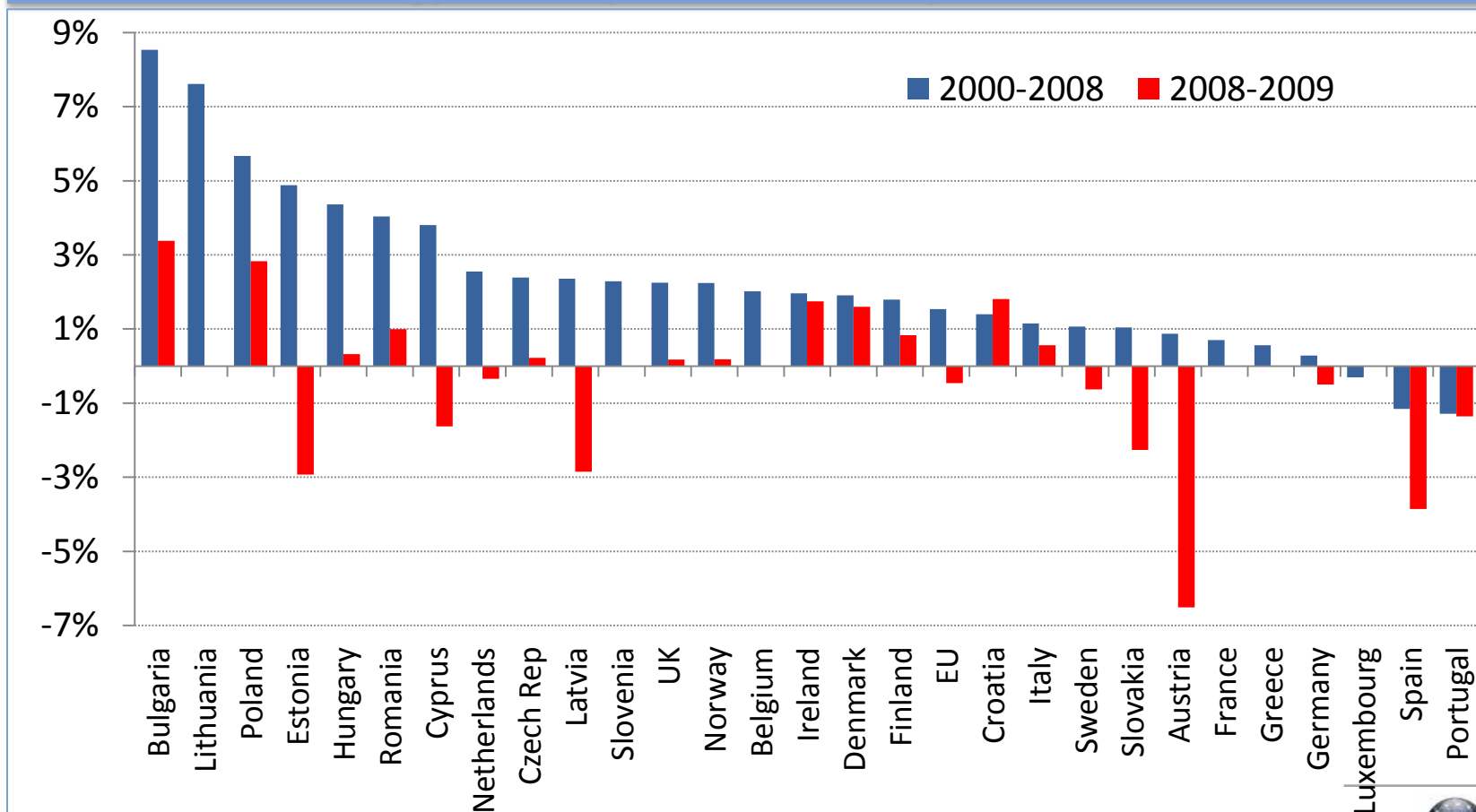
- In 2009, energy savings in industry almost reached 110 Mtoe: without energy efficiency improvement in industrial branches, the energy consumption would have been higher by 110 Mtoe

Negative energy savings in 2008 and mainly in 2009 due to the economic recession



- Energy efficiency improved on average by 1.5 % per year in industry in the EU as a whole from 2000 to 2008, but quite unevenly across the countries
- In 2009 the crisis had a negative impact on energy efficiency with a reverse trends in several countries (e.g. Germany, Sweden, Austria, Baltic countries) or a slowdown in the other countries

