

ODYSSEE-MURE



# Energy efficiency trends in EU

Results from ODYSSEE project

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*July 2016*

# About Enerdata: a global energy intelligence company

- Independent research company since 1991
- International team of experienced analysts & economists in
  - ✓ Global energy market analysis & modelling
  - ✓ Energy efficiency & demand
- Leveraging globally recognized databases & forecasting models
- Headquartered in the Grenoble (French Alps) with offices in Paris and Singapore

[www.enerdata.net](http://www.enerdata.net)



# About ODYSSEE-MURE

- Project supported by a special programme of the European Commission called H2020 and coordinated by ADEME, the French Energy Environment and Efficiency Agency ;
- The project covers 31 countries (28 EU Member States + Norway, Serbia and Switzerland), mainly energy efficiency agencies or Ministries (or their representatives);
- Main objectives :
  - ✓ Evaluate and compare energy efficiency progress by sector by country and for the EU as a whole, and relate the progress to the observed trend in energy consumption;
  - ✓ Evaluate energy efficiency policy measures.
- Project relying on two data bases, covering 31 countries and the EU:
  - ✓ The **ODYSSEE** data base on energy efficiency indicators
  - ✓ The **MURE** database on all policy measures implemented by sector, and their impact evaluation whenever available:

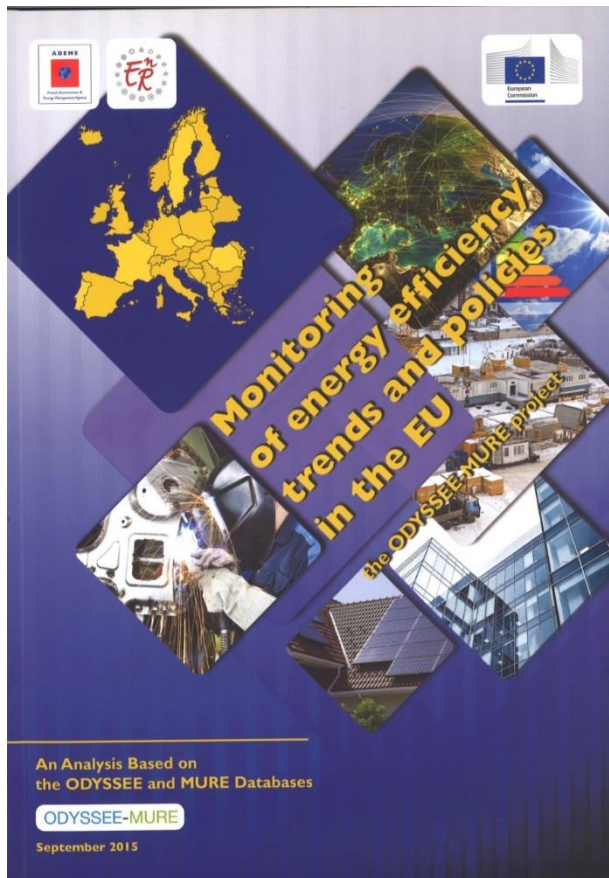
[www.odyssee-mure.eu](http://www.odyssee-mure.eu)

# The 2015 synthesis brochure

The following analysis is based on the 2015 ODYSSEE MURE synthesis brochure with revised data up to 2014

## The ODYSSEE data tools

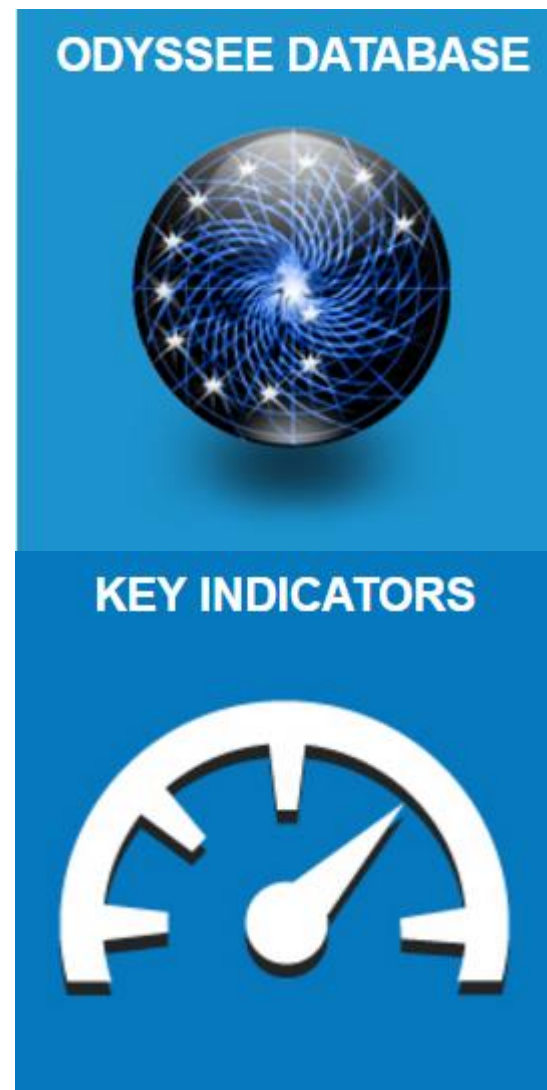
<http://www.indicators.odyssee-mure.eu/>



<http://www.odyssee-mure.eu/publications/br/energy-efficiency-trends-policies-in-europe.html>

# Content

- Industry
- Transport
- Households
- Synthesis





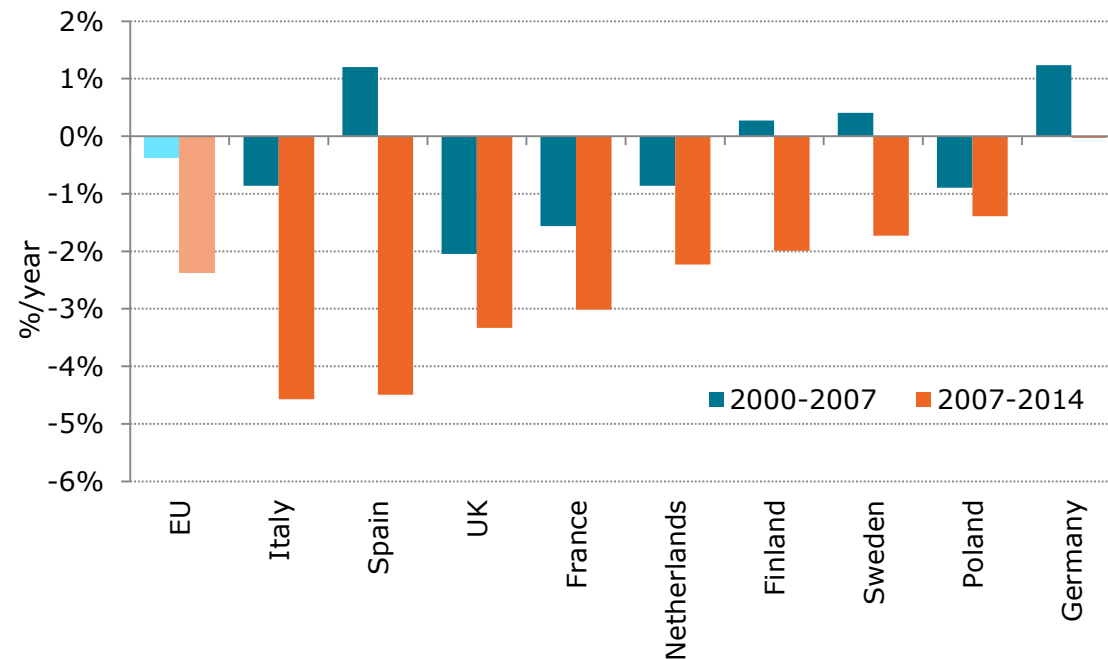
# Industry

*Slowdown in energy savings since 2007*

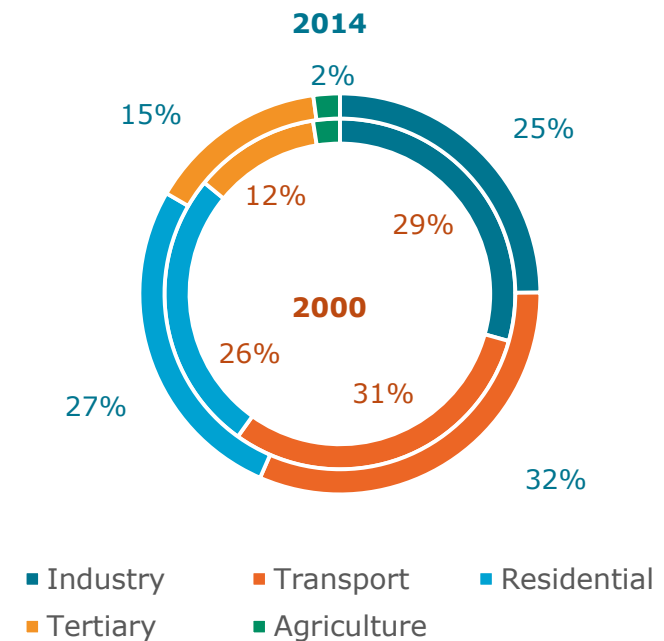
## Since 2007, strong decline of the industry energy consumption...

