



Energy efficiency trends in the EU

From 1990 to 2009 with a focus on 2000-2009

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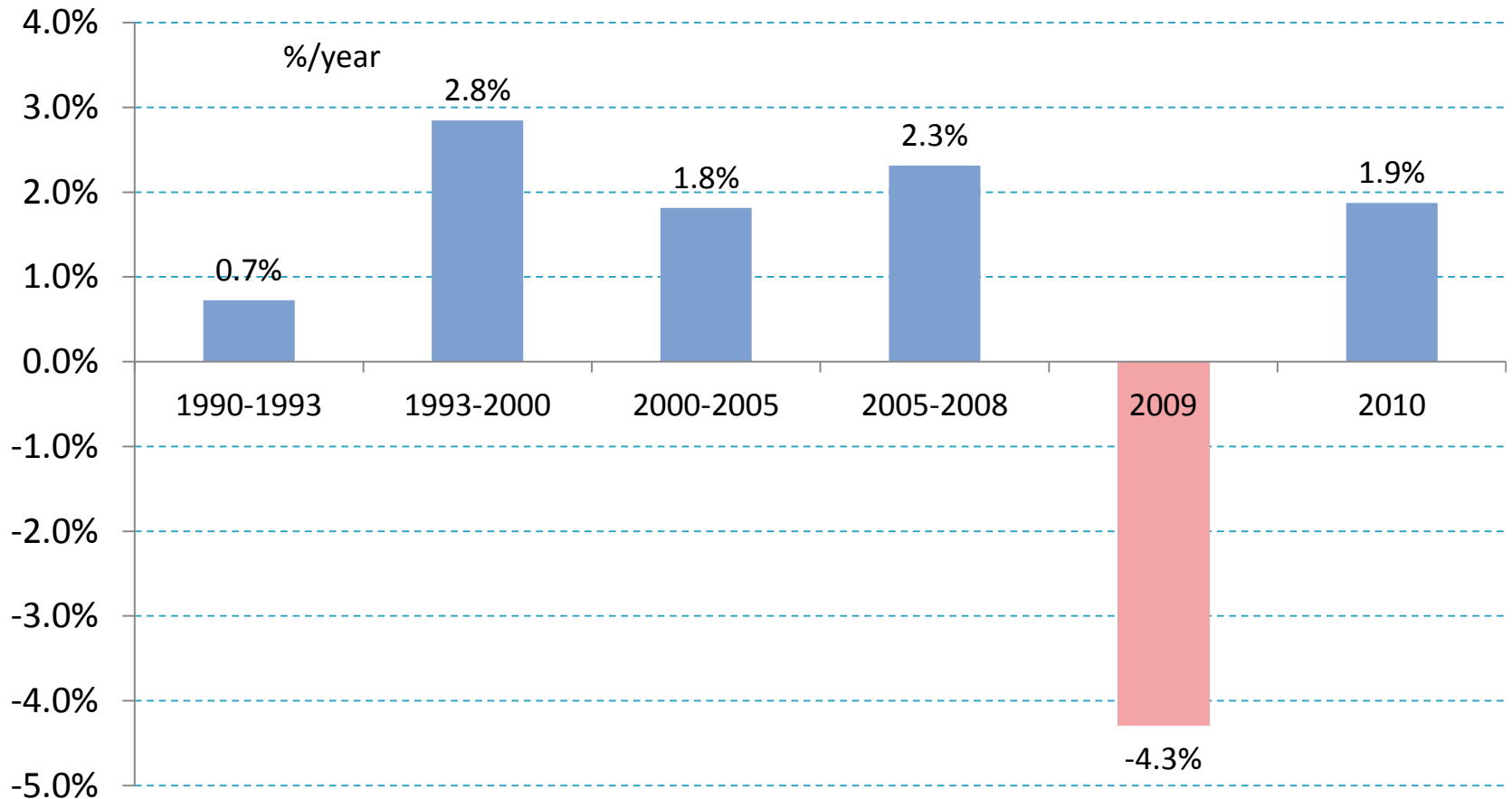
December 2011



- ▶ **1. Economic features**
- 2. Energy consumption trends
- 3. Energy intensity trends
- 4. Trends in specific energy consumption
- 5. Energy efficiency trends
- 6. Cross-country comparison of energy intensity level
- 7. Cross-country comparison of specific energy consumption
- 8. CO2 emissions and indicators

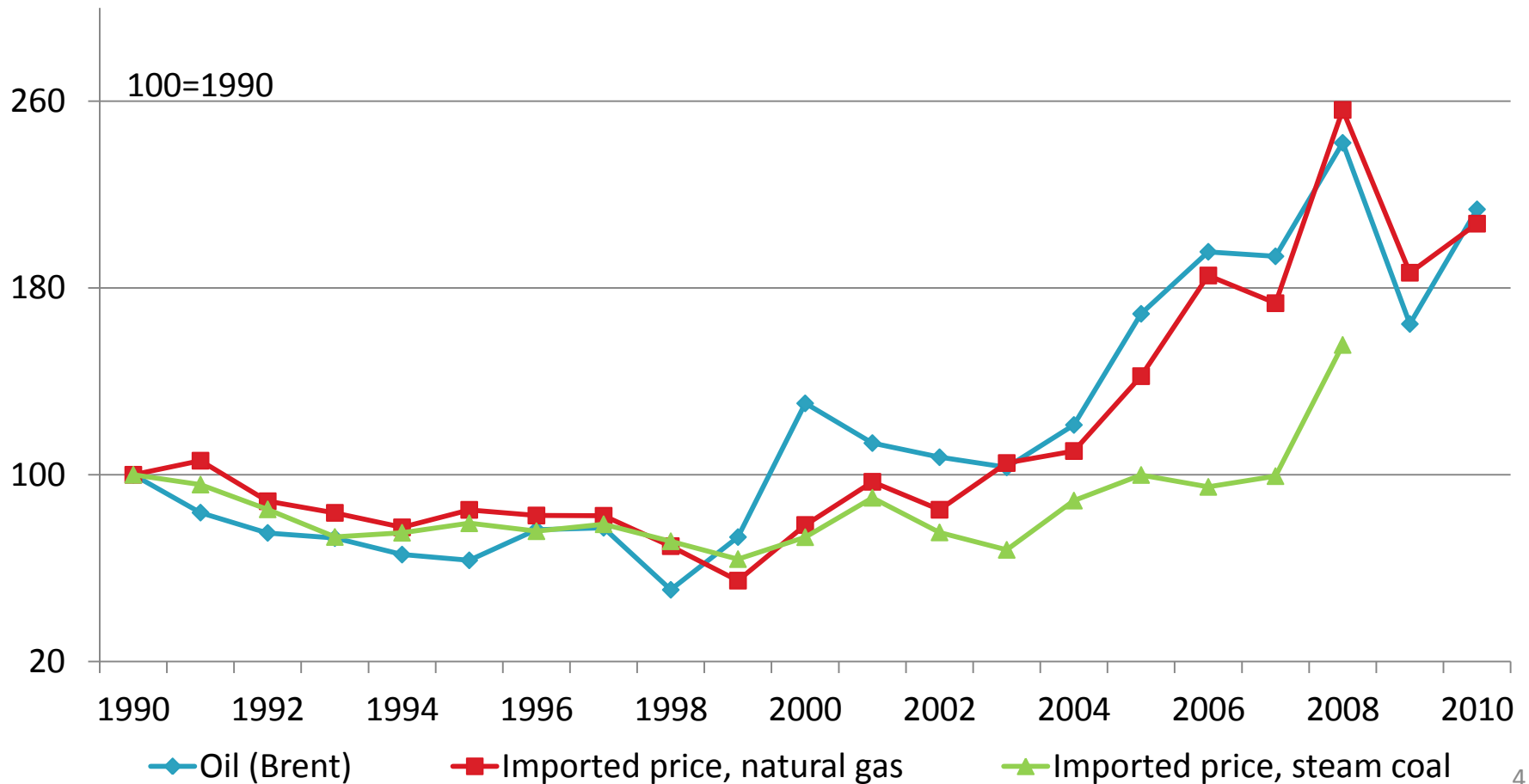
Economic growth

- Since 1990, GDP has increased by 1.8%/year on average
- Drop in economic growth in 2009 (-4.3%)



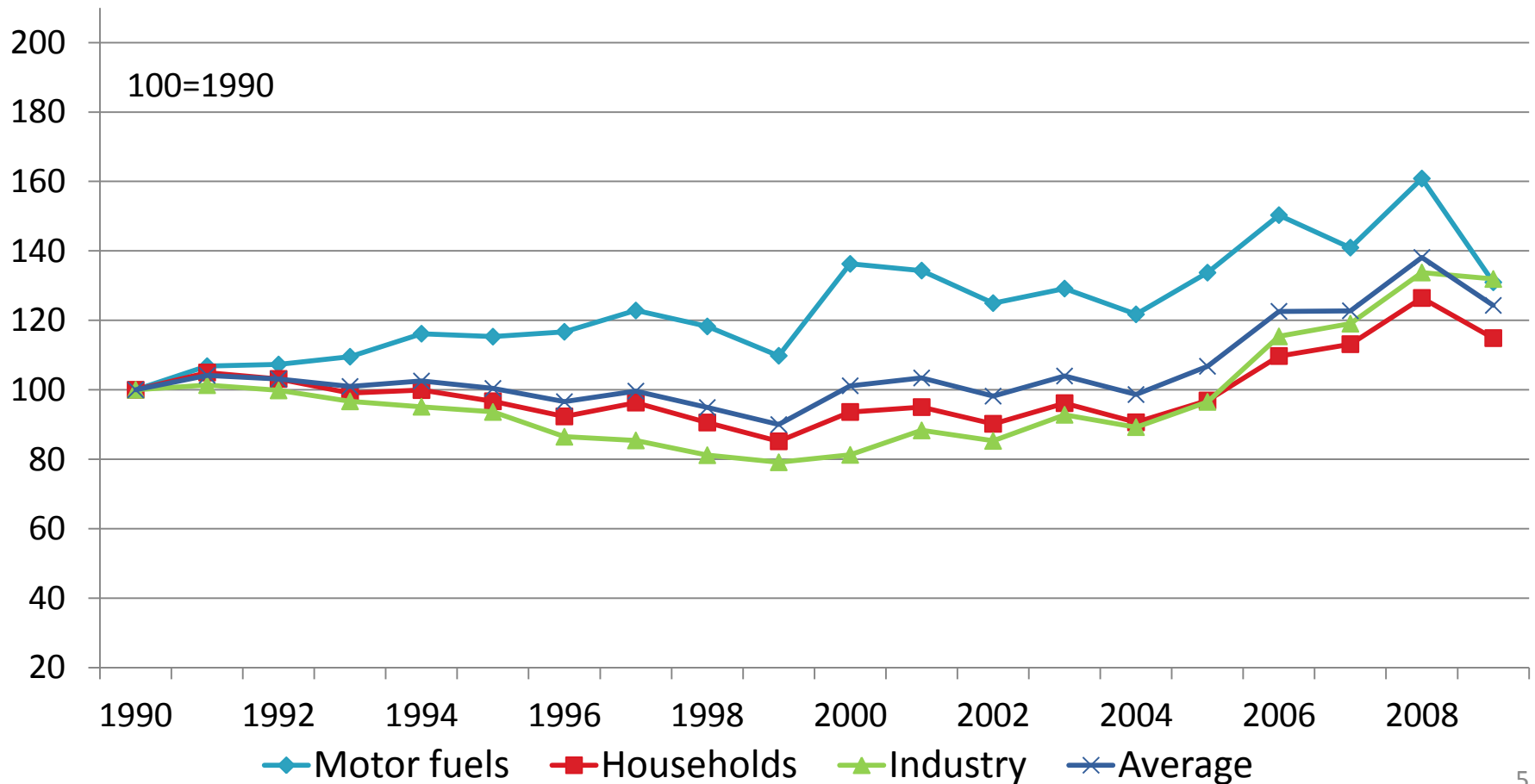
- Rapid increase between 1999 and 2008 of the price of oil, gas and coal
- Drop in oil and gas prices in 2009 :-32% for oil (62€ \$ /bl in 2009 compared to 97 \$/bl in 2008), -27% for gas.

