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ODYSSEE-MURE

ODYSSEE-MURE seminar

„Efektywność energetyczna – konieczność i szansa polskiej gospodarki”

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Warszawa

Monitoring energy efficiency trends – the ODYSSEE database

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Fraunhofer ISI

Outline

- Overview of the ODYSSEE-MURE project
- The ODYSSEE database: Energy efficiency trends in the EU
- The ODYSSEE tools on energy efficiency indicators
- The new “Multiple Benefits” tool in the ODYSSEE-MURE project

Overview of the ODYSSEE-MURE project

The project ODYSSEE – MURE

- The current project is supported by the Horizon 2020 programme of the European Commission and coordinated by ADEME
- **Aim:** Enhancing the capacity of public authorities and other stakeholders to plan and implement energy efficiency policies and measures
- The present project covers **31 countries** (all EU MS, Norway, Serbia and Switzerland)
- **Network of 37 partners** (mainly energy agencies and some research institutes, universities, statistical offices)
- The heart of the project are two databases:

  ODYSSEE: energy efficiency and CO_2 indicators (about 180 indicators) based on energy consumption data by sector and end-use and their drivers (about 600 main data series) → managed by Enerdata

  MURE: structured description of past, present and planned energy efficiency policies in the EU and all partner countries → managed by Fraunhofer ISI and ISINNOVA.

All information available on the website: **www.odyssee-mure.eu**

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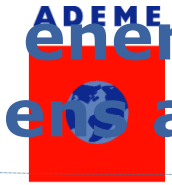
The ODYSSEE-MURE network : more than 150 experts mainly from energy efficiency agencies gathering staticiens and policy analysts