- Industrial energy consumption roughly stable at EU level between 2000 and 2007.
- Strong reduction of energy use since 2007 in the countries the most struck by the economic crisis (e.g. Spain, Italy).
- As a result, industrial consumption was in 2014 18% below its 2000 level and only represented 25 % of the energy used by final consumers (29% in 2000).

### Trends in industrial energy consumption EU & main countries

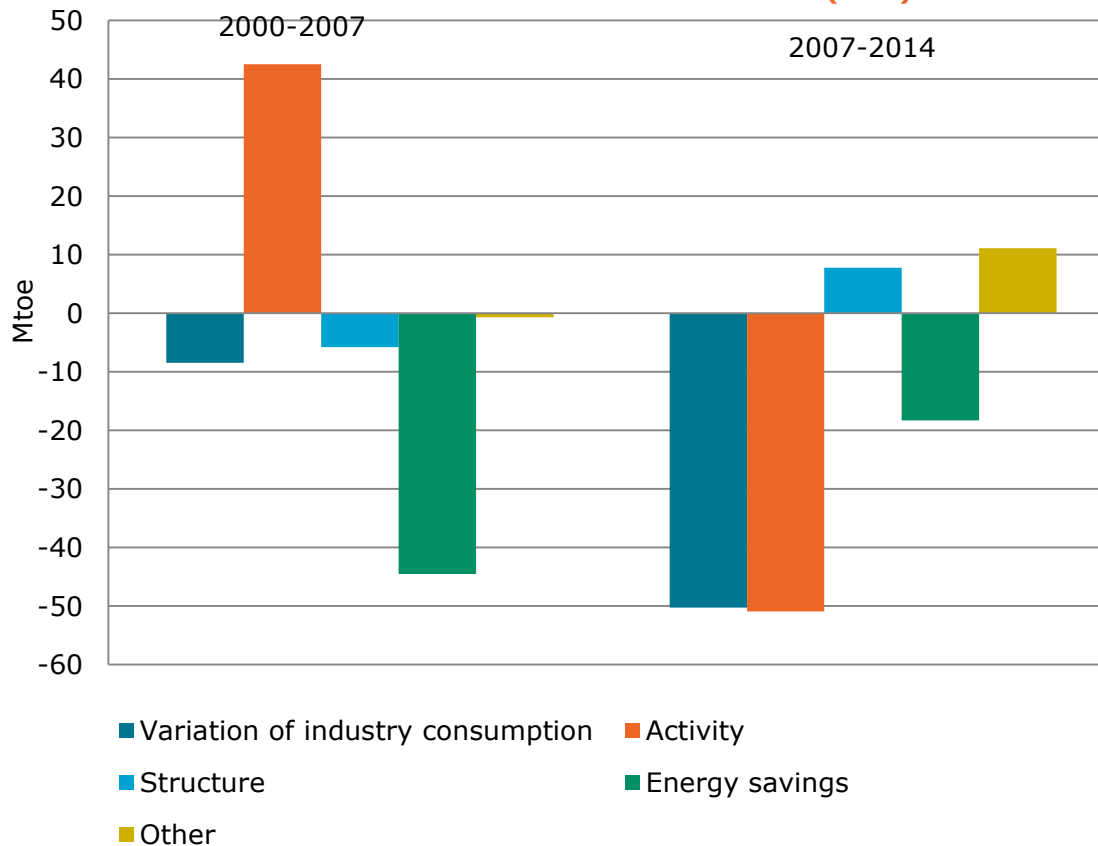


### EU total consumption breakdown



...mainly explained by a decrease in the activity of industry

### Drivers of the energy consumption of industry after and before the crisis (EU)



- Since 2007 the reduction of activity is the main driver of the decrease of consumption (-51 Mtoe);
- Energy savings had a much lower impact since 2007 (2,6 Mtoe/yr compared to 6,4 Mtoe/yr over 2000-2007).
- Structural effects have low impacts on the variation of consumption.

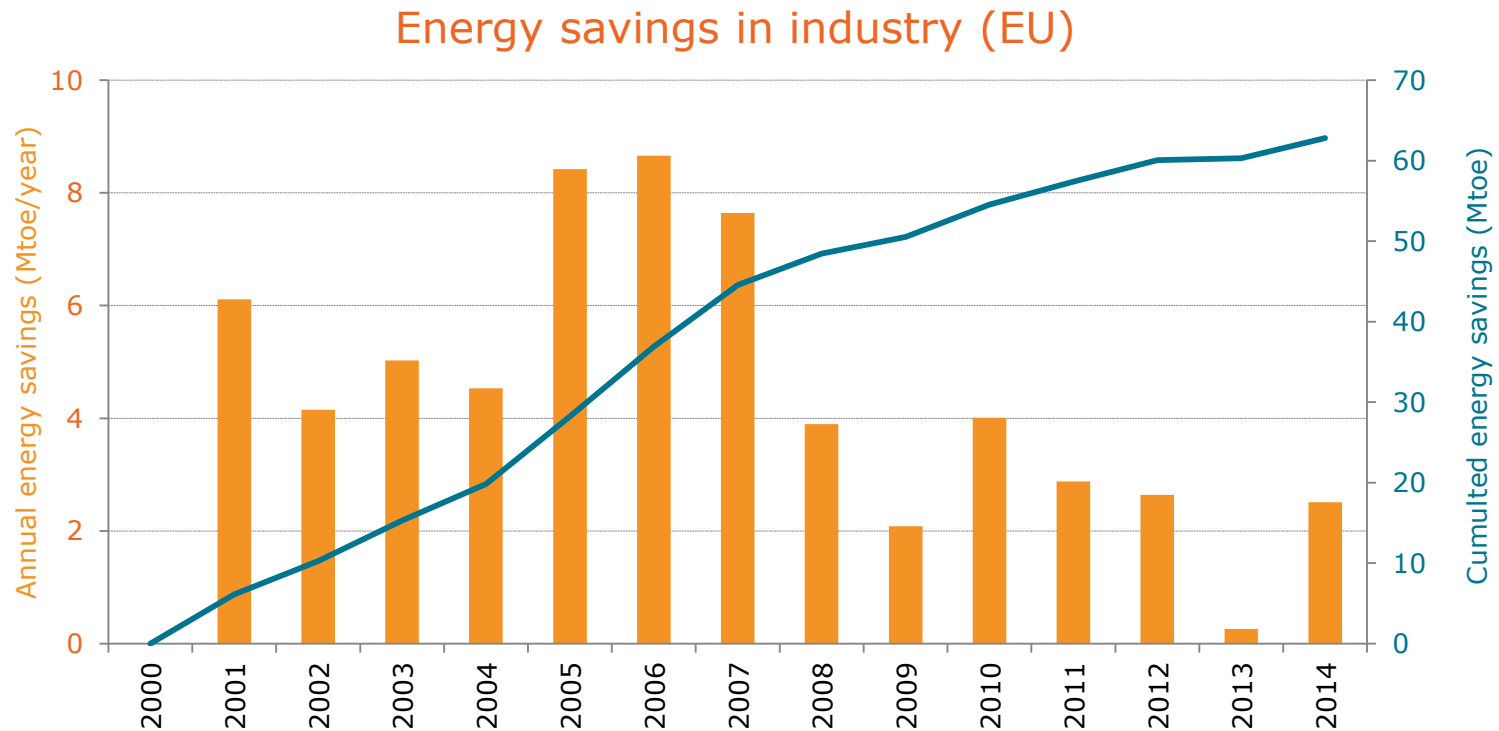
Other effects: mainly "negative" savings due to inefficient operations in industry

Source: ODYSSEE



## Since 2007, the energy savings in industry have reduced by half...

- In 2014, cumulated energy savings since 2000 reached around 62 Mtoe : without energy efficiency improvement, energy consumption would have been higher by 62 Mtoe.
- The annual volume of energy savings in industry has more than halved since 2007 from an average of 7,6 Mtoe/year to 2,5 Mtoe/year.