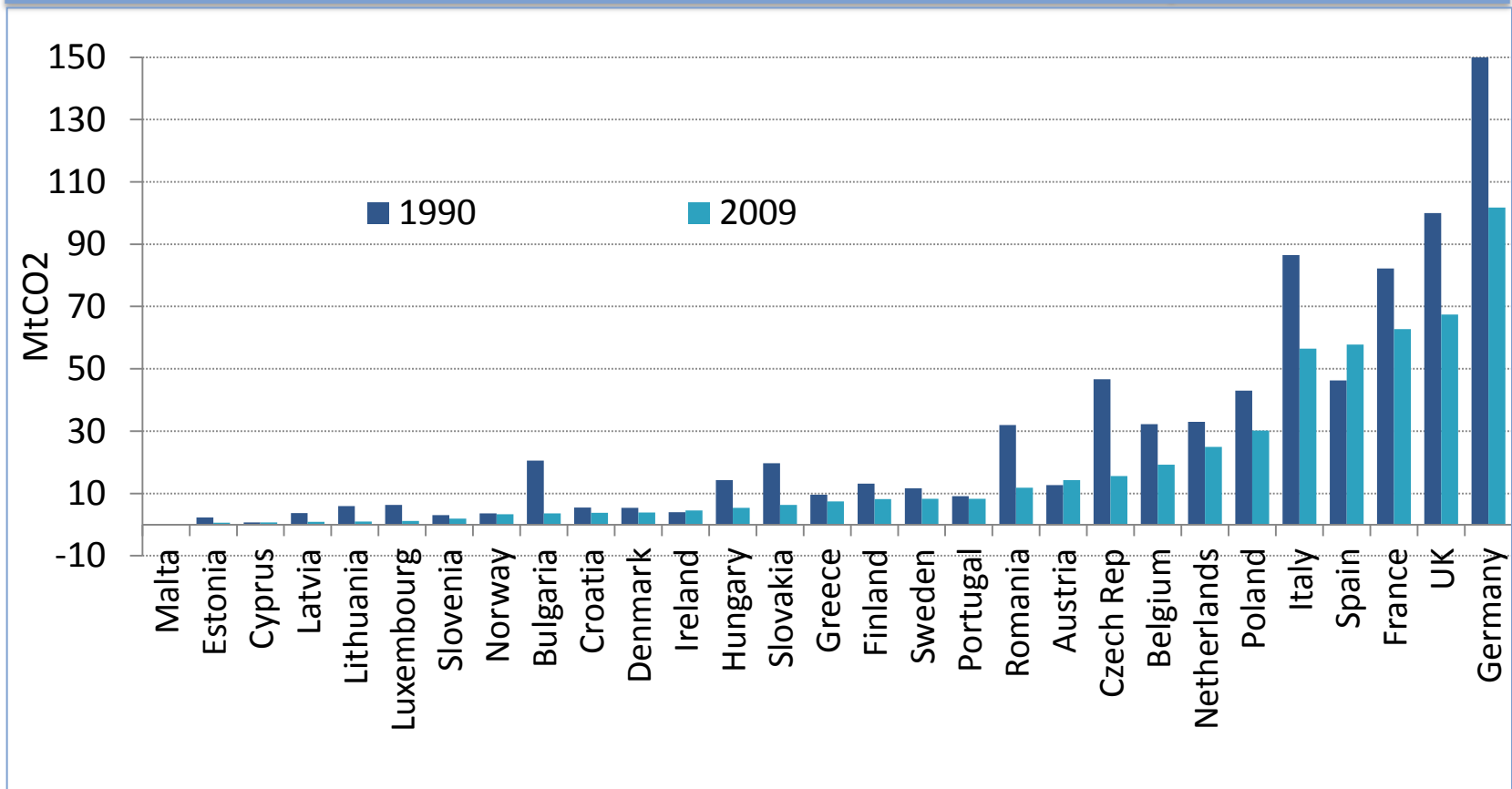
Energy efficiency trends in industry in EU countries