Fraunhofer FhG Gesellschaft

Enerdata

ECN

AUSTRIAN ENERGY AGENCY

NL Agency
Ministry of Economic Affairs

CYPRUS INSTITUTE OF ENERGY

IDAE Instituto para la Diversificación y Ahorro de la Energía

ENERGI STYRELSEN

ECONOTEC CONSULTANTS

КАПЕ CRES

seai SUSTAINABLE ENERGY AUTHORITY OF IRELAND

ENEA

ICEMENERG eficiență energetică

Motiva

IFE Institutt for energiteknikk

ADENE AGÊNCIA PARA A ENERGIA

KAPE

AEA Energy & Environment
From the AEA group

Swedish Energy Agency

ENVIROS

"Jožef Stefan" Institute

EA

LIAA

MRA

AEE EEA

enova

ENERGIA KÖZPONT ENERGY CENTRE

ANRE Autoritatea Națională de Reglementare în domeniul Energiei

GUS

FEI

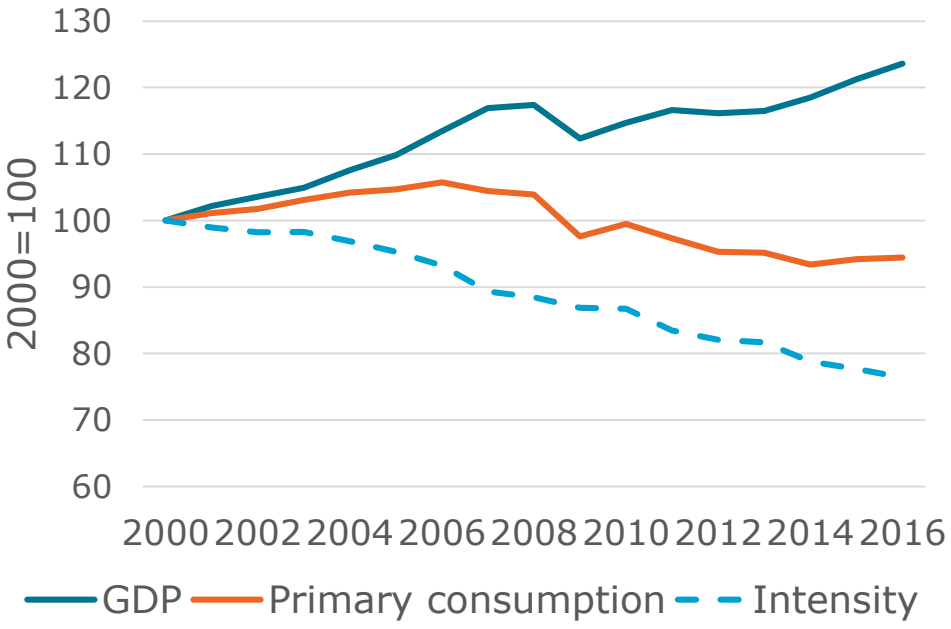
KREDEX

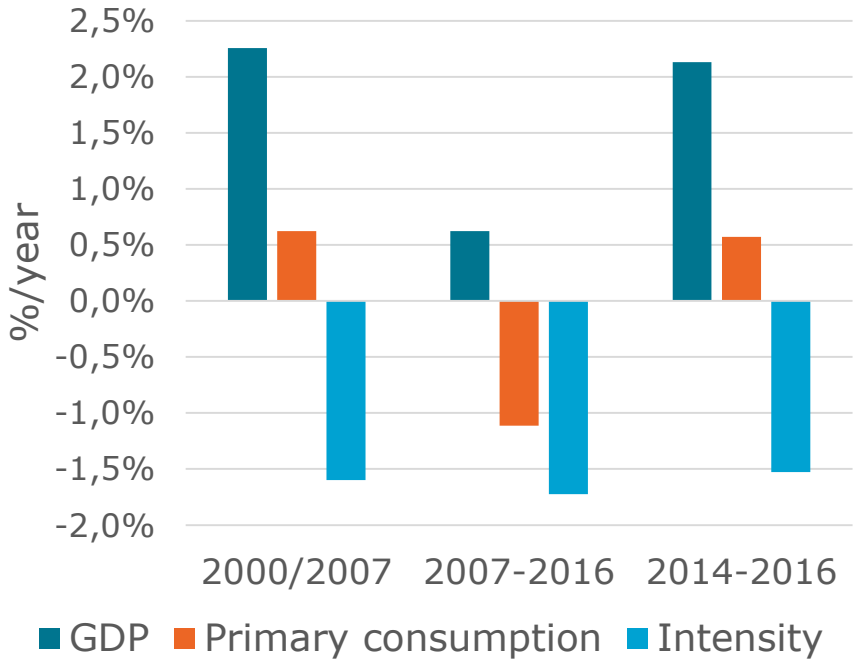
EIHP

The ODYSSEE database: Energy efficiency trends in the EU

- Slight progression of the primary consumption since 2014, 4 times slower than GDP, after a decrease of ~1%/yr between 2007 and 2014.
- Regular and rapid decrease of the primary energy intensity since 2000 (~1.7%/year)
- In 2016, EU primary energy consumption EU was closed to the 2020 efficiency target (4% higher).

Primary energy consumption and intensity vs GDP (EU 28)