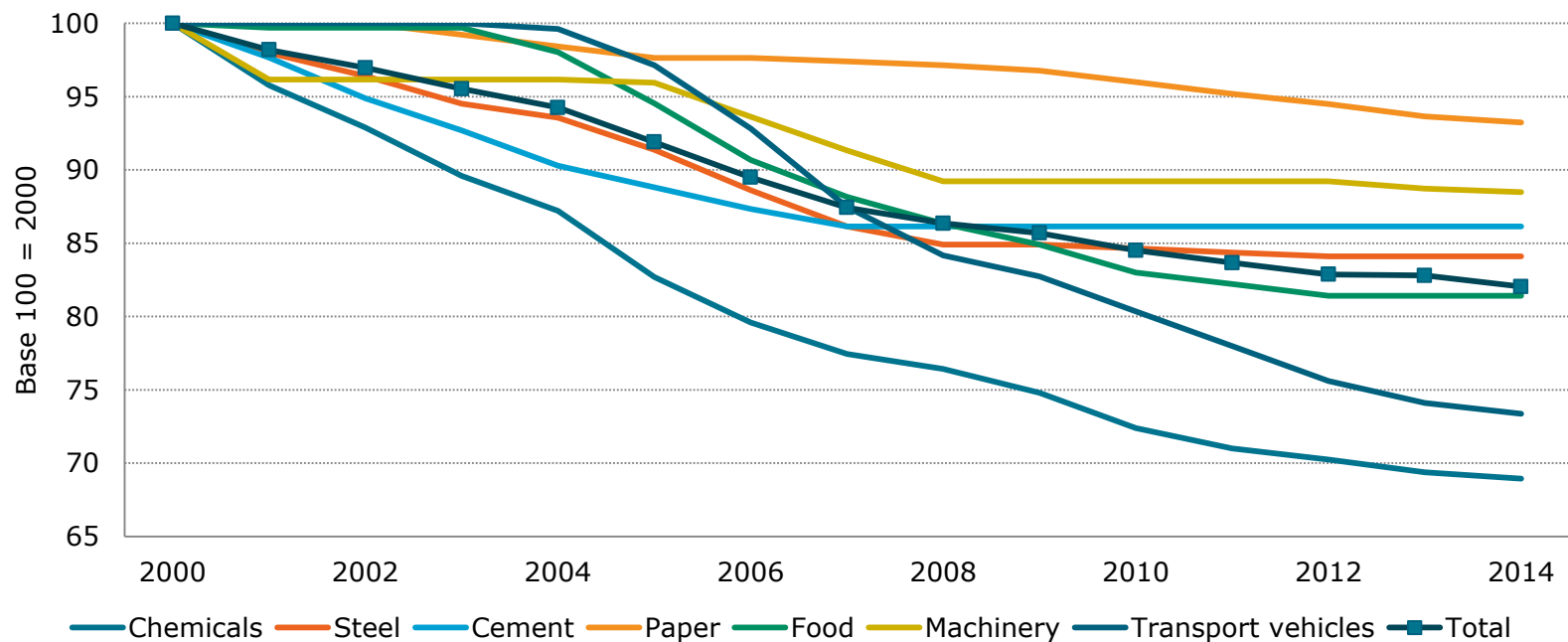
Only >0 savings

Source: ODYSSEE

## ...because of a lower progress of EE improvements in some branches

- On average, energy efficiency has improved by 0.9%/year since 2007 compared to 1.9%/year before (1.4%/year on average since 2000 or 17% compared to 2000 level).
- Slower energy efficiency progress since 2007 due to lower progress in some branches and even no more energy efficiency improvement for others because of the recession (e.g. cement, machinery, paper).
- On the opposite, greater progress in chemicals and transport vehicles.

### Energy efficiency trends in industry (EU)



Energy efficiency measured with ODEX indicator based on trends in specific consumption per ton for steel, cement and paper; consumption per IPI for other branches. Index are expressed in 3 year-moving average to avoid short-term fluctuations.



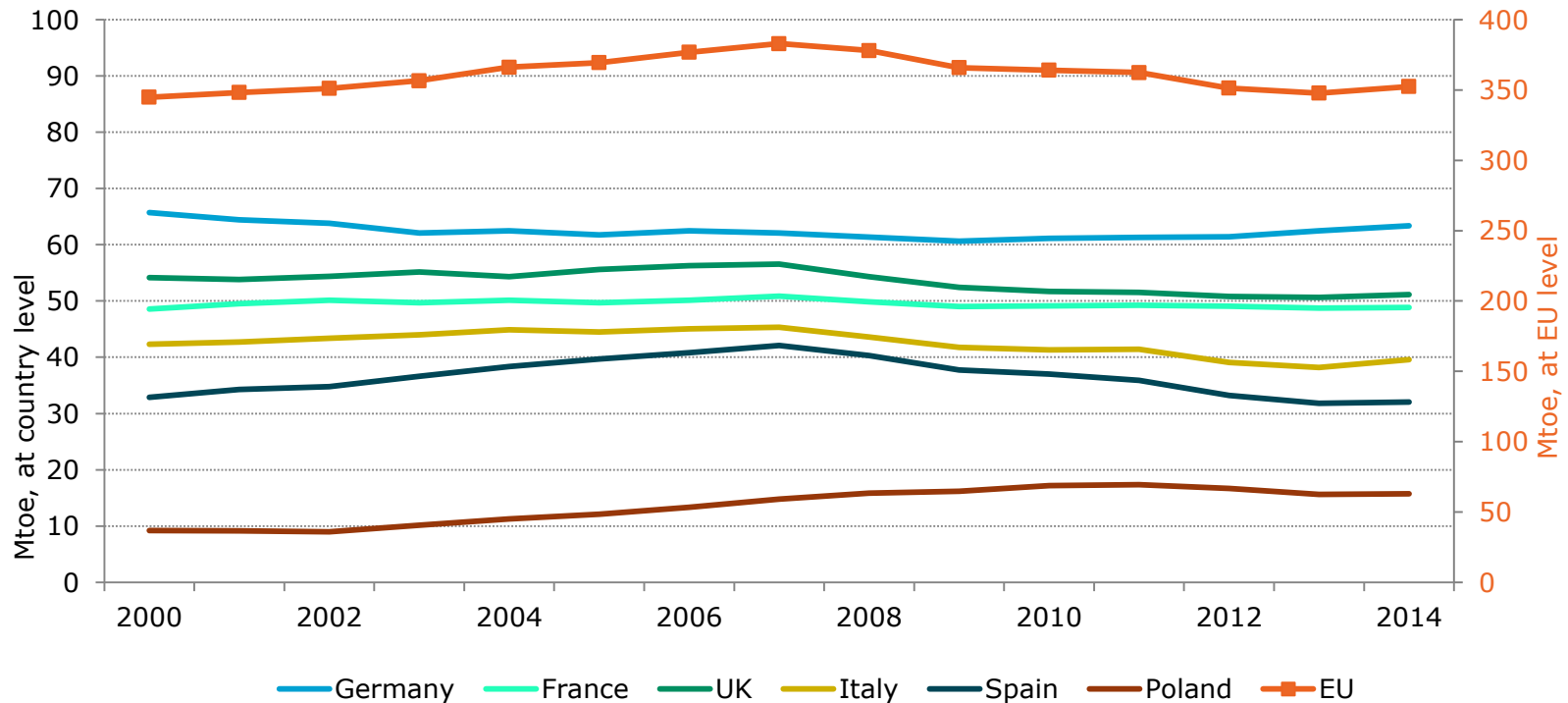
# Transport

*Noteworthy energy efficiency improvements since a decade mainly for cars and air transport*

## Decrease of the transport energy consumption since 2007

- Over the period 2000-2007, increasing energy consumption in most countries (+1.5%/year for the EU as a whole), except Germany and low growth in France and UK.
- Decreasing trend of transport energy consumption between 2007 and 2013 at EU level (-1.6%/year from 2007 to 2013), due to a stable or decreasing consumption in the largest EU countries: -4.6%/year in Spain, -2.8%/year in Italy and -1.8%/year in UK.