International energy prices



- Increasing energy prices by sector mainly from 1999 to 2008 (+4.9%/year on average)
- Drop in 2009 (-10% on average, of which -19% for motor fuel)

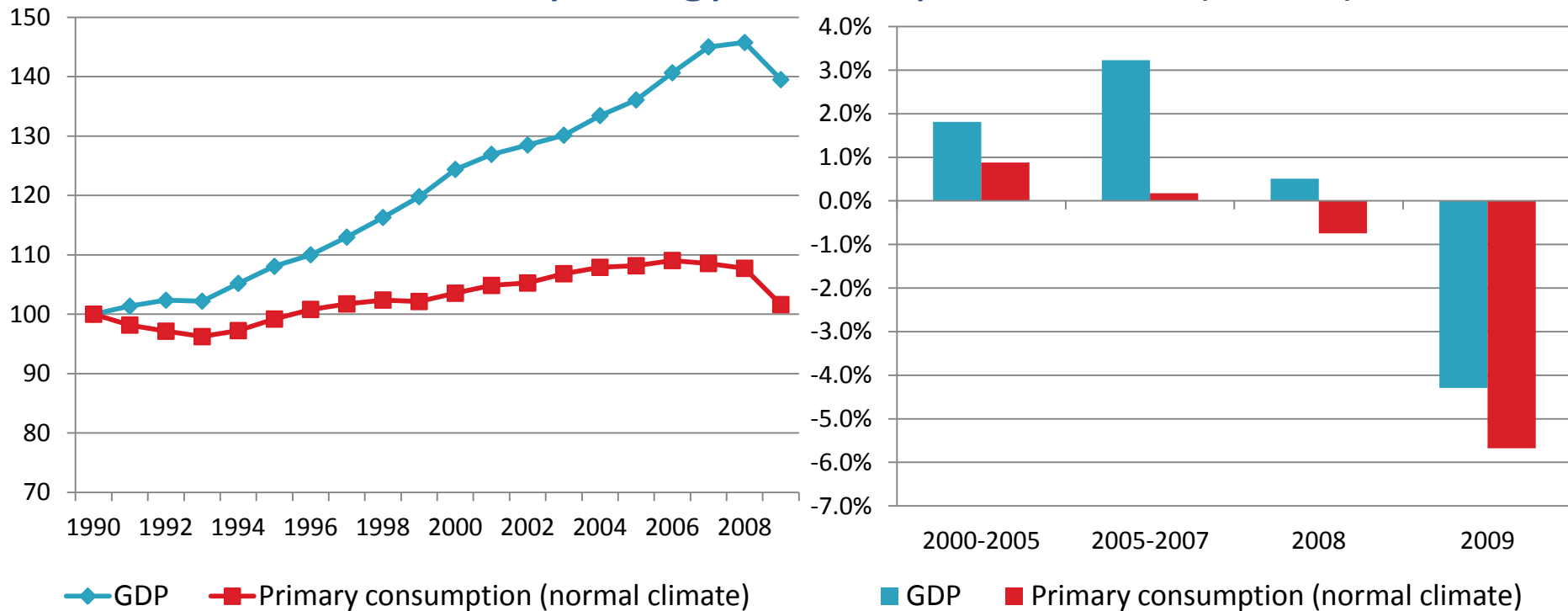
Average real energy prices by sector



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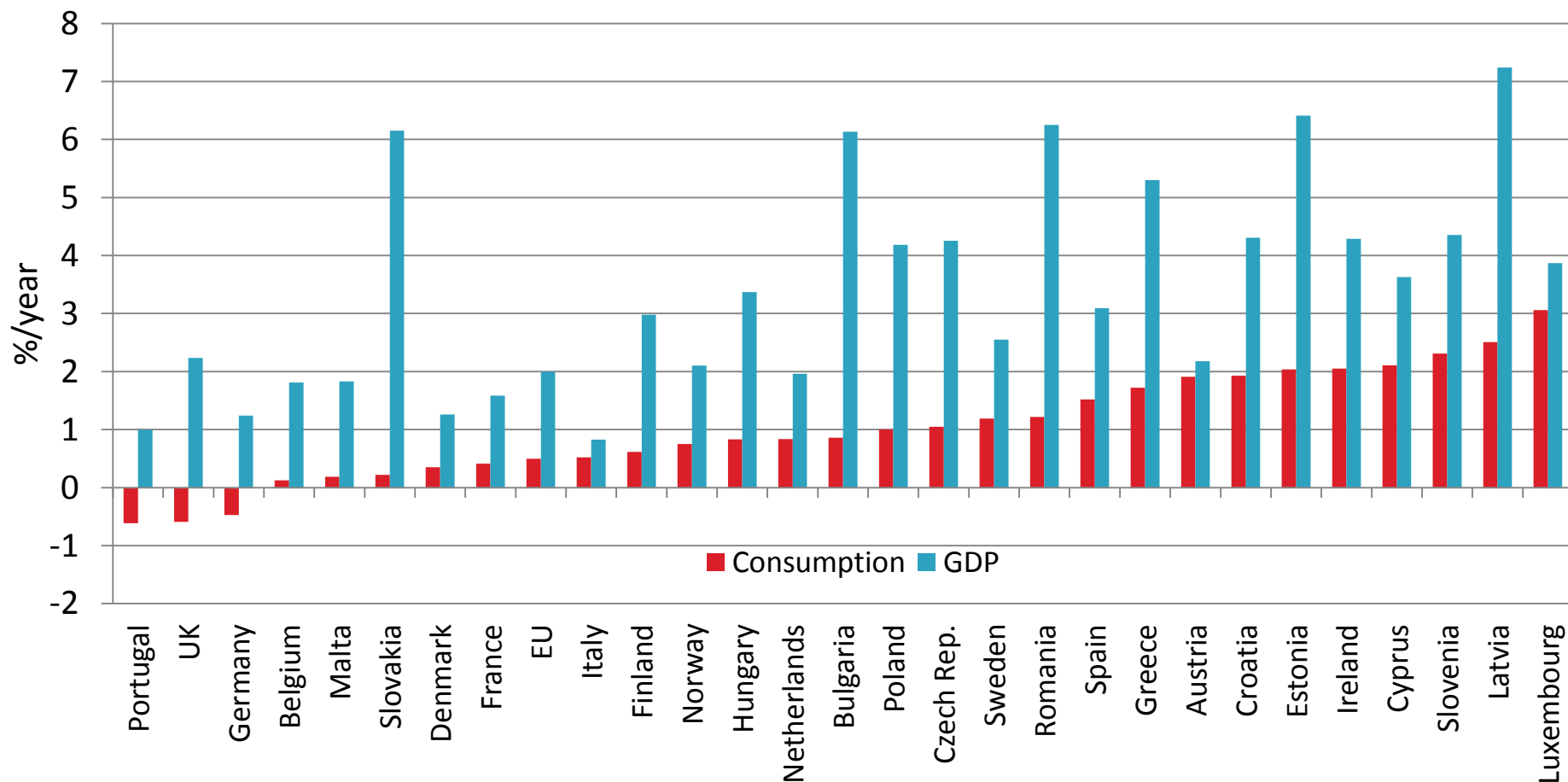
- 2%/year economic growth from 2000 to 2008 and -4.3% in 2009
- Slow progression of the primary energy consumption from 2000 to 2008 (0,5 %/year);
- Strong reduction in 2009 (-5.7%) more rapid than the GDP drop.

Primary energy consumption trends (EU-27)



Variation of primary energy consumption* and GDP in EU countries (2000-2008)

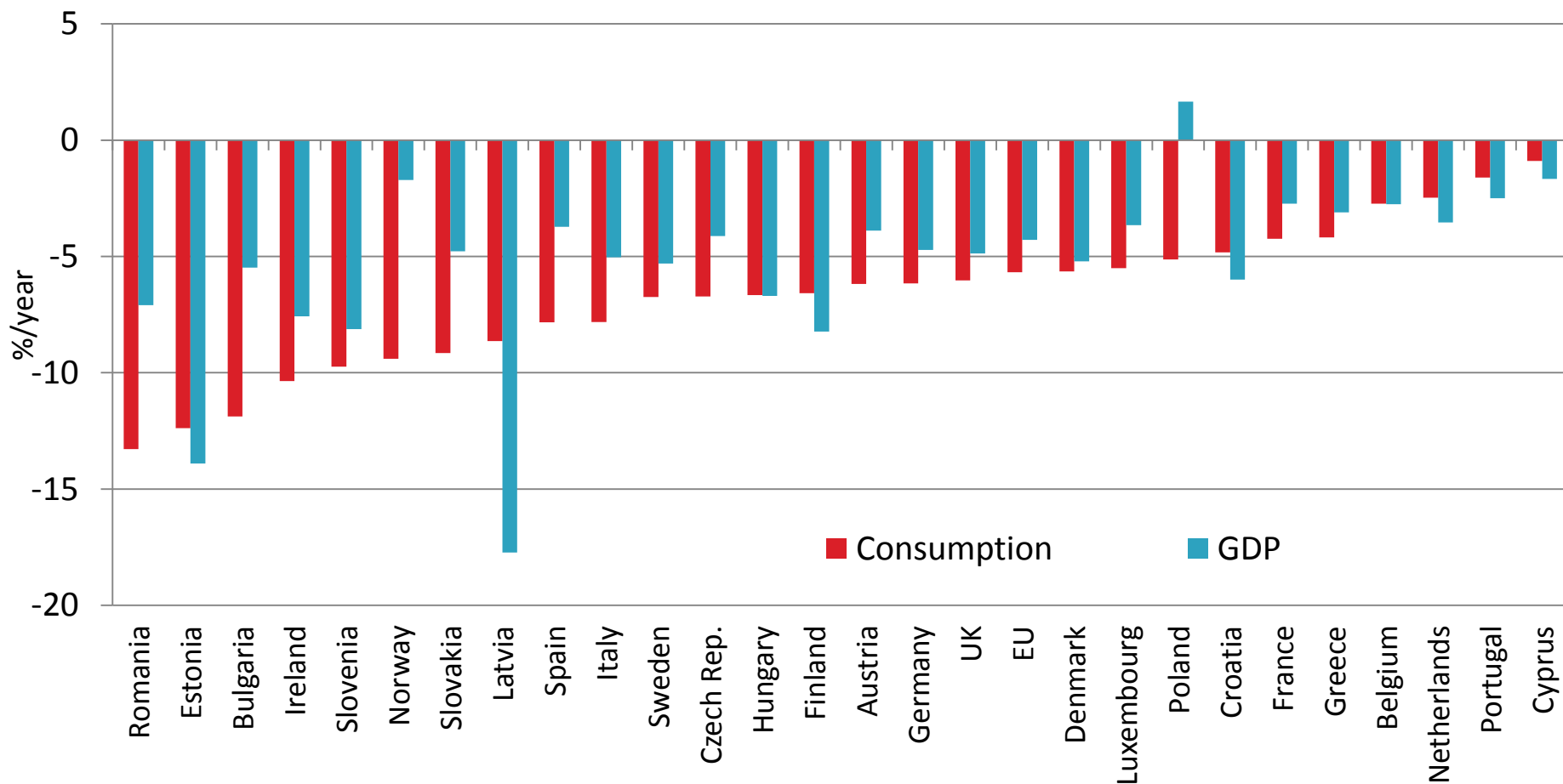
- More rapid progression of GDP in new member countries (more than 4%/year)
- Half of countries with primary energy consumption higher than 1%/year