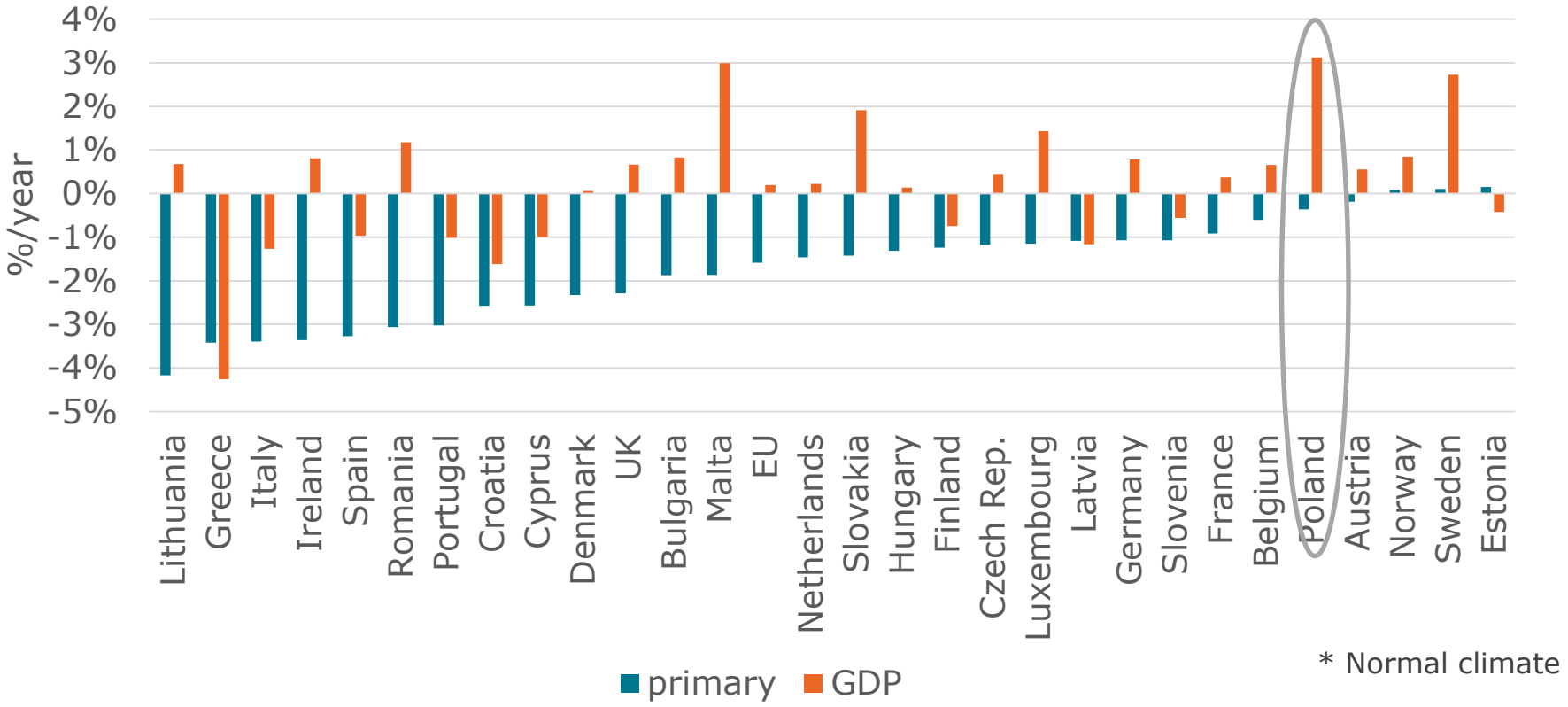




Consumption and intensity at normal climate, Source: Eurostat

- Decreasing trend of the primary consumption in all countries in the period of slow economic growth or recession*
  - ✓ Strong reduction, between -2 and -4%/yr in 11 countries;
  - ✓ Between -1 and -2%/yr in 12 countries