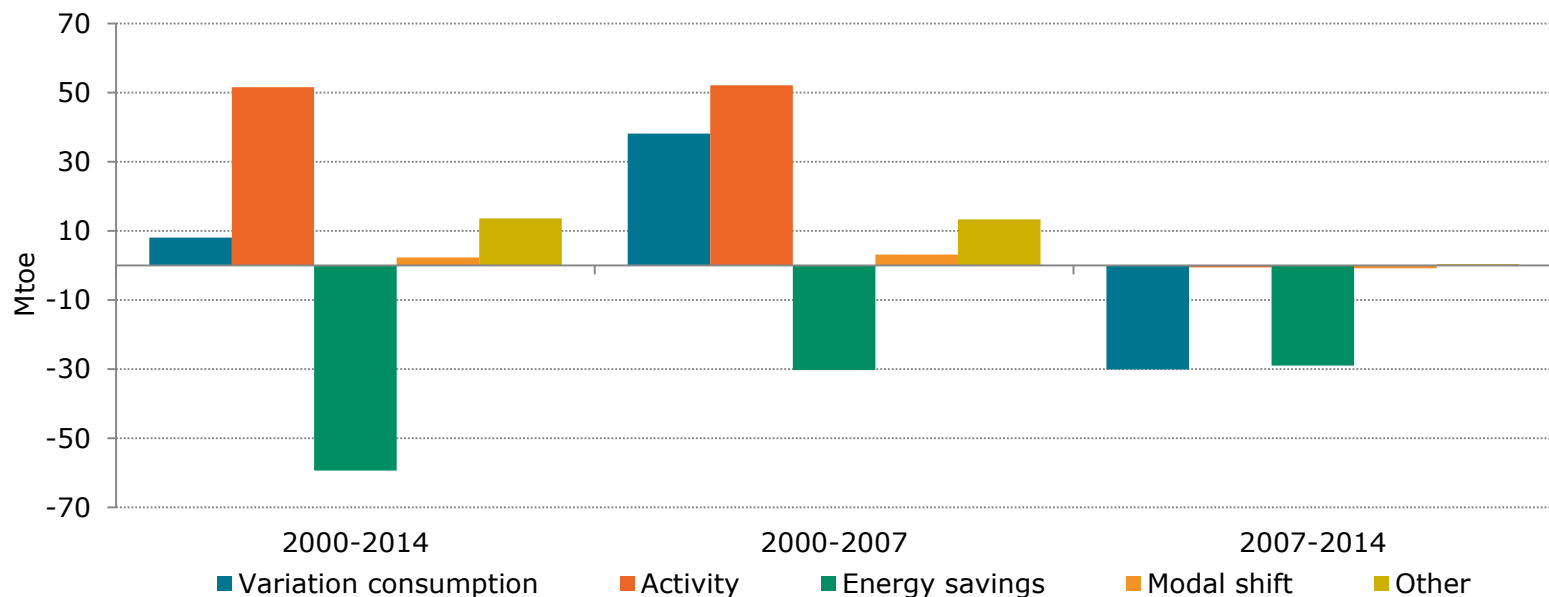
### Energy consumption trends in transport *EU & main countries*



## The energy savings in transport offset by the activity effect before 2007

- The slight increase in energy consumption of transport between 2000 and 2014 is due to the fact that energy savings (around 60 Mtoe) balanced the effect of the growth in traffic of passengers or goods (almost +50 Mtoe).
- Since 2007, the decreasing energy consumption in transport is mainly due to energy savings (29 Mtoe) with no more activity effect due to the traffic slowdown.

### Decomposition of consumption variation of transport : EU (2000-2014)



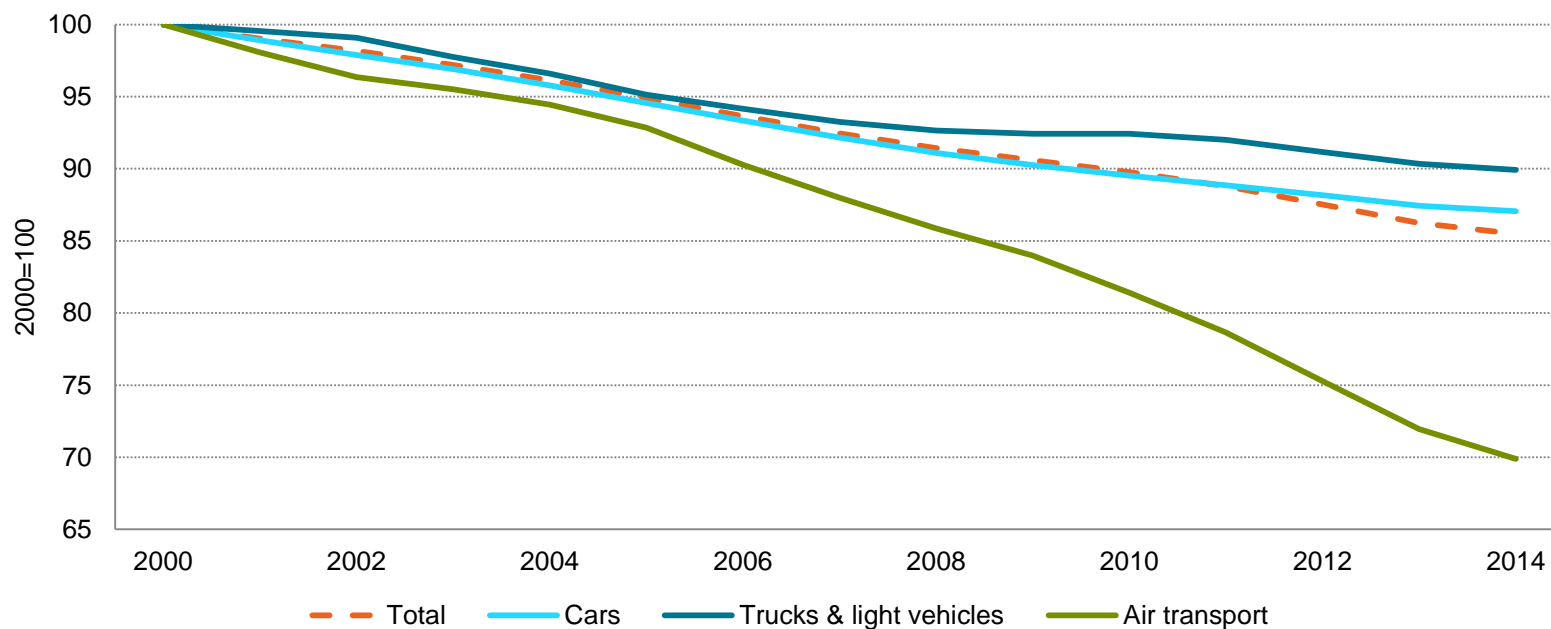
Air transport included

Source: ODYSSEE

## Greater energy efficiency improvements in cars and air transport

- The energy efficiency of transport improved by 1.1%/year in the EU since 2000 (or 15% compared to 2000 level).
- Greater progress was achieved for both cars and airplanes.
- Energy efficiency progress has slowed down for trucks and light vehicles since 2007 : the fall down in freight traffic by road (- 1,6%/year since 2007) led to a less efficient operation of trucks → sharp decrease in load factors (trucks less loaded and increased empty running).

### Energy efficiency trends for transport in the EU

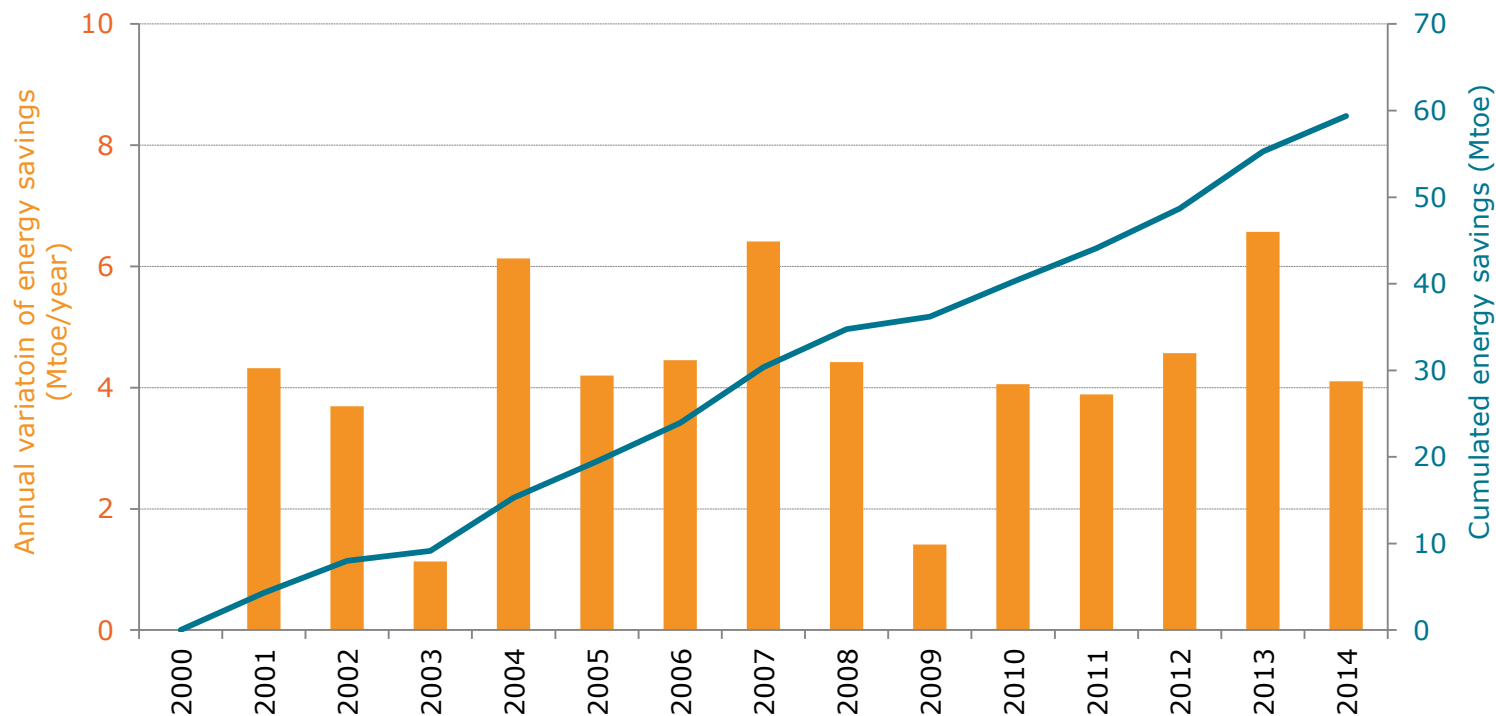


Energy efficiency calculated from trend in ODEX indicator calculated on 7 modes: cars (litres/km), trucks & light vehicles (toe per tkm), air (toe per passenger); rail ,water (toe/ tkm); motorcycles, buses (toe/vehicle). Index are expressed in 3 year-moving average to avoid short-term fluctuations. 2014 estimates