Primary energy consumption and GDP : focus on 2009

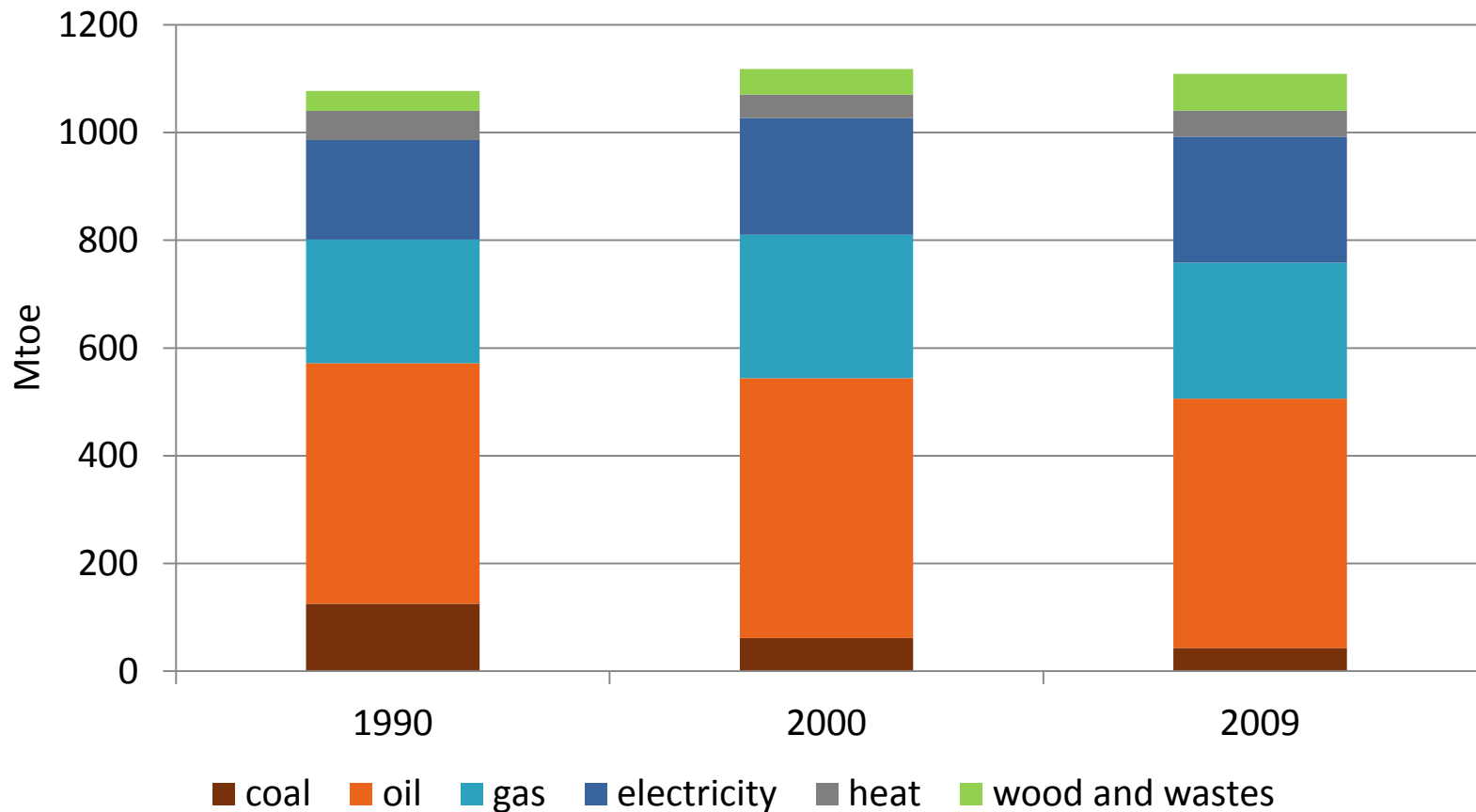
In 18 EU countries and in the EU as a whole, the primary energy consumption decreased more than the GDP

In 2009 only Poland had a positive economic growth (1.7%)



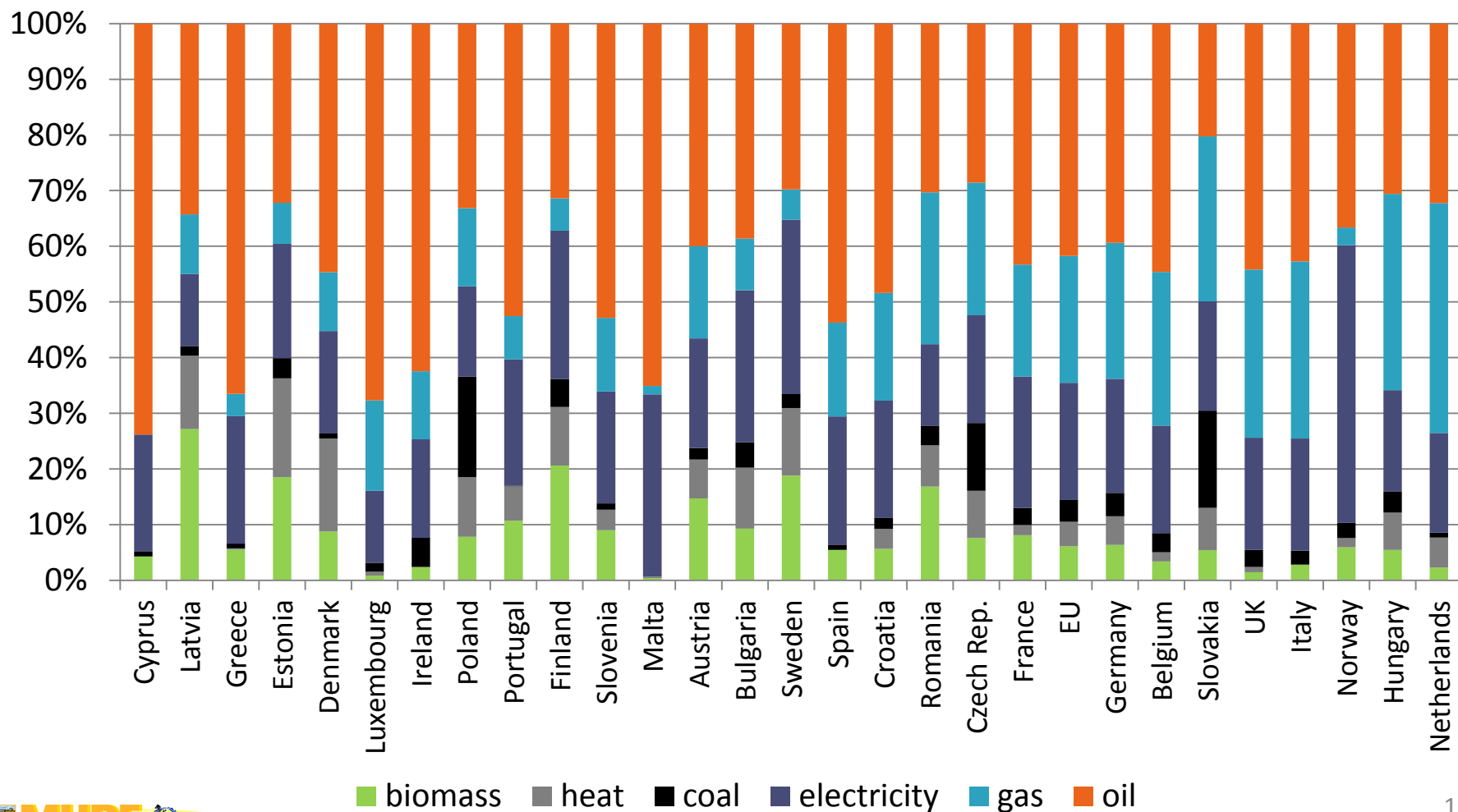
Final consumption by energy in the EU-27

- Increasing share for electricity (from 17% in 1990 to 21% in 2009), gas (from 21 to 23%), and biomass (from 3 to 6%)
- Decreasing share for coal (from 12 to 4%); the other energies remain constant



Final consumption by energy in the EU-27 countries (2009)

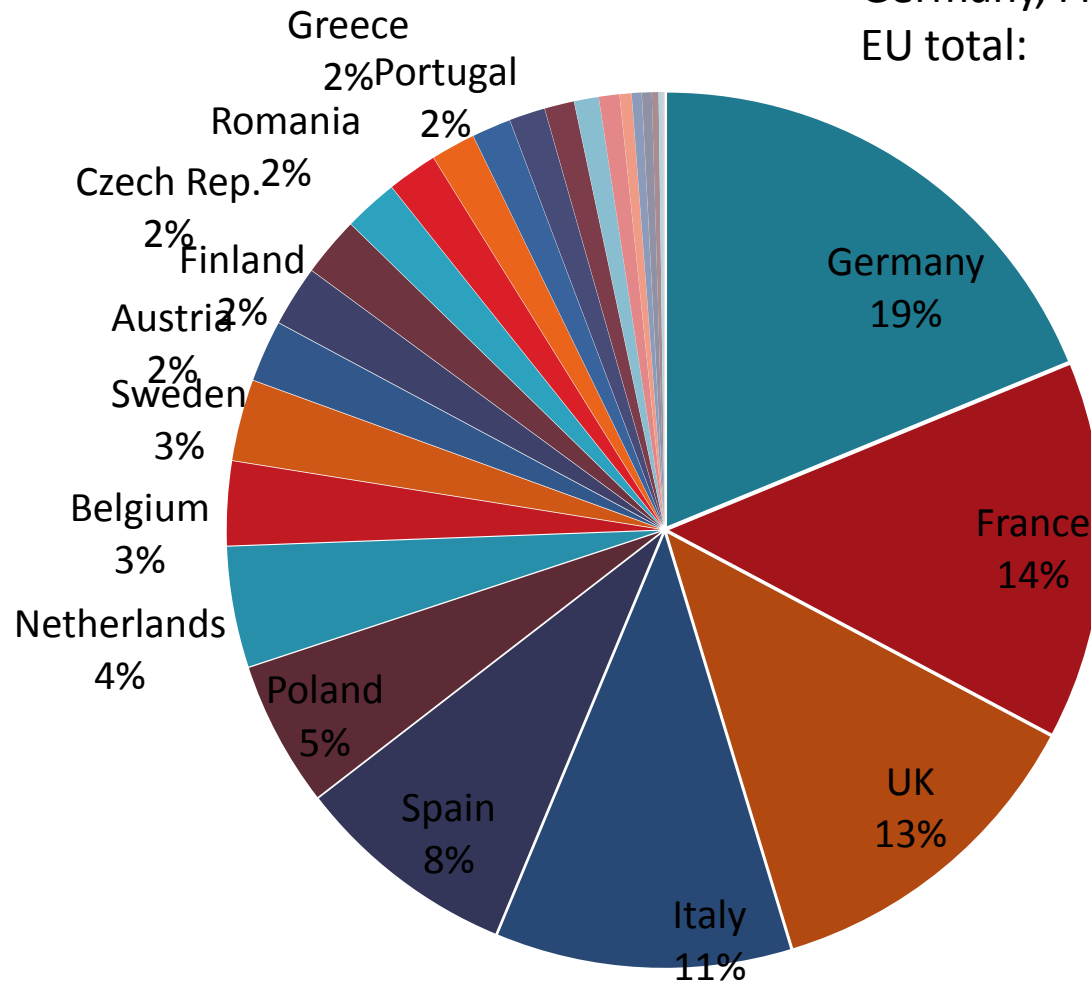
- Oil is the main energy consumed in EU except in Netherlands, Hungary (the main energy is gas), Sweden and Norway (main energy : electricity)