Variation of primary energy consumption* and GDP over 2007-2014

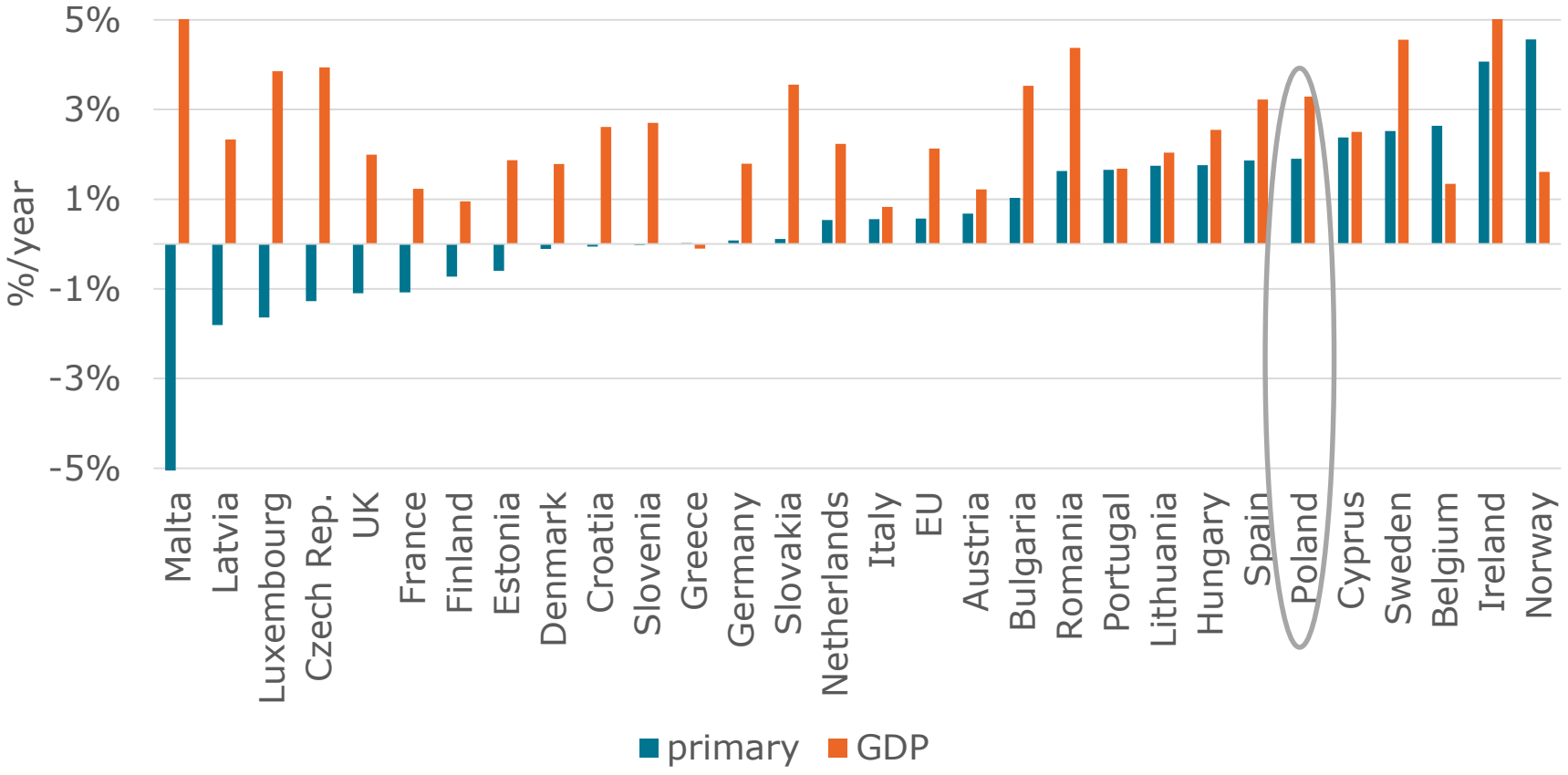


* Normal climate

**except in Poland, Sweden, Malta and Slovakia*

- Since 2014, with the economic recovery, increasing primary consumption in 18 countries as for the EU (that stood at 0.6%/year).
- For the other countries, decreasing consumption despite sustained economic GDP growth (except in France and Finland)

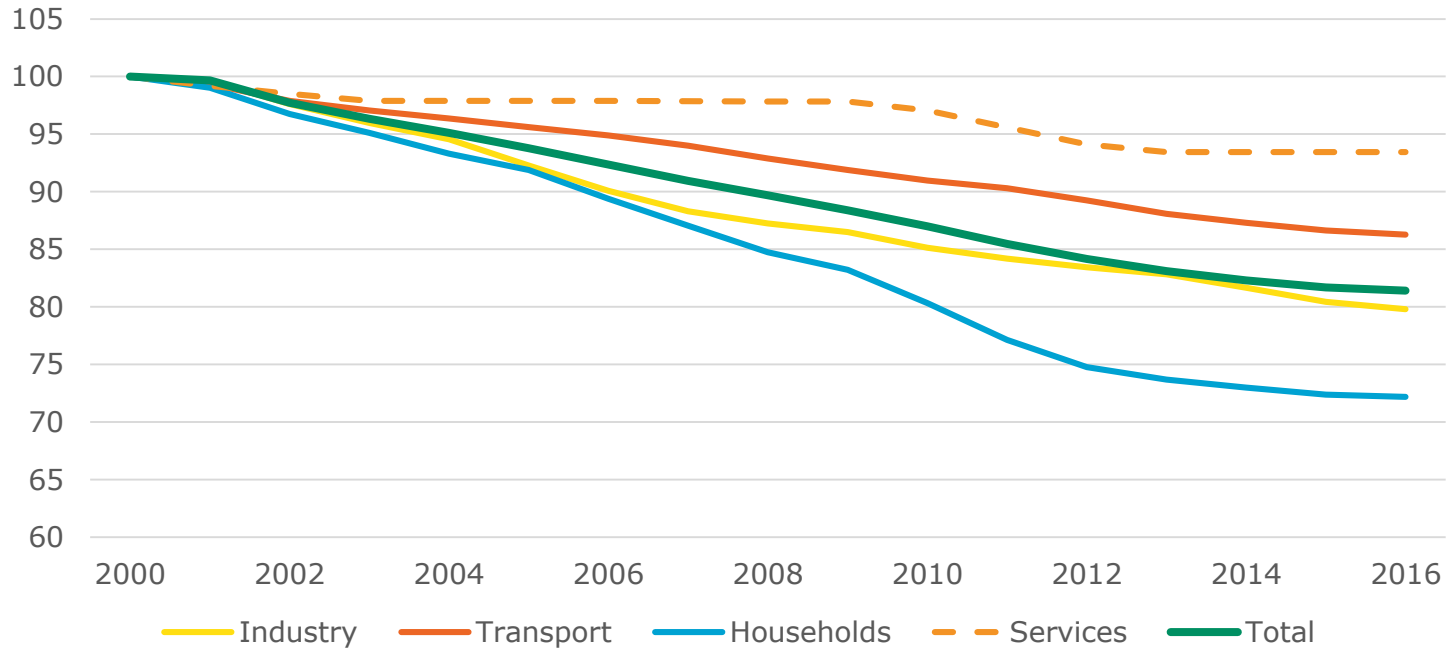
Variation of primary energy consumption* and GDP over 2014-2016