## Less energy savings since the economic recession for transport

- In 2014, energy savings in transport reached around 60 Mtoe compared to 2000: without energy efficiency improvement, the energy consumption would have been 60 Mtoe higher
- Slowdown in energy savings since 2009, mainly due to no more progress for goods transport as a consequence of the economic recession.

### Energy savings in transport (EU)



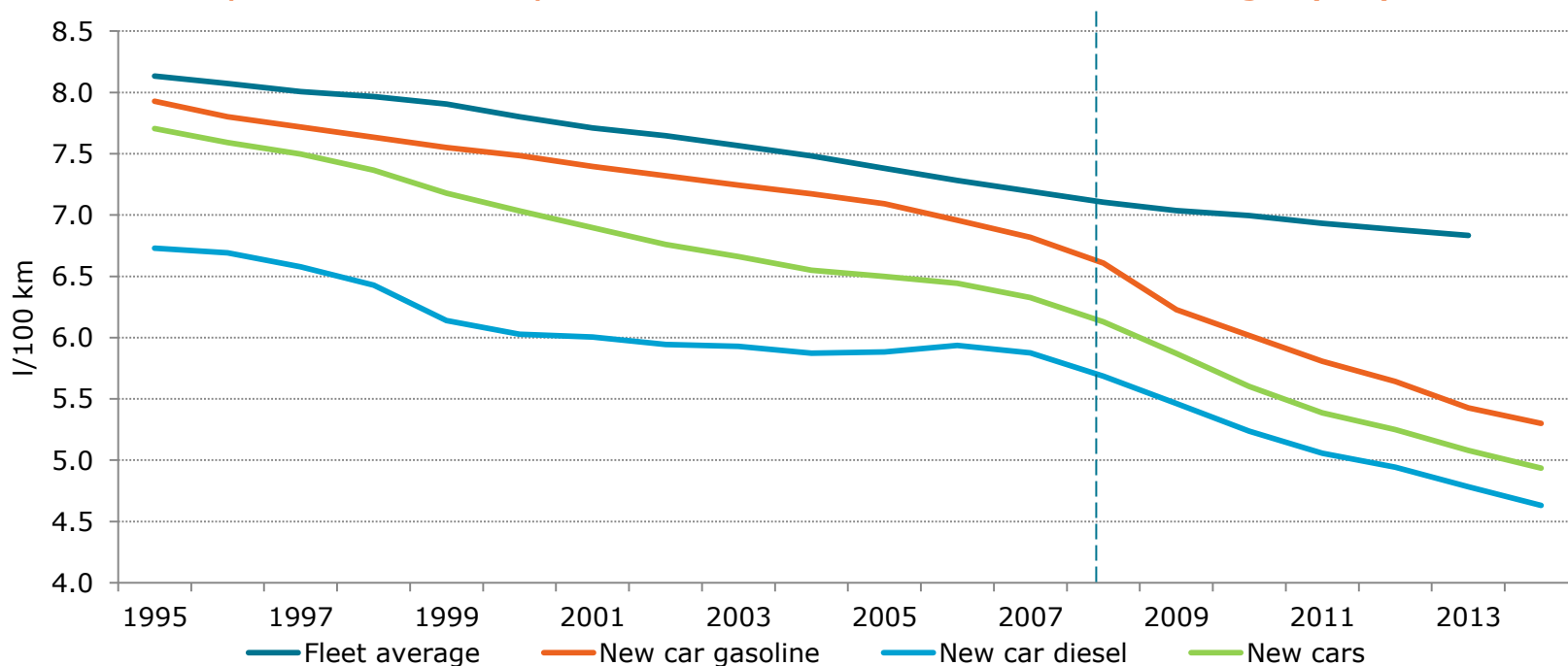
Air transport included

Source: ODYSSEE

## Faster decrease of specific consumption of new cars since 2007

- The average specific consumption of cars has decreased from 8.1 l/100km in 1995 to 6.8 l/100km in 2013 with the diffusion of more efficient new cars.
- The specific consumption of new cars has been decreasing faster since 2007 (3.5%/year compared to 1.5% between 2000 and 2007), as a result of EU regulations (labeling and standard), national fiscal incentives and higher fuel prices.
- New cars consume around 40% less in 2014 than in 1995 (4.9 vs 7.7 l/100km).

### Specific consumption of new cars and stock average (EU)



Source : ODYSSEE (specific consumption of new cars calculated based on gCO<sub>2</sub>/km from EEA)

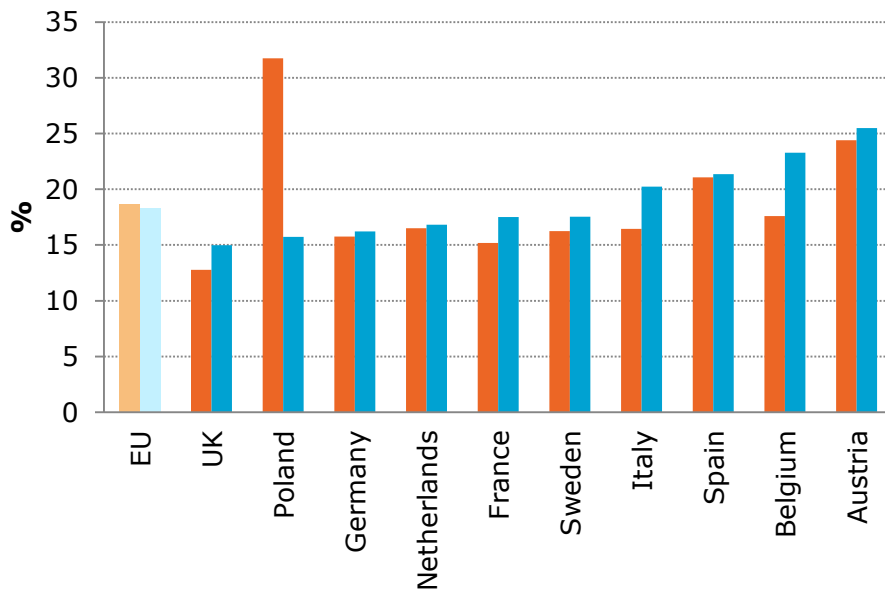


## Trends in modal shift: public transport and rail and water goods traffic

- Steady share of public transport in passenger traffic at EU level (18%), with a high progression in Belgium (+ 6 pts), Italy (+4 pts), France and UK (+2 pts).
- At EU level, 25% of goods traffic is carried by rail and boats. Sweden and The Netherlands have the highest share (>40%).
- Belgium and UK have the highest progression (25% and 29%) in goods traffic due to water transport.