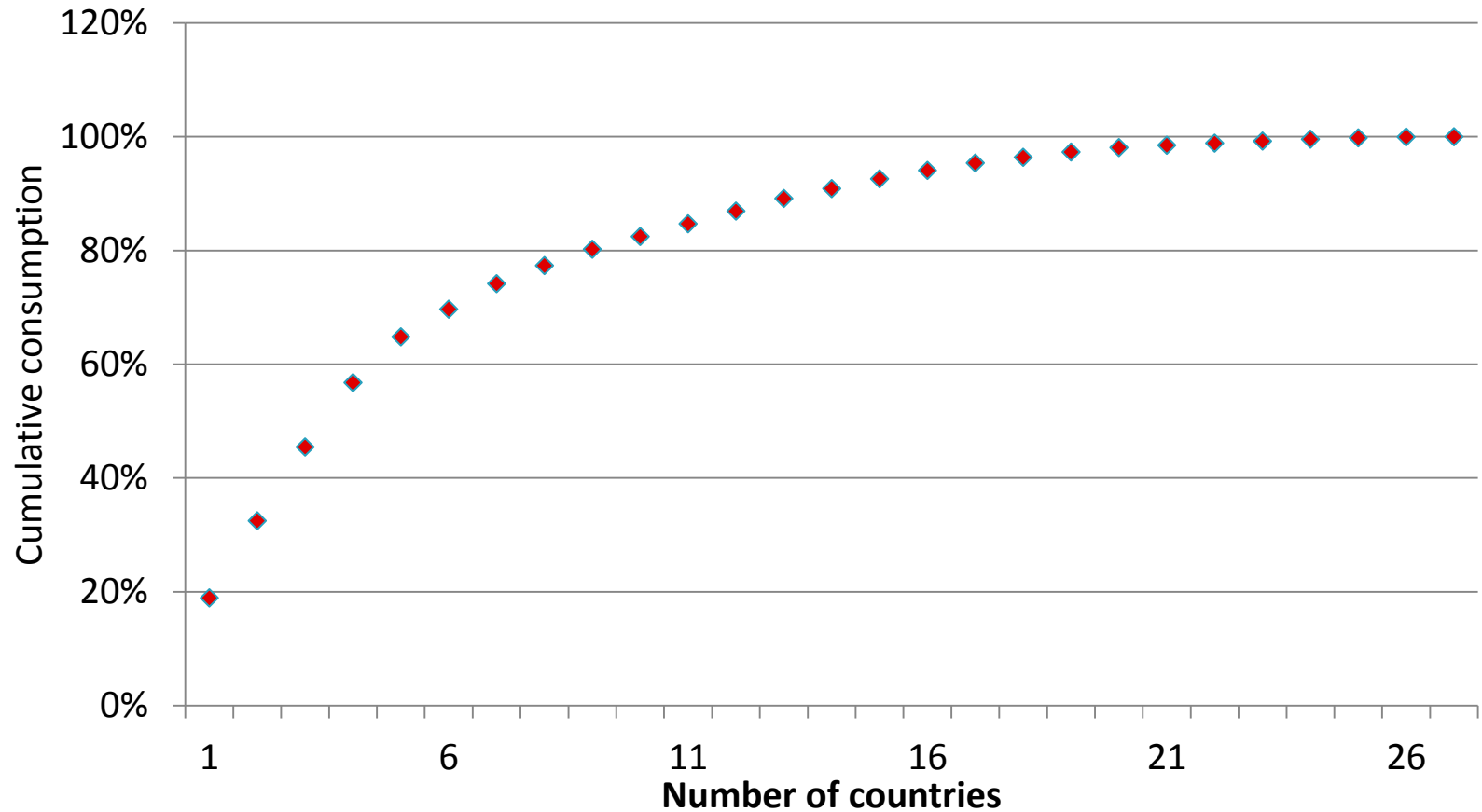
Final consumption by country in the EU-27 (2009)

EU- 15 : 86% of total

Germany, France ,UK and Italy: 57% of EU total:

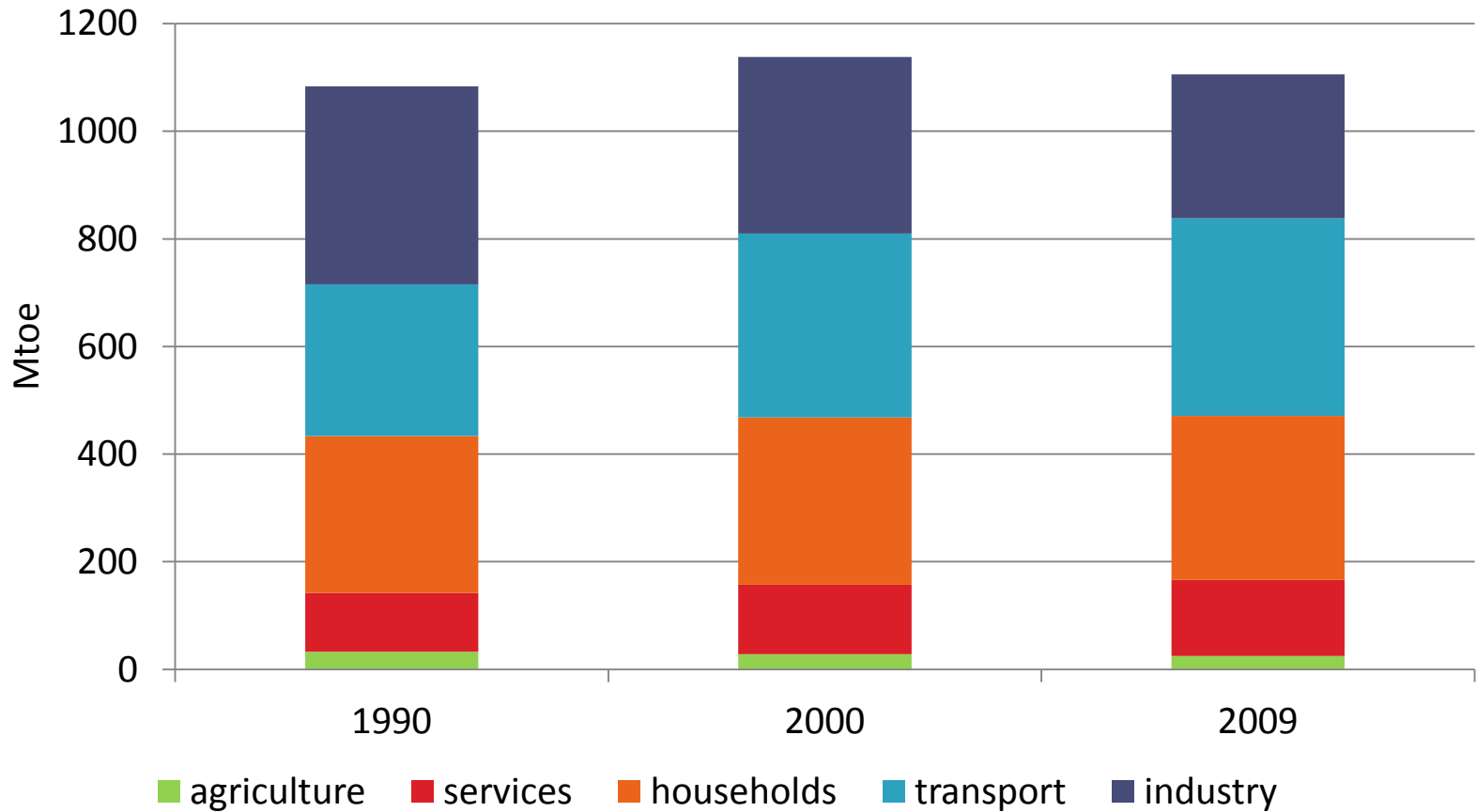


Cumulative final energy consumption by country in the EU-27



Final energy consumption by sector in the EU-27*

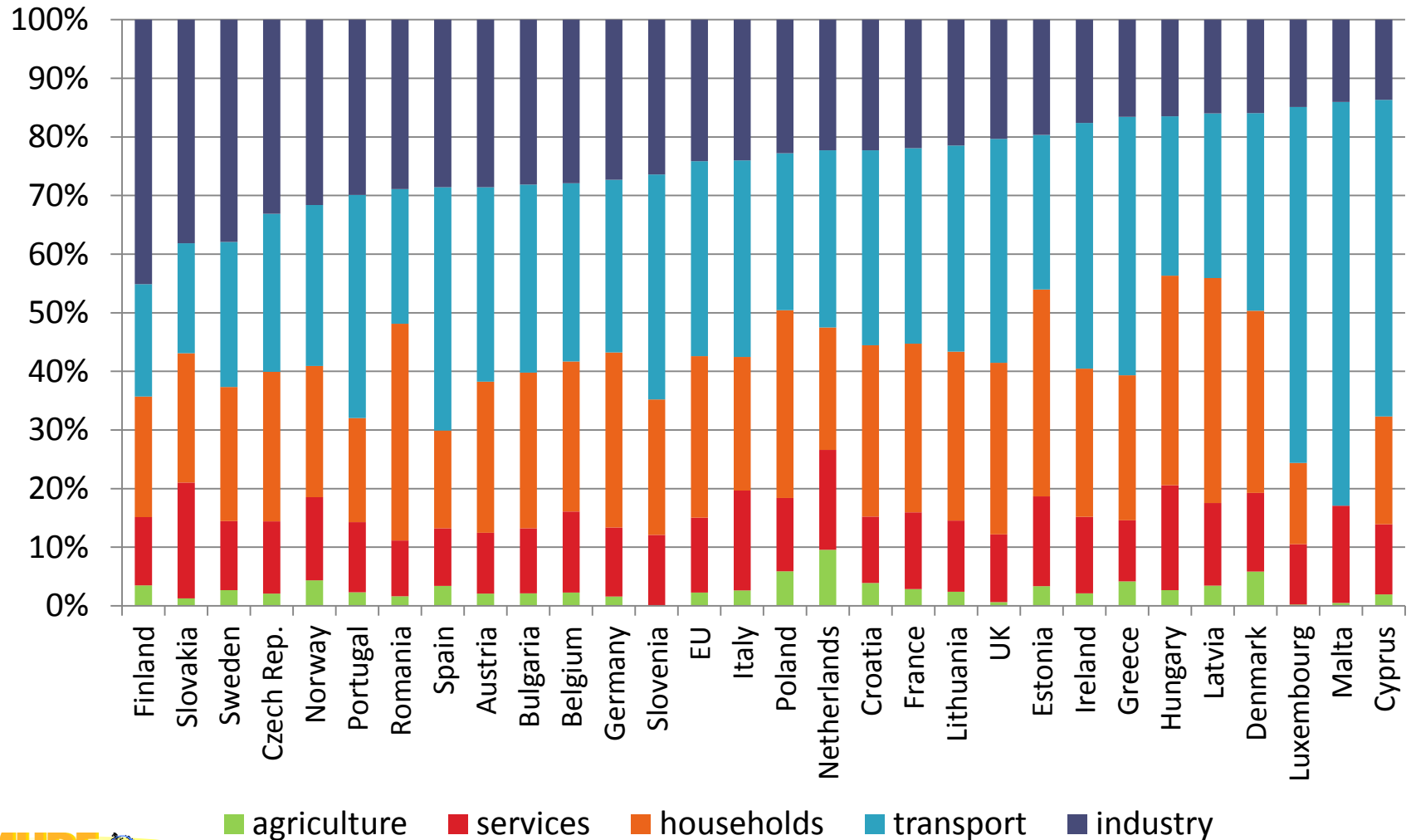
Increasing share for transport (from 26% in 1990 to 34% in 2009) and services (from 10 to 13%). The share of industry has decreased by 10 percentage points, from 34% in 1990 to 25% in 2009. For households the share is rather constant : 28% in 2009