* Normal climate

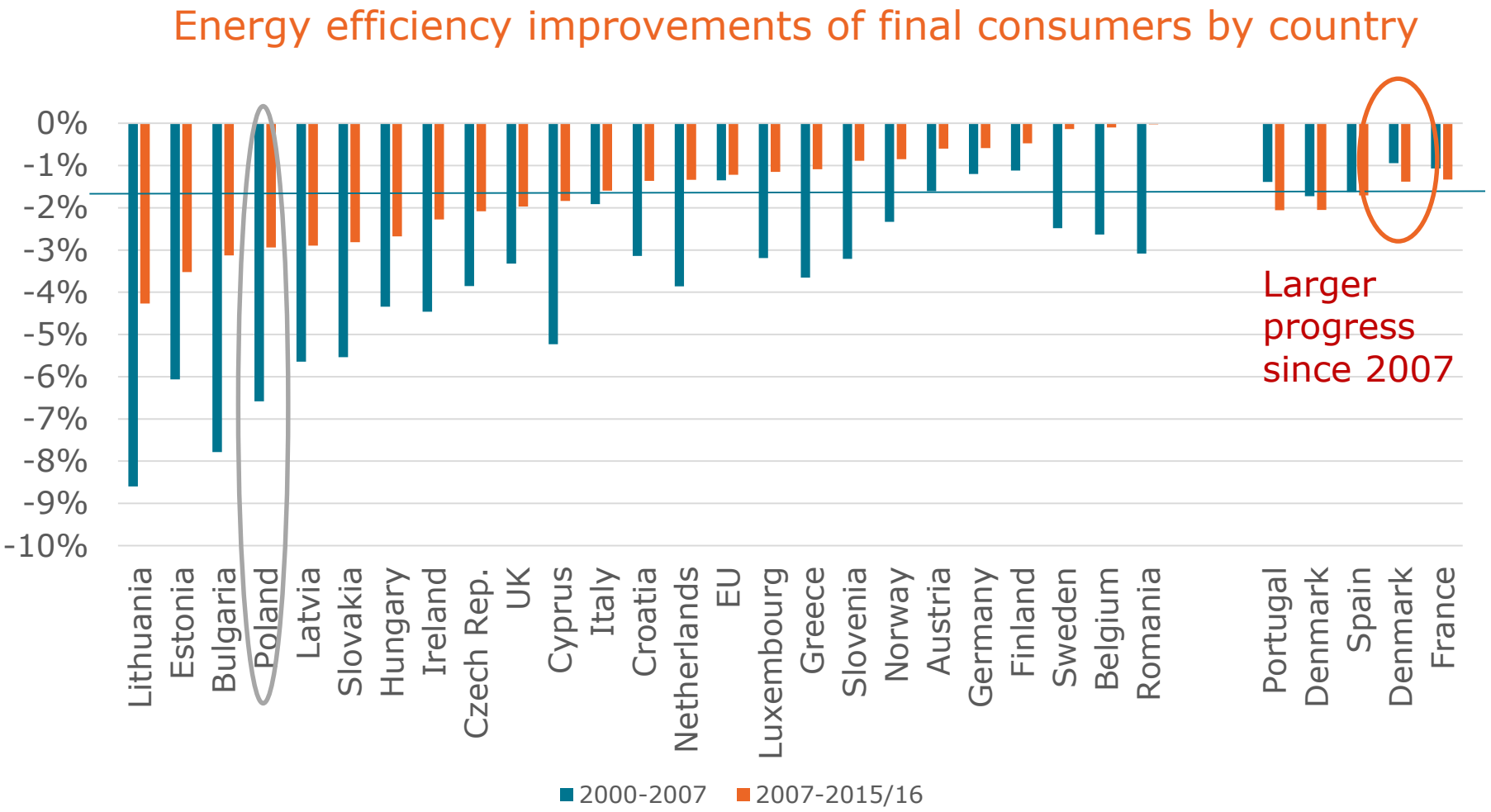
- Energy efficiency of final consumers improved by 1.3%/year between 2000 and 2016 (1.4%/yr before 2007 and between 2010-2014). Slight slow down between 2014-2016 (0.5%/year).
- Larger gains for households (2%/yr since 2000) with a slow down since 2012 (0.9 %/yr against 2.4%/yr over the previous period).
- Rate of improvement almost divided by 2 in industry, since 2007 (-1%/compared to 1.8%/yr before).
- Regular but limited improvement in transport (0.9%/year): greater for cars than for trucks.