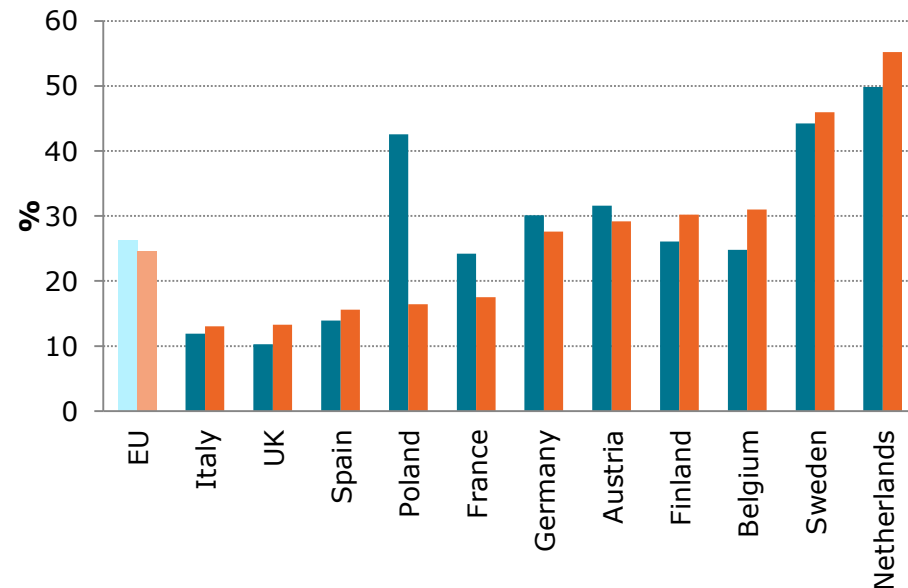
### Share of public transport in total passengers traffic

2000 2013



### Share of rail and water in total goods traffic

2000 2013



Source: ODYSSEE



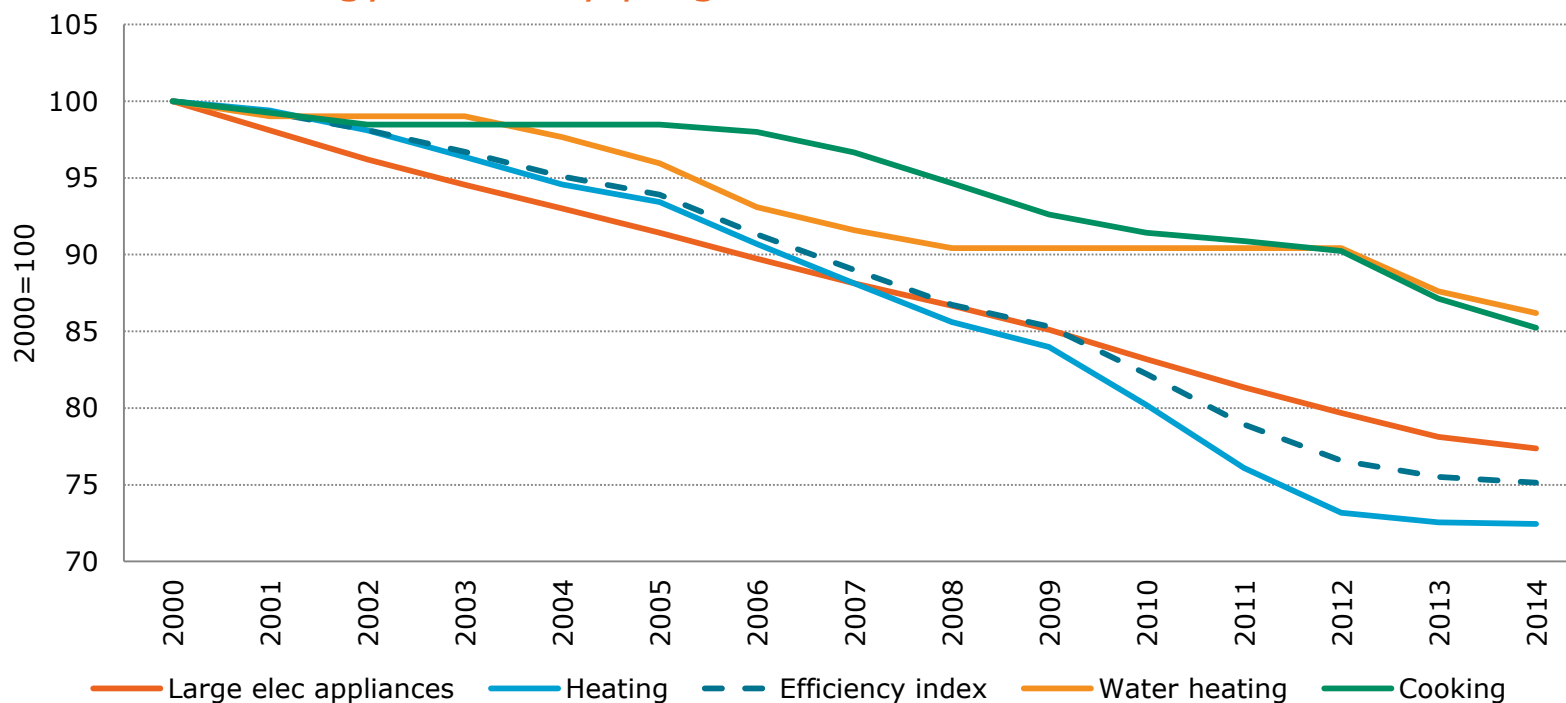
# Households

*Improvements driven by efforts in space heating and large appliances*

# Households energy efficiency improvements

- Households energy efficiency has improved by 2%/year at EU level in the period 2000-2014, thanks to the energy efficiency improvements for space heating and the diffusion of more efficient new electrical appliances (e.g. labels A+ to A++).

## Energy efficiency progress for households in the EU



ODEX is an index weighting the energy efficiency progress gains of 7 end-uses/appliances : heating (toe/m<sup>2</sup>), water heating, cooking (toe/dwelling), refrigerators, freezers, washing machine, dishwashers (kWh/year).

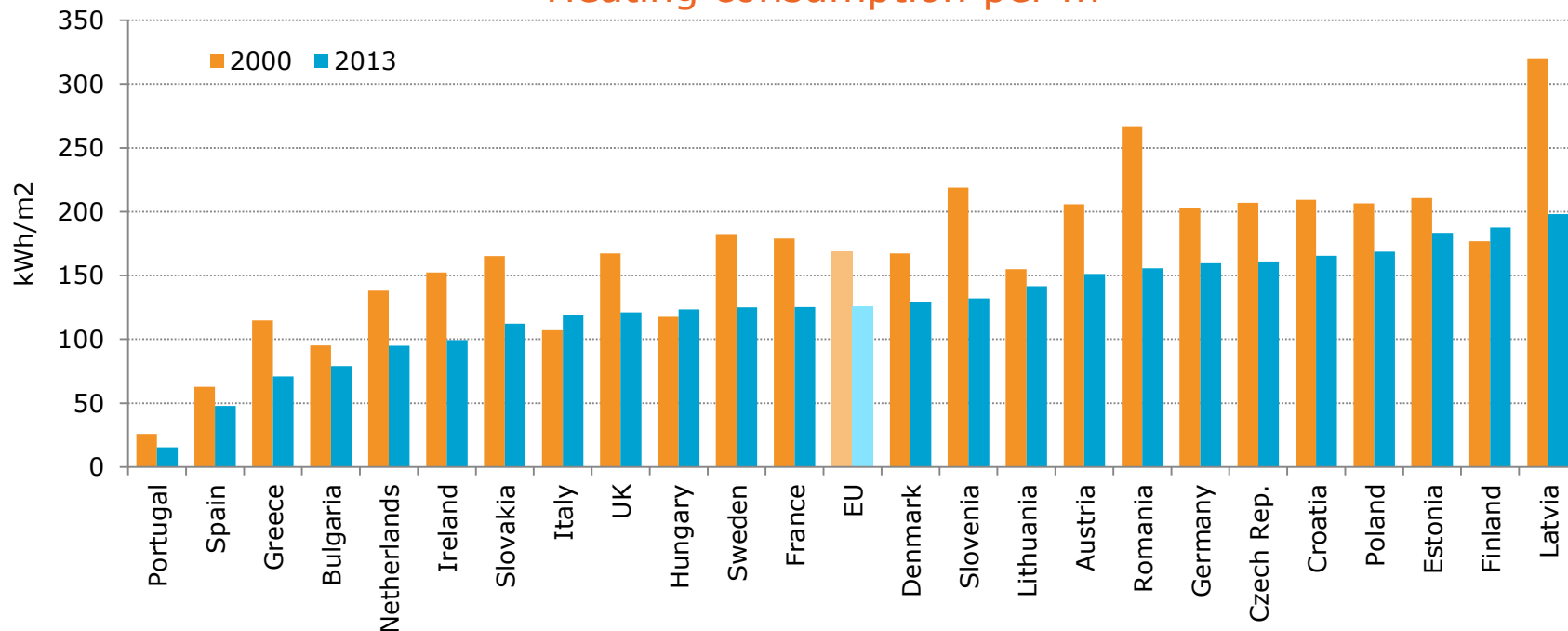
Index are expressed in 3 year-moving average to avoid short-term fluctuations.

Source: ODYSSEE, 2014 estimates (revised data)

# Decreasing share of heating in household consumption

- The efficiency of households space heating has improved steadily since 2000, by around 2.2%/year at EU level.
- The deployment of more efficient new buildings and heating appliances and the renovation of existing dwellings can explain this performance. As a result, the share of space heating in total household consumption is declining (4 points less than in 2000).
- The lower volume of construction since 2009 has, however, limited the impact of new dwellings standards.