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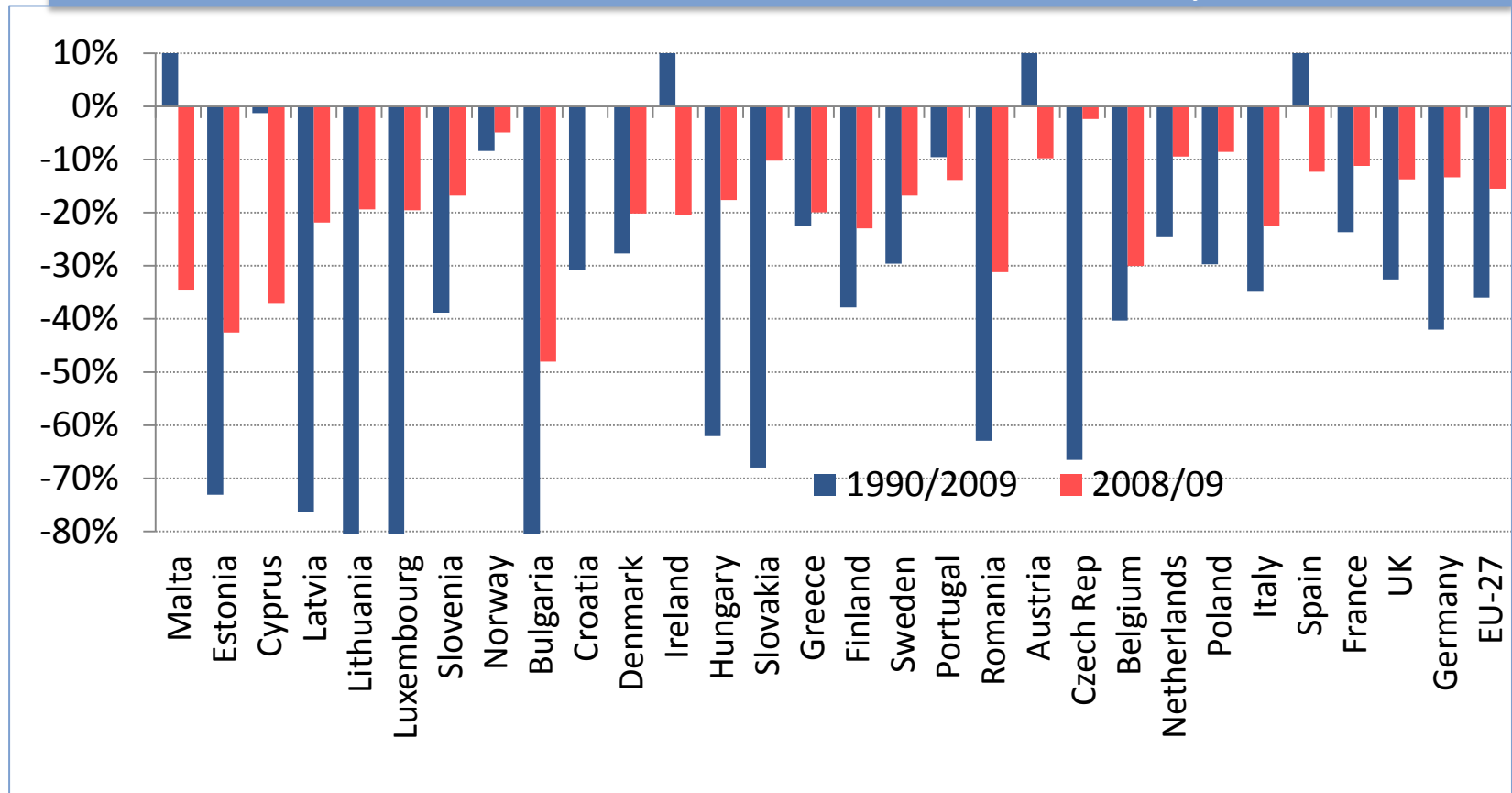
- Decreasing CO2 emissions from fuel combustion in all countries except Malta, Ireland, Austria and Spain
- Strong reduction (-60-80%) in most new member countries (except Poland, Slovenia, Cyprus and Malta) and in Luxembourg
- -40% for the EU as a whole