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

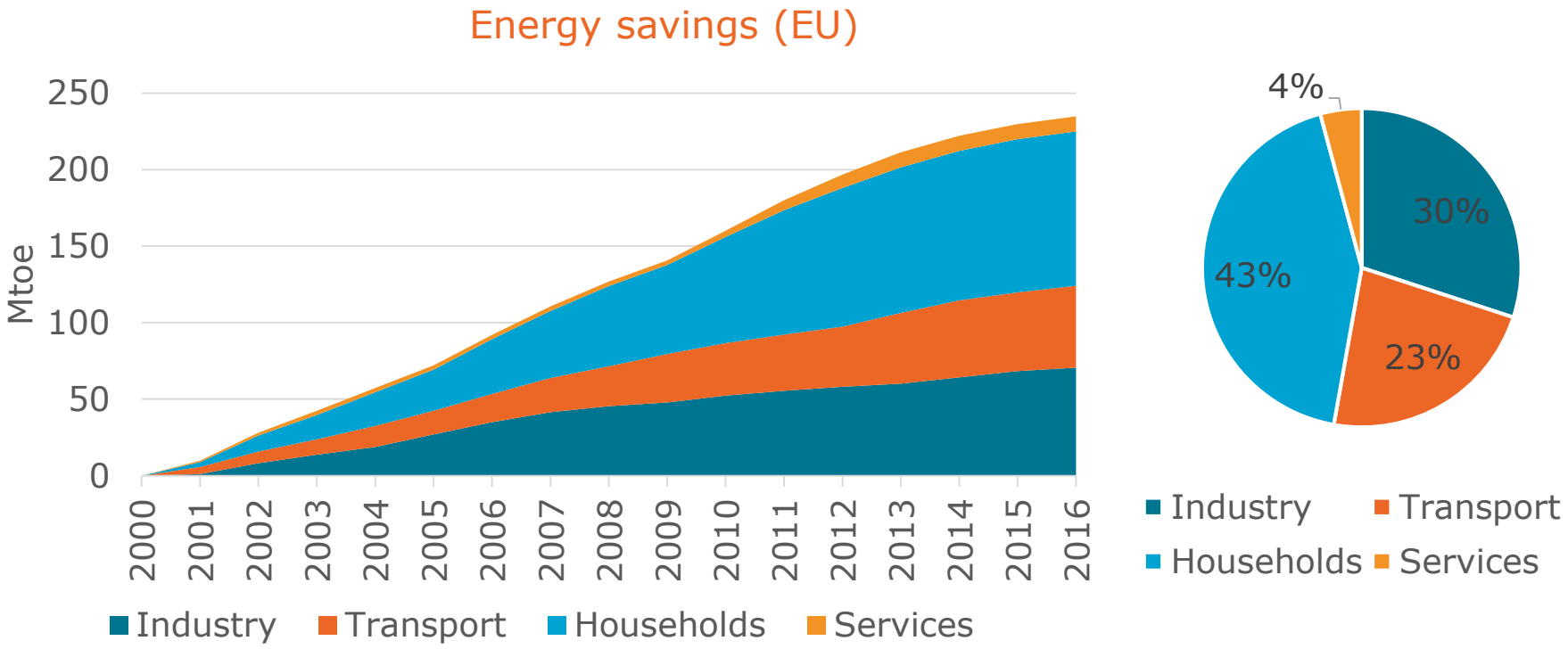


ODEX=81 in 2016 ➔ 19% energy efficiency improvement or 1.3%/yr

- Energy efficiency improvement above 1.5%/year since 2007 in 15 countries, of which 7 have accelerated their rate of improvement since 2007.
- To be compared to Article 7 target of EED.