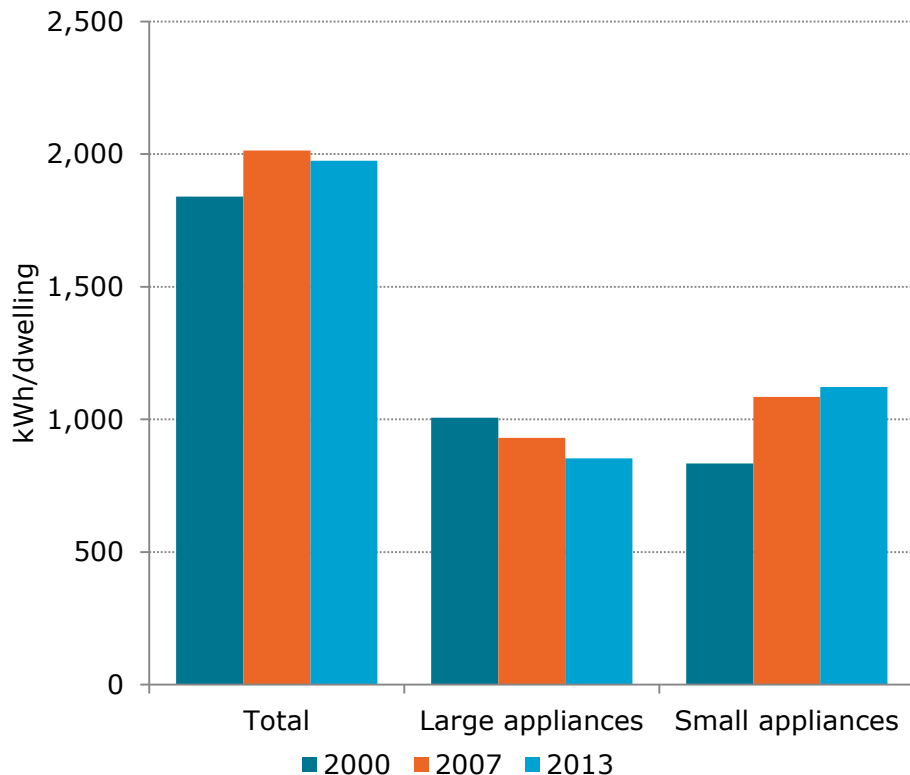
Heating consumption per m<sup>2</sup>



Source: ODYSSEE, revised data

# Small appliances now consume more than large ones

## Consumption of electrical appliances per dwelling by type of appliance (EU)



Large appliances: refrigerators, freezers, washing machine, dishwashers, dryers

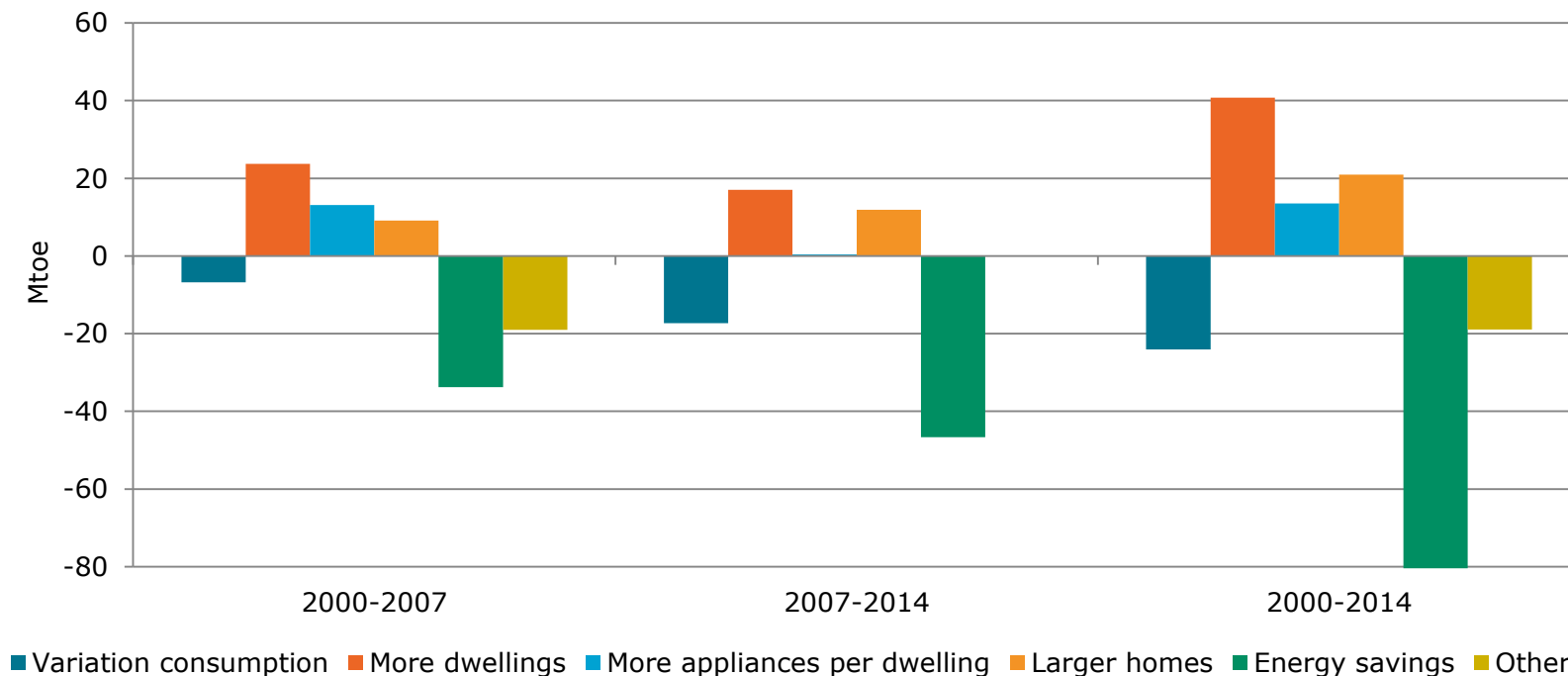
Source: ODYSSEE

- Consumption of electrical appliances per dwelling has increased by 0,5%/year since 2000, with a slightly decreasing trend since 2007.
- The consumption of small electrical appliances has been growing rapidly and now represents a higher share of the total consumption of appliances than large appliances
  - ➔ Steady equipment rate for large appliances + targeted policies
  - ➔ Diffusion of ICT and small electrical appliances with less policy target

## Energy savings counterbalance the increasing number of dwellings and appliances

The increasing number of dwellings and appliances contribute to raise the households energy consumption. Their effect is however counter balanced by the energy efficiency improvements. Without these savings since 2000 the energy consumption of households would have been around 80 Mtoe higher in 2014 at EU level.