* Household & services at normal climate; non energy uses excluded

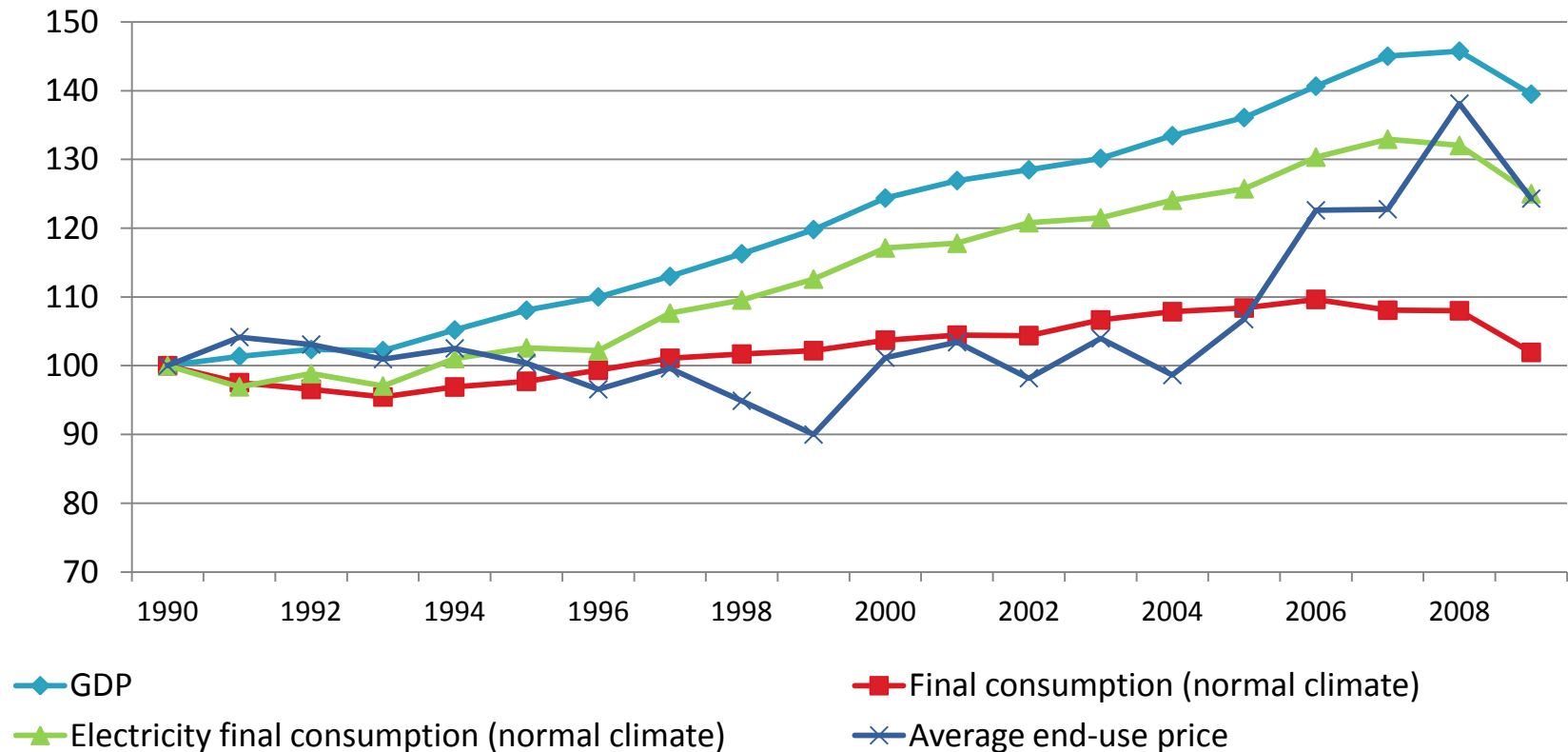
Final consumption by sector in the EU-27 countries (2009)

- At EU level transport represent 33% of the final energy consumption, following by households 28%, industry 24%, services 13% and agriculture.



Final energy consumption trends (EU-27)

- Slow progression of the final energy consumption from 2000 to 2008 (0,5 %/year);
- More rapid progression for electricity (+1.5%/year)
- Strong reduction for the final energy consumption in 2009 (-5.6%) more rapid than the GDP drop.

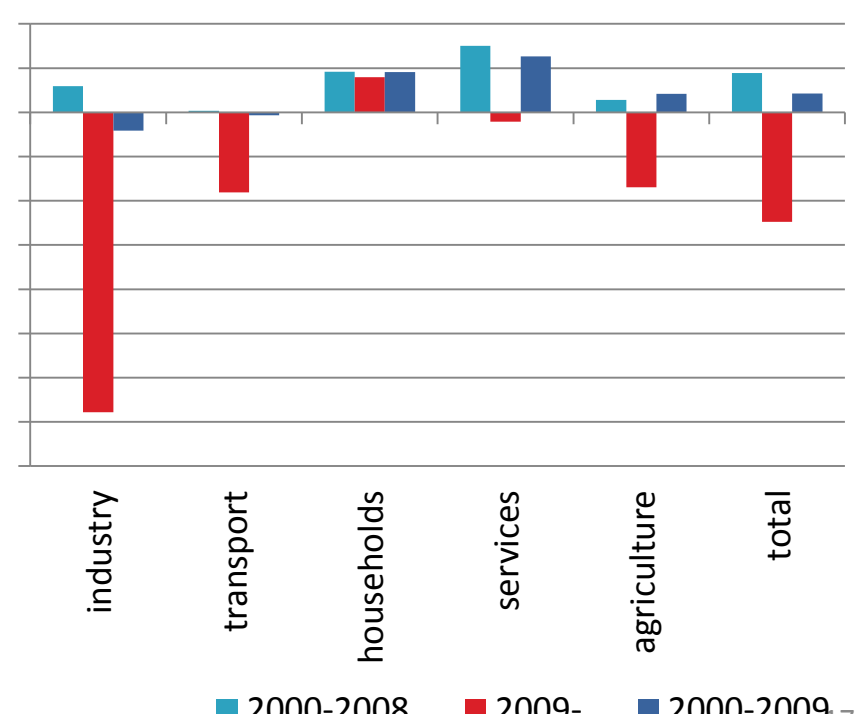
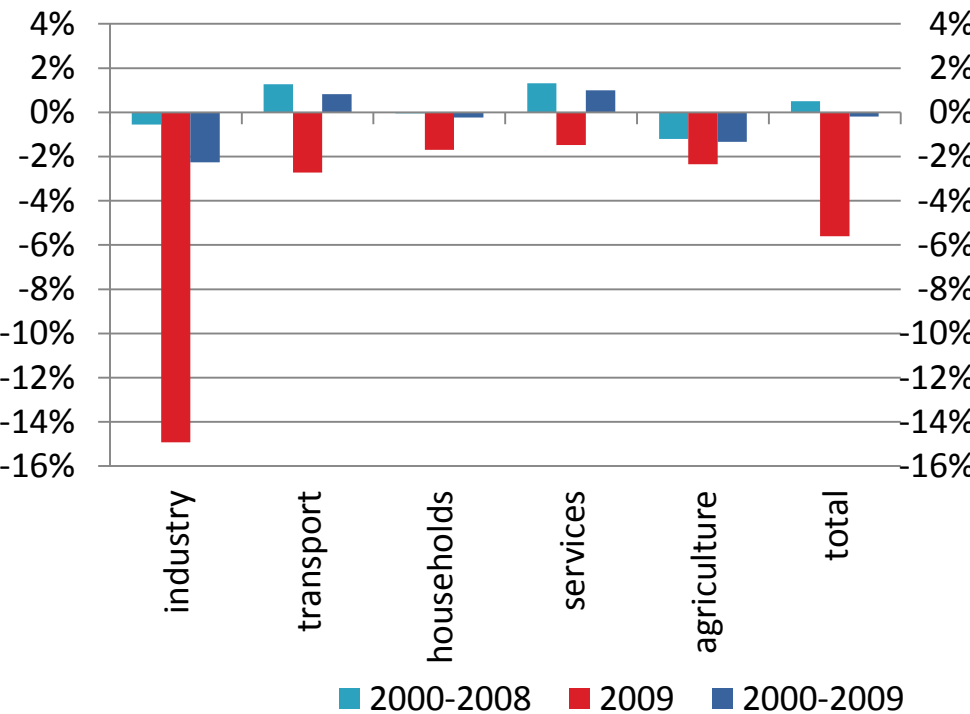


Final energy consumption trends by sector (EU-27)

- Slow growth since 2000 in all sectors
- Strong effect of tee crisis in industry in 2009
- Higher growth of electricity consumption in services (3%/year from 2000 to 2008)