CO2 emissions from fuel combustion in industry

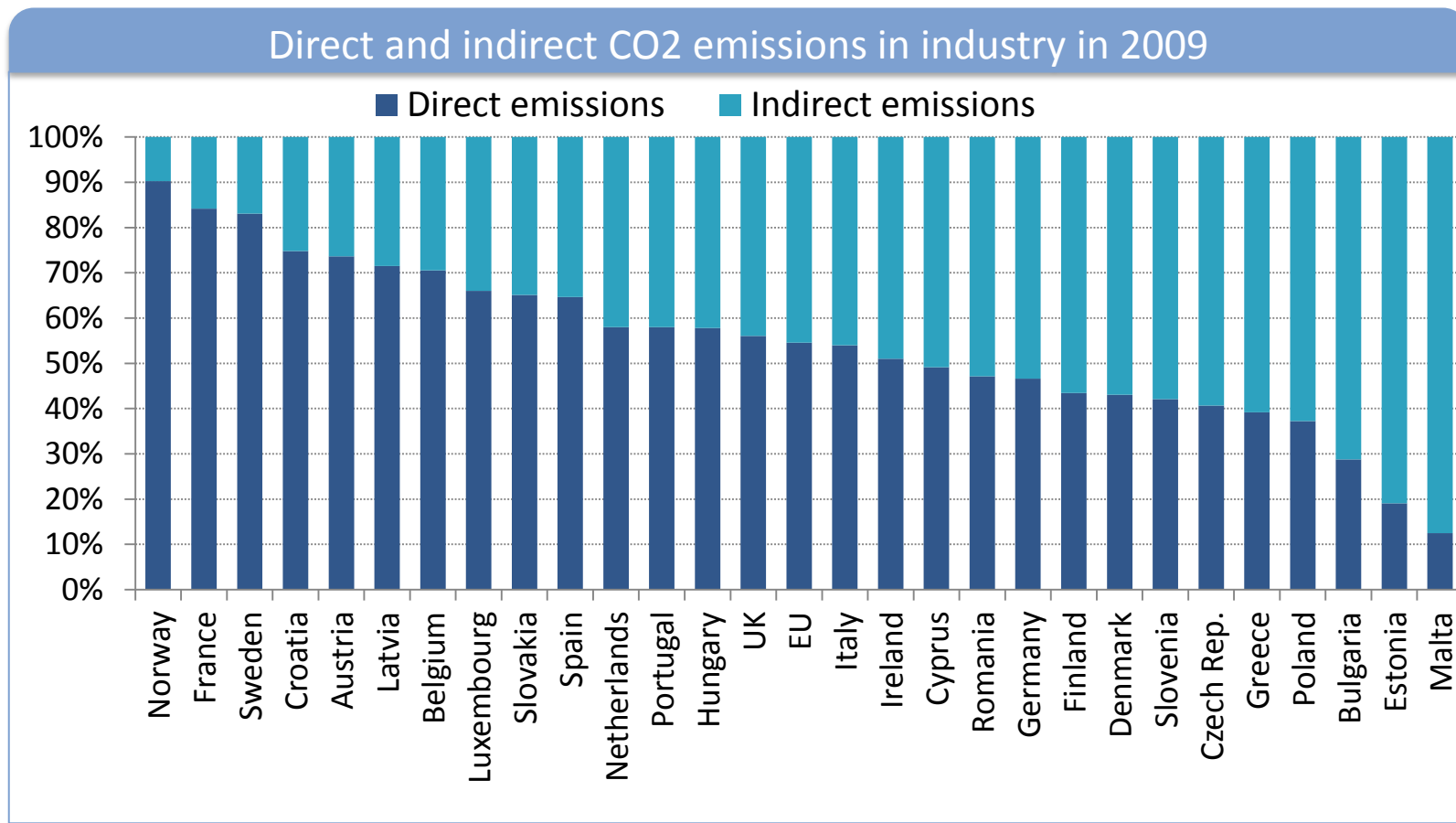


- Strong reduction in 2009: -16% in 2009 at EU level, ie 40% of the whole variation between 1990 and 2009
- In several countries, most of the reduction achieved in 2009 compared to 1990 took place in 2009 (above 60%) (e.g. Portugal, Greece, Belgium, Estonia, Bulgaria, Norway, Denmark, & Italy)

CO2 emissions from fuel combustion in industry



- Indirect CO2 emissions of industry are of the same magnitude as direct emissions in the EU in 2009; large discrepancies between countries depending on energy mix for public power generation (16% in France, 53% in Germany)



Indirect emissions: emissions induced by electricity purchased ; emissions of electricity sector allocated to industry in proportion of its share in electricity consumption

Conclusions

- Severe drop in industrial energy consumption of industry in 2009 (-15%)
- Diverse reactions to the economic recession of 2009:
 - acceleration of the energy intensity decrease in 2/3 of countries and in the EU as a whole, mainly because of a stronger recession in energy intensive branches (i.e. structural effect);
 - strong increase in the intensity, i.e. the energy consumption did not follow the reduction in the energy consumption, due to lower efficiency
- Around 30% progress in energy efficiency in industry in the EU since 1990; however no progress since 2008 with even a reverse trend in 2009 (+ 0.5% for the index after a stability in 2008)
- Strong reduction of CO₂ emissions from energy combustion in 2009: -16% at EU level, i.e. 40% of the whole variation between 1990 and 2009