### Drivers of energy use for households (EU)





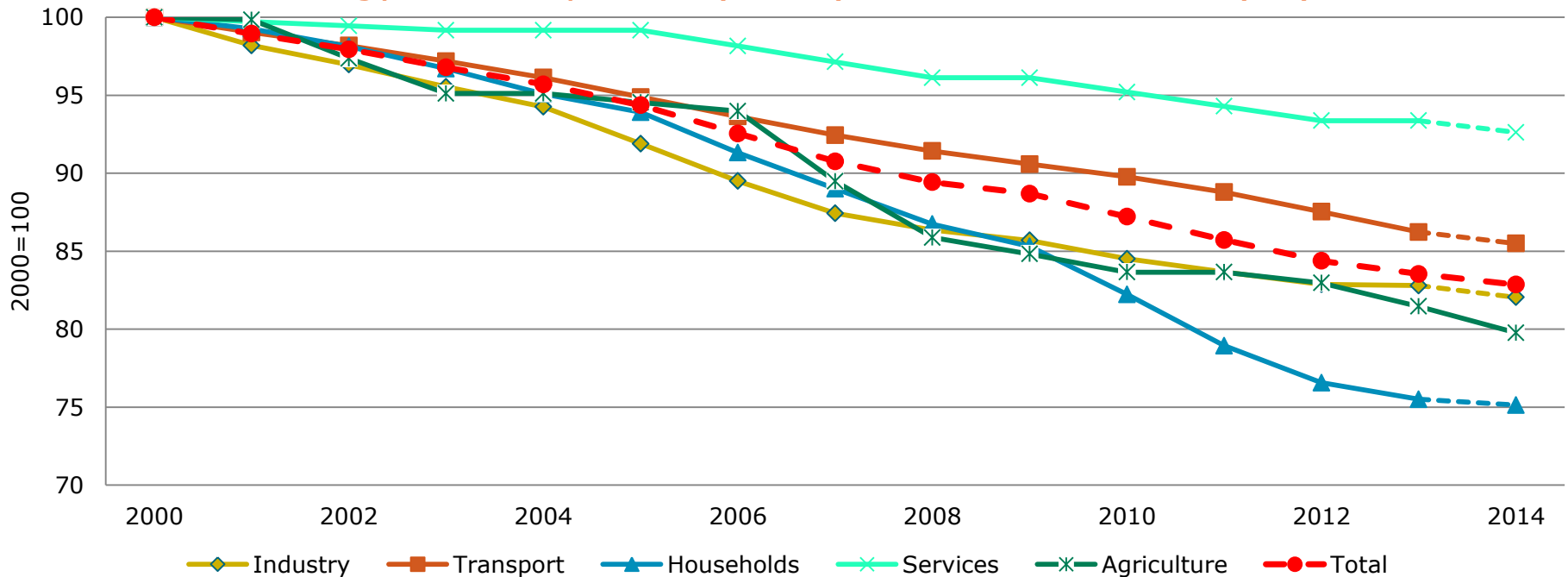
# Synthesis

*17% of energy efficiency improvement  
since 2000*

# Global energy efficiency improvements

- 17% energy efficiency improvement with end-users between 2000 and 2014 (1.3%/year).
- Slow down since 2007 in industry: 0.9%/year since 2007, compared to around 1.9%/year between 2000 and 2007;
- Regular and larger gains for households (almost 2%/year), followed by transport (1.1%/year) and services (0.5%/year).

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



Technical ODEX; calculated as a 3 years moving average to avoid short term fluctuations. 2014 based on estimates.

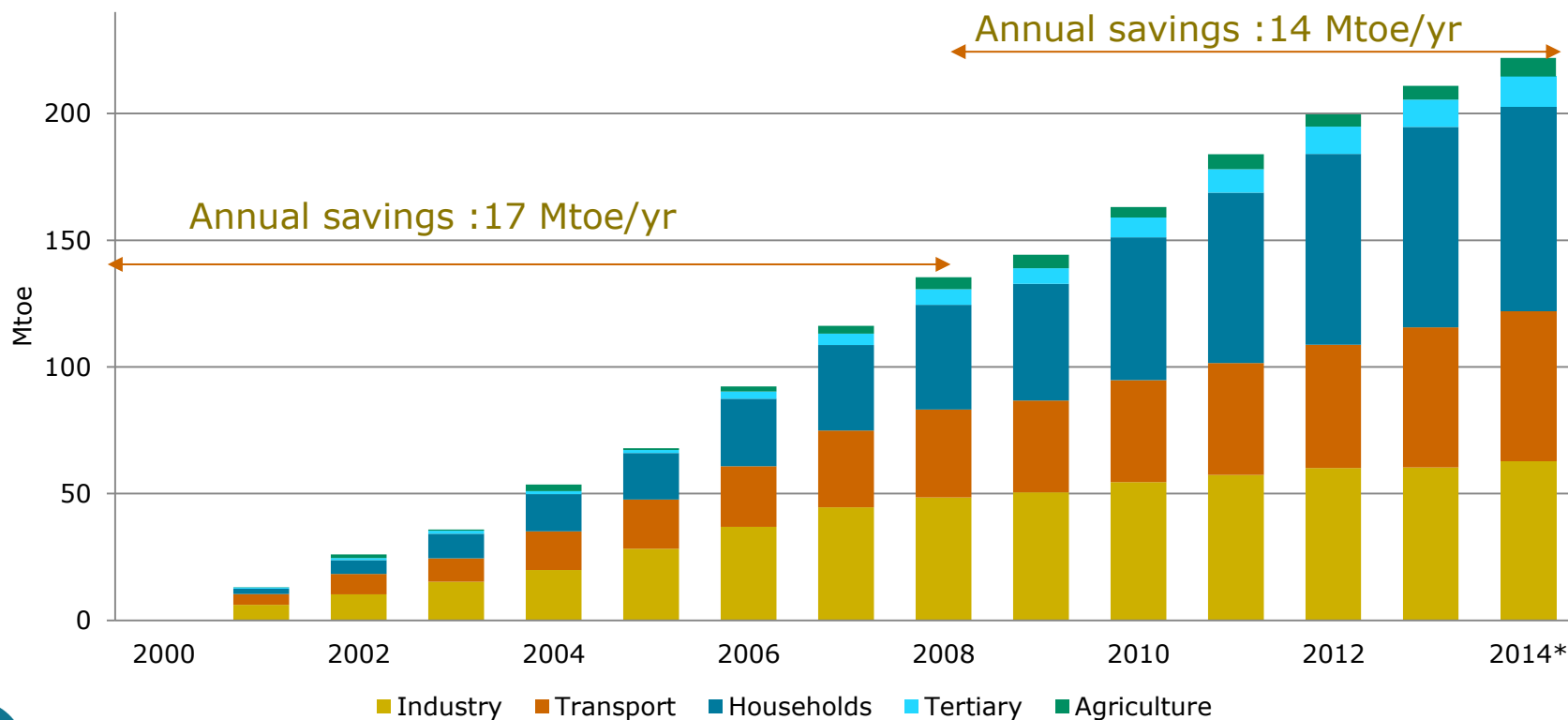
Source: ODYSSEE



## 17% of savings in final energy consumption since 2000...

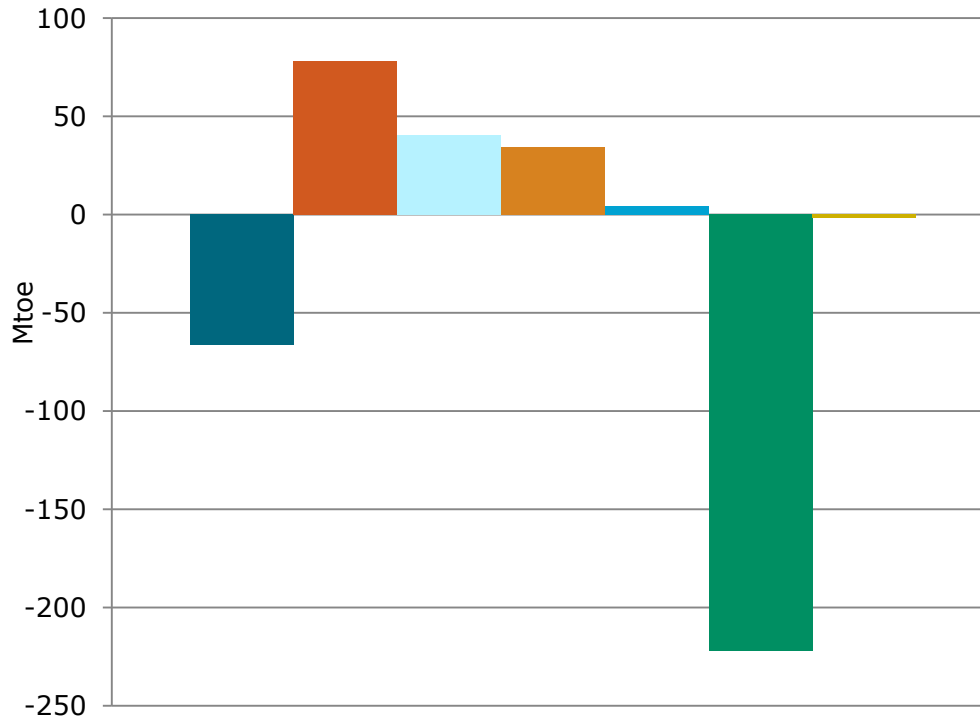
- Around 220 Mtoe energy savings in 2014 compared to 2000 (i.e. 17% of final energy consumption). In other words without energy savings the final energy consumption would have been 17% higher in 2014.
- Lower progression of energy savings since 2008, as a result of the economic crisis.
- Most of savings for households (36% of savings), following by industry (28%), transport (27%), services (5%) and agriculture (3%).

### Evaluation of energy savings for final consumers (EU)



...partially offset by economic activity, demography and lifestyles effects

### Drivers of final energy consumption variation (EU) (2000-2014)



- Economic activity increased consumption by around 80 Mtoe over 2000-2014.
- Demography (more dwellings) and lifestyles (increase appliance ownership and larger dwellings) also contributed to increase consumption by around 40-35 Mtoe each.
- Energy savings of 220 Mtoe more than offset the effect of these 4 drivers of consumption growth leading to a decrease in final consumption (-66 Mtoe).

■ Variation of final consumption\*    ■ Activity  
■ Demography    ■ Lifestyles  
■ Structure    ■ Energy savings  
■ Other

\*Climate corrected

Source: ODYSSEE – decomposition facility

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## About Enerdata:

Enerdata is an energy intelligence and consulting company established in 1991. Our experts will help you tackle key energy and climate issues and make sound strategic and business decisions.

We provide research, solutions, consulting and training to key energy players worldwide.

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attention !