Energy consumption

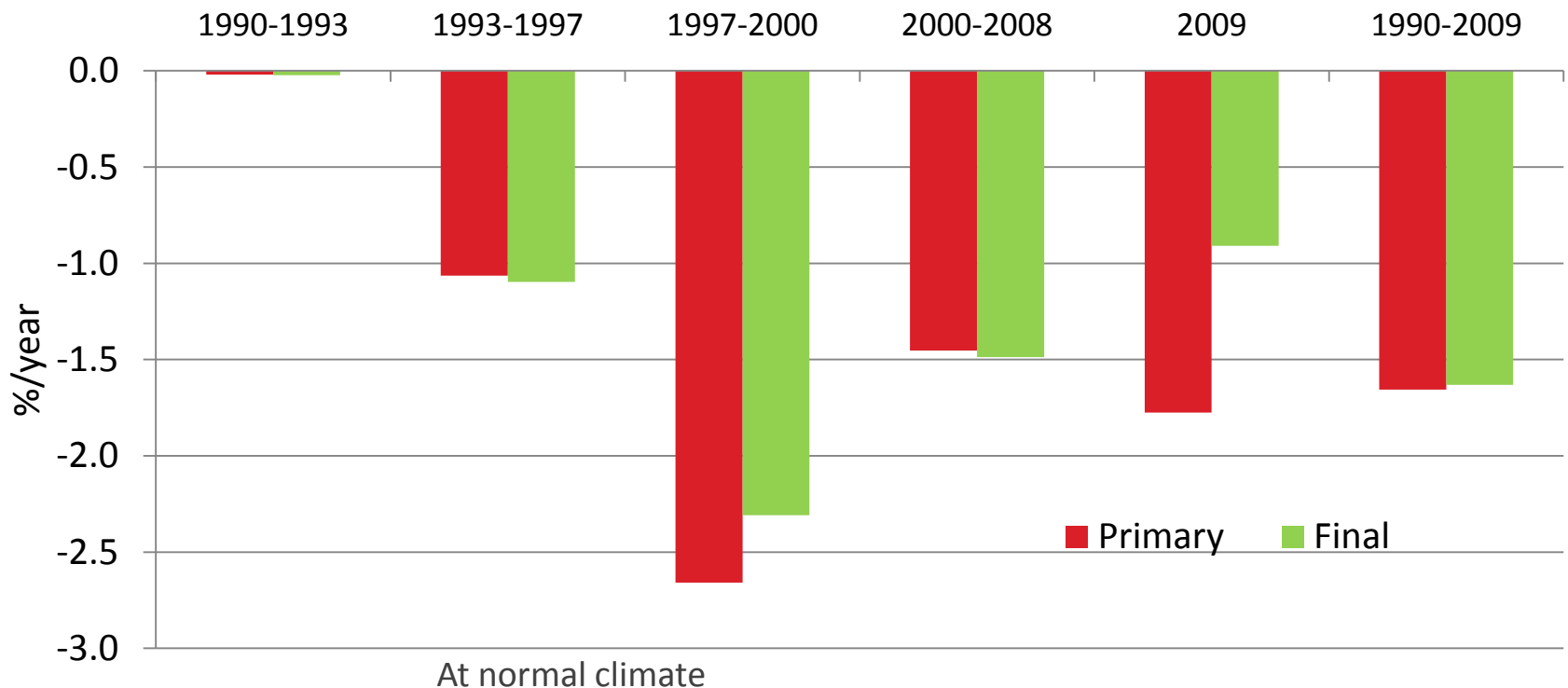
Electricity consumption



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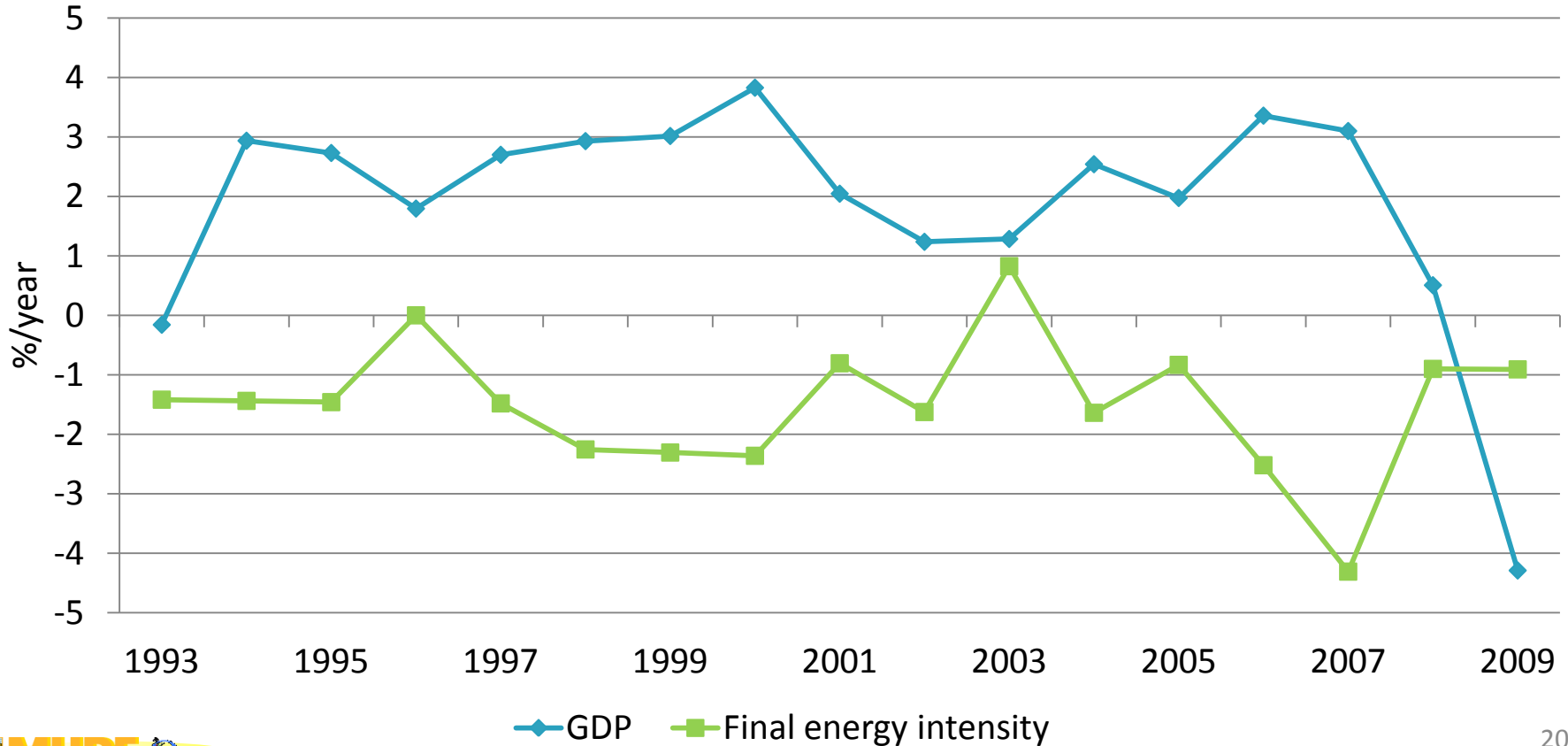
EU-27 primary and final energy intensities

- Reduction in energy intensities growth since 1990 (1.7%/y for primary, -1,6%/y for final)
- Drop in 2009 : -1.8% for the primary intensity, -0.8% for the final intensity
- Faster decrease of the primary intensity because of cogeneration, wind, gas combined cycles; reverse phenomena since 2000.



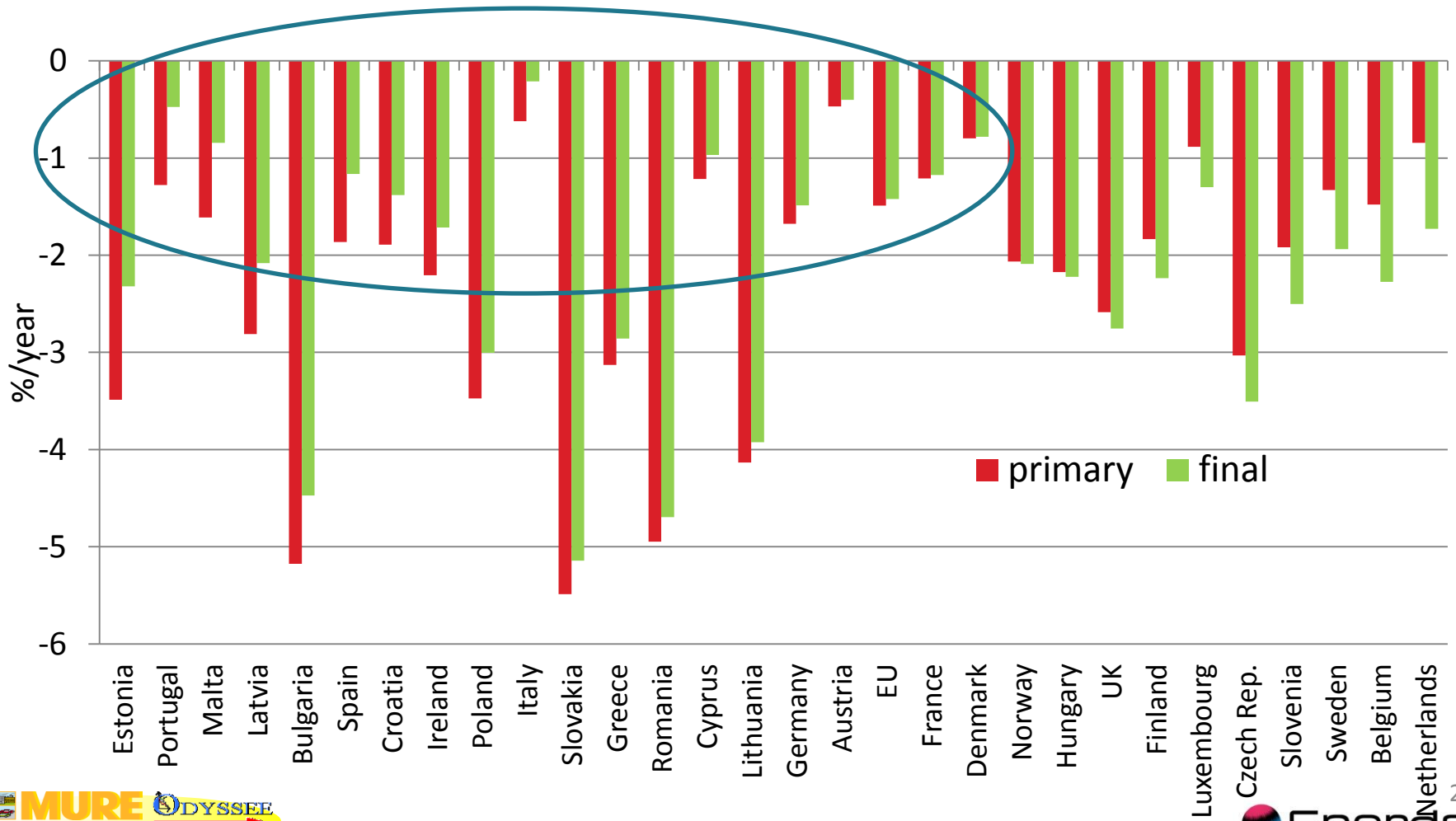
Variation of GDP and final energy intensity

- Increasing final energy intensity when the economic growth falls under 2%: part of the final consumption is not dependant on the GDP; the highest the economic growth, the more rapid the decrease of the intensity
- Drop of GDP in 2009: rather flat final energy consumption



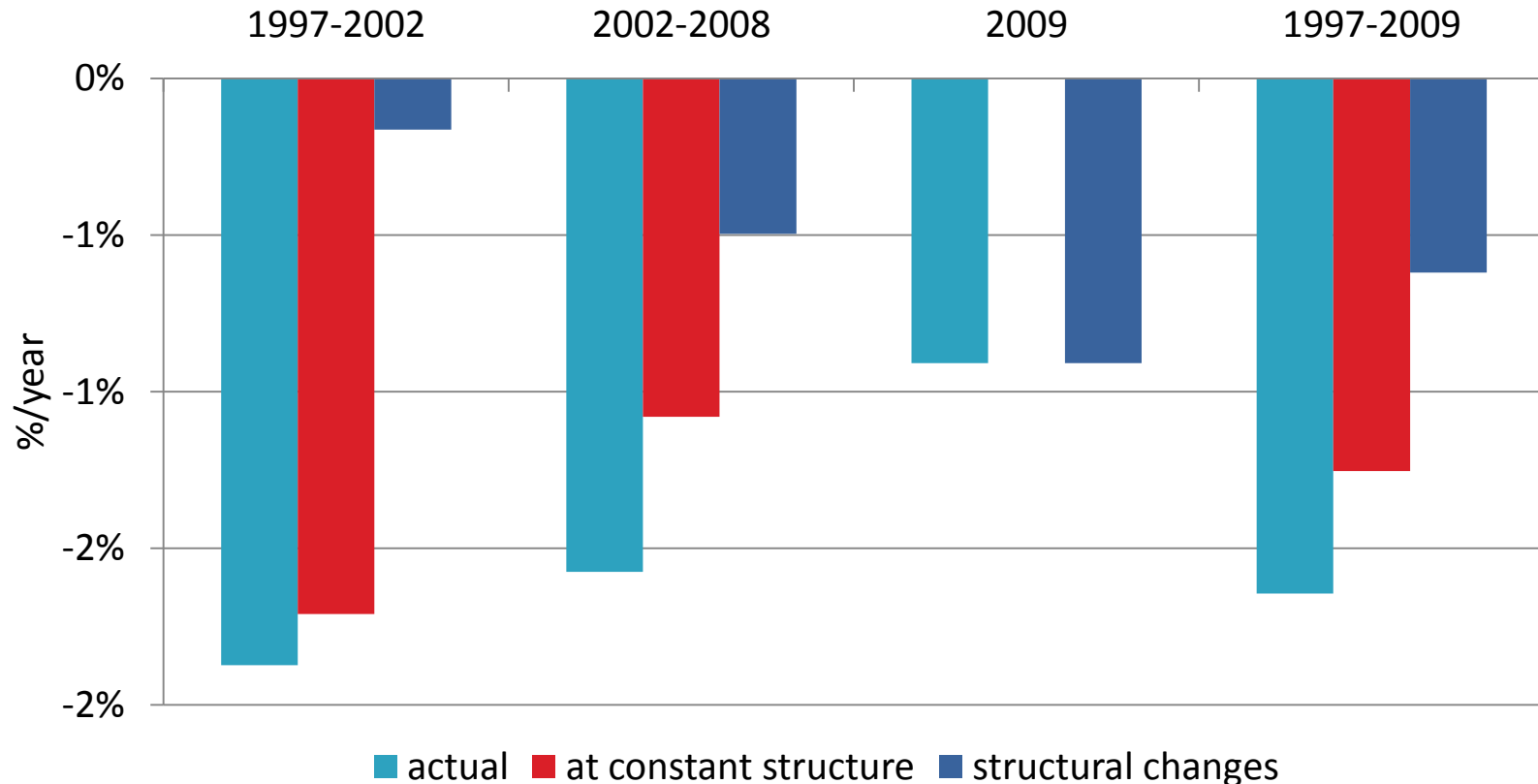
Variation of primary and final energy intensities in EU-27 (2000-2009)

- Faster decrease of the primary energy intensity than the final intensity in the majority of countries because of an improvement in the efficiency of electricity generation linked to the rapid penetration of gas-combined cycles, cogeneration and wind.



Impact of structural changes on the final intensity in EU27

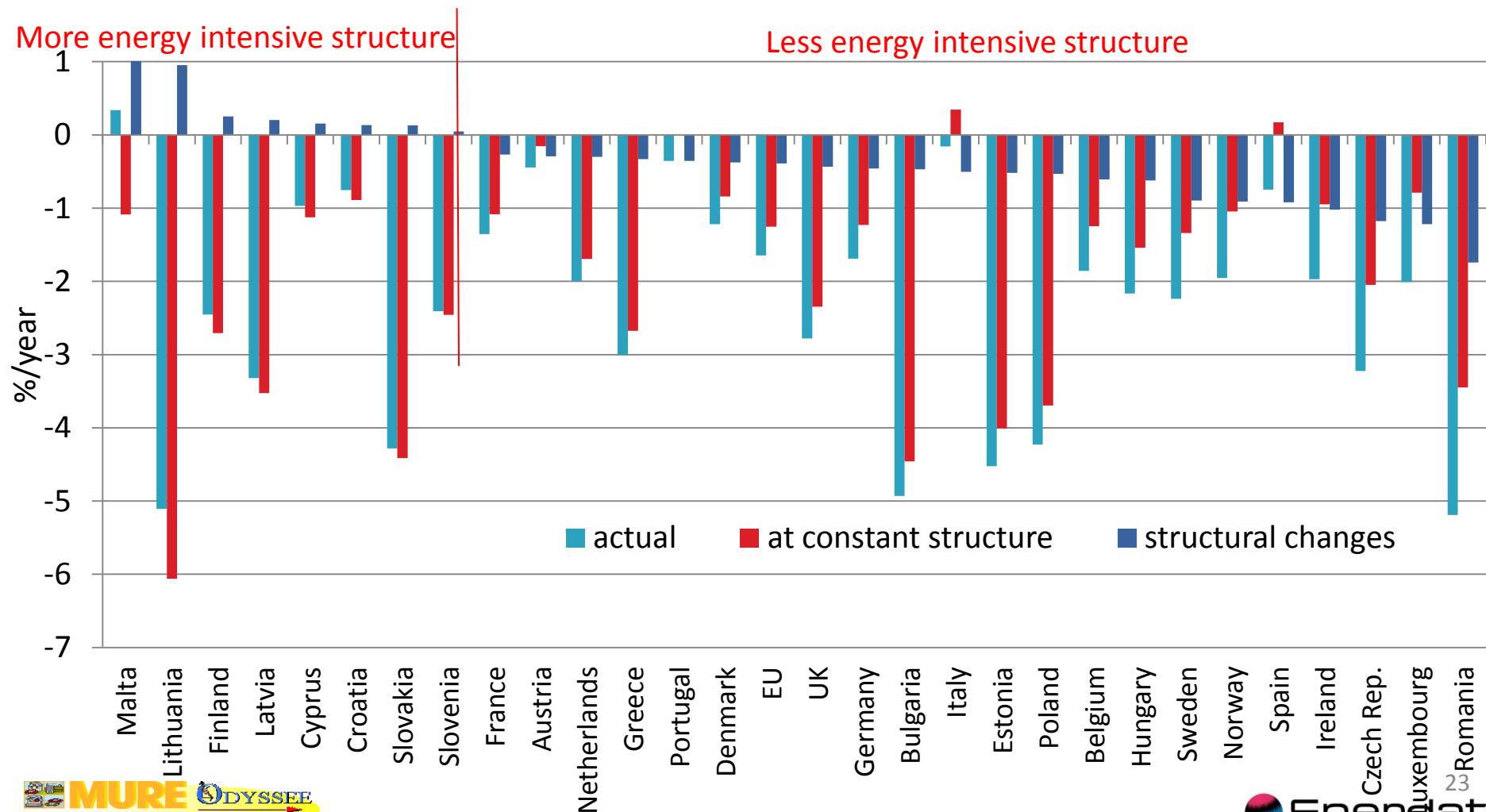
- Structural changes explain around 40% of the reduction of the final intensity over the period 1997-2009



Structural changes taken into account include changes in the share of the different economic sectors in the GDP (services, agriculture, construction, mining and manufacturing), as well as changes within manufacturing branches.

Impact of structural changes on the final intensity (1997-2009)

- Faster decrease of the final energy intensity than the intensity at constant structure: this means that these countries have moved to a less energy intensive economic structure



How energy efficiency progress and energy savings are measured within ODYSSEE?

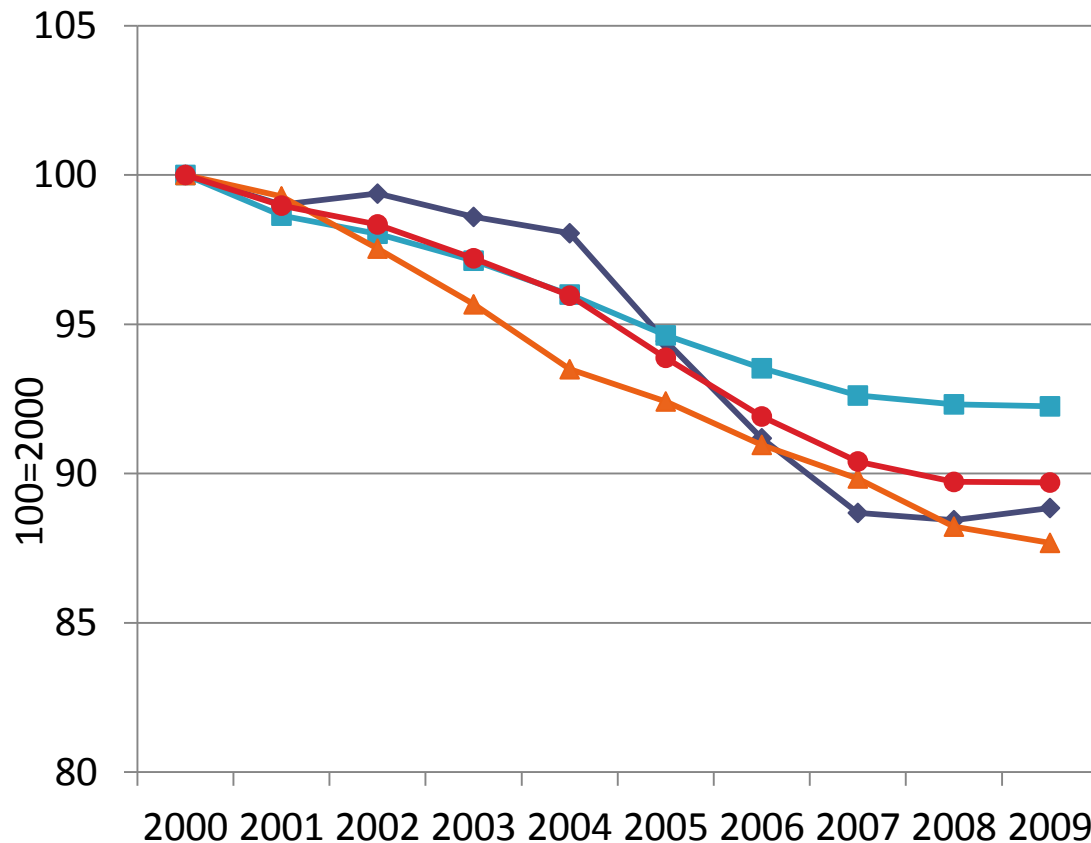
- Progress in energy efficiency and/or energy savings for final consumers are measured within ODYSSEE through indicators that are as much as possible cleaned from structural changes or other factors that have nothing to do with energy efficiency (e.g. increase in comfort or in equipment ownership, structural changes in industry, climate variations from one year to the other)
- Energy efficiency trends are first of all measured at a detailed level (by end-use, sub-sector, mode of transport) through changes (reduction) in unit consumption, measured in physical units
- Energy efficiency progress is then evaluated at the level of the main end-use sectors (industry, transport, households) and, finally, at the level of the whole economy

→ ODEX (“ODYSSEE energy efficiency index”)

How ODEX is calculated for final consumers?

- ODEX by sector is calculated from unit consumption trends by sub – sector (or end-use or mode of transport)
 - By aggregation of unit consumption indices by sub-sector in one index for the sector on the basis of the current weight of each sub-sector in the sector’s energy consumption;
 - Unit consumption by sub-sector are expressed in different physical units so as to be as close as possible to energy efficiency evaluation : toe/ m2, kWh/appliance, toe/ton, litre/100km,...
 - Energy efficiency gains are measured in relation to the previous year (“sliding ODEX”) and not to a base year (e.g. 1990), to avoid to have results influenced by the situation at the base year;
- ODEX is presently calculated on the basis of about 30 sub- sectors (up to 7 modes in transport, 9 end-uses for households, 11 branches in industry) . Calculation on the service sector should be improved.
- Other similar indicators are also available (e.g. ODEX for transformations, ODEX CO2)... not shown here

Energy efficiency index (ODEX) for final consumers (EU-27)



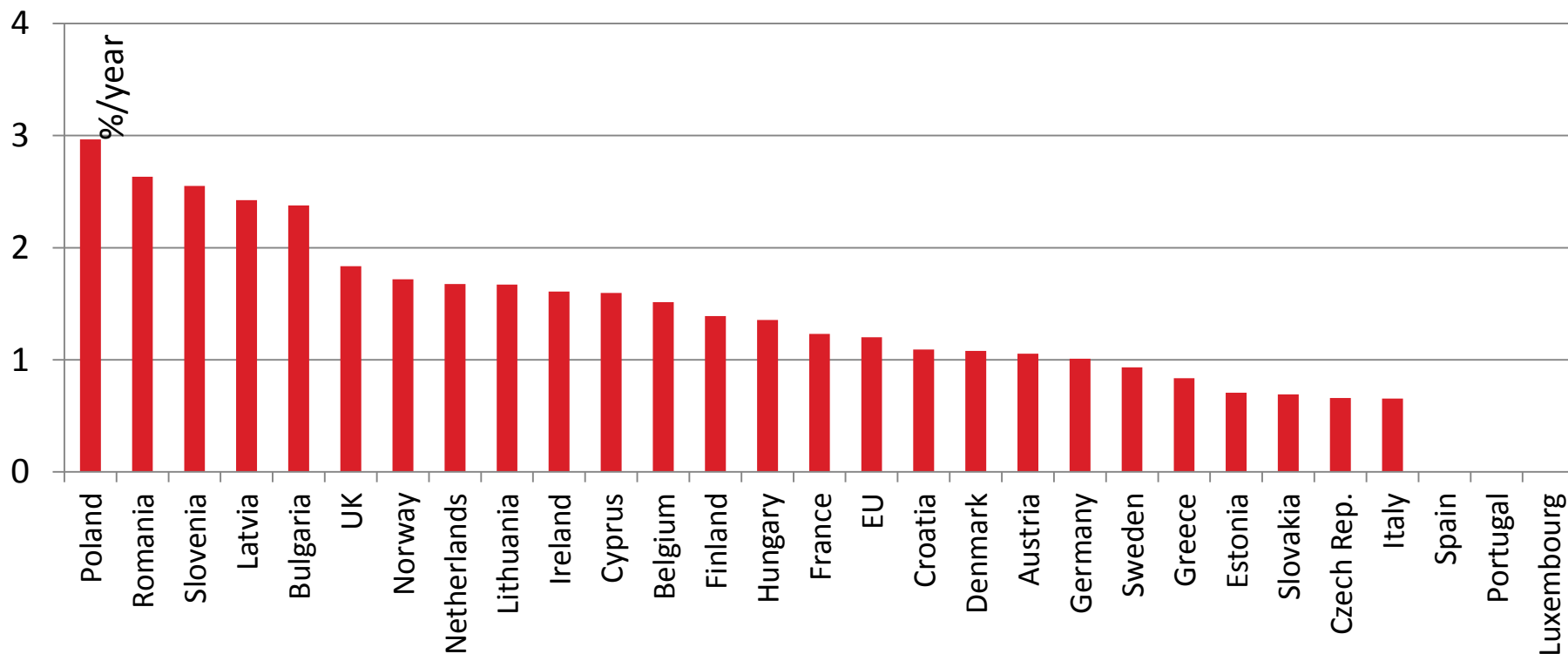
- ODEX= 90 in 2009
- 10% energy efficiency improvement between 2000 and 2009 (or 1.2%/year)
- Larger gains for households (1.5%/year) and industry (1.3%/year)
- Lower progress for transport (0.9%/year)

◆ Industry ■ Transport ▲ Households (technical) ● Total

ODEX is calculated as a 3 years moving average to avoid short term fluctuations (imperfect climatic corrections, behavioural factors, business cycles)...

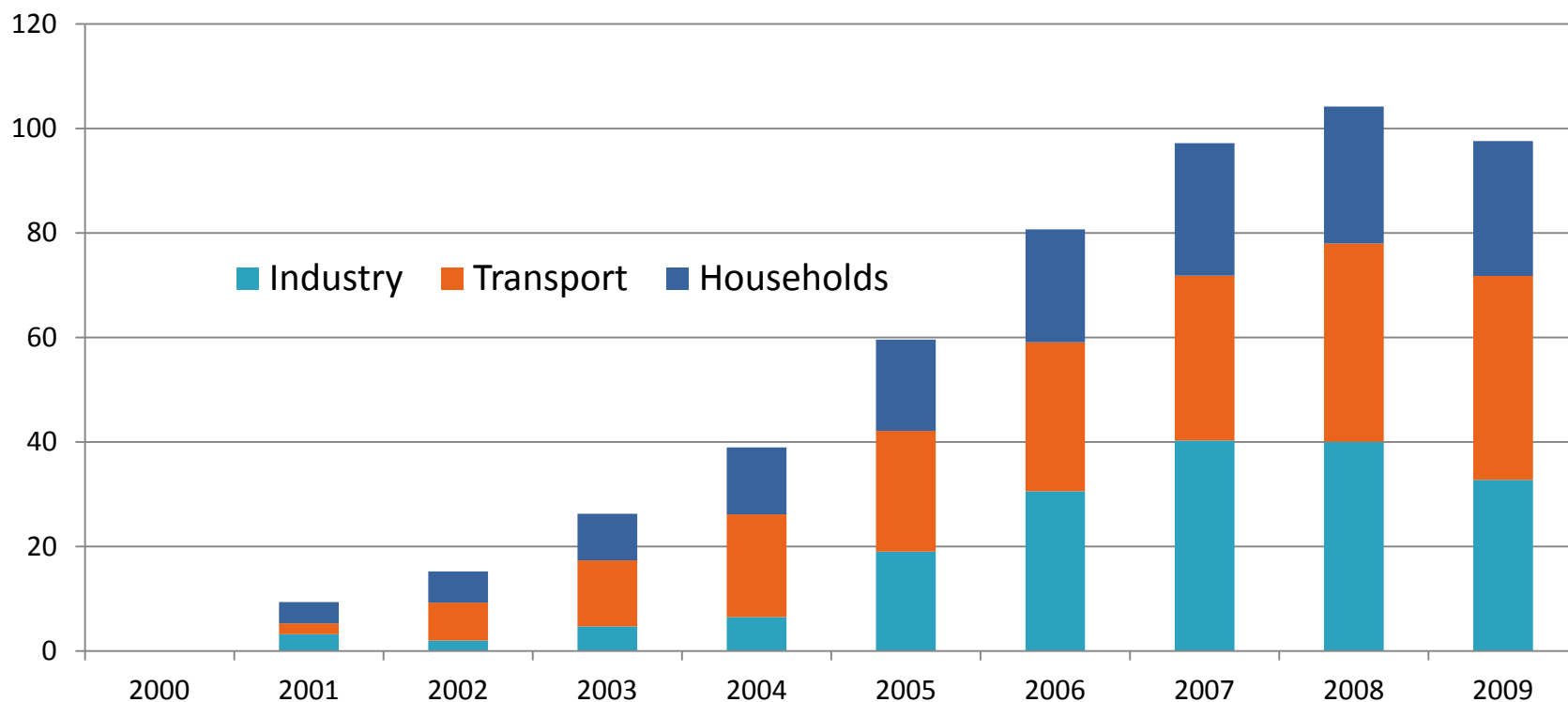
Energy efficiency improvement for final consumers (2000-2009)

- For 5 countries, energy efficiency improvement around 2%/year since 2000; 13 countries with improvement higher than 1%/year (1.2%/year on average for EU) and 3 countries without improvement.



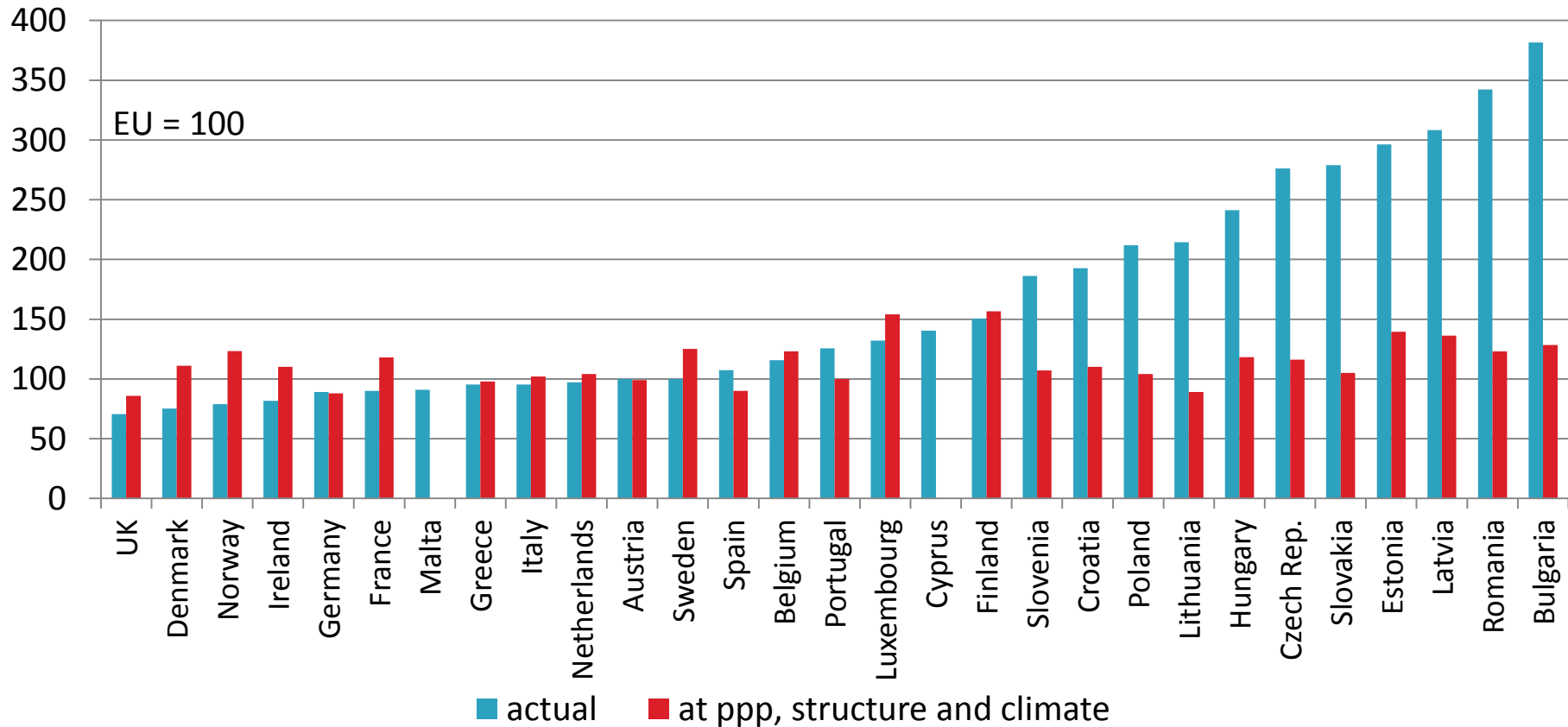
Evaluation of energy savings (EU-27)

- About 100 Mtoe cumulated energy savings since 2000 (i.e. 10% of final energy consumption). In other words without energy savings the final energy consumption should have been 10% higher in 2009
- Around 40% of total savings in transport, 35% for industry, 26% for household



After adjustment for differences in prices (at purchasing power parities, ppp), at EU average climate and EU average industry & economic structures, differences in final energy intensities are narrowed and UK has the lowest value, followed by Denmark

Adjusted final energy intensities



No economic and climatic adjustment for Malta and Cyprus