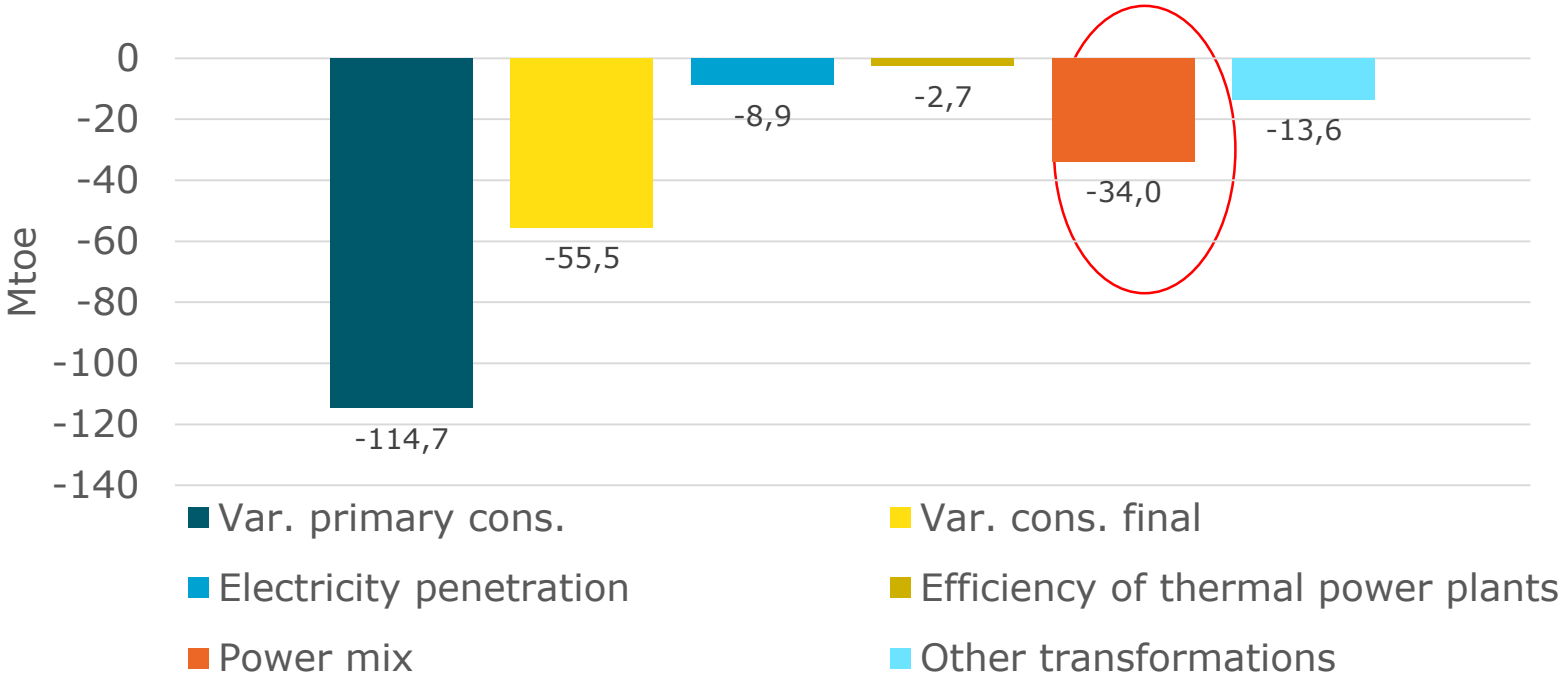
- Around 235 Mtoe energy savings in 2016 compared to 2000 (i.e. 20% of final energy consumption).
- Without these savings the final energy consumption would have been 20% higher in 2016.
- Most of these savings come from households (43%), 30% from industry, 23% from transport and 4% from services.



▪The primary consumption decreased faster than the final consumption between 2010 and 2016.

▪This is mainly explained by a change in the power mix (higher share of renewables, lower share of nuclear).

Drivers of primary energy consumption variation (EU): 2010-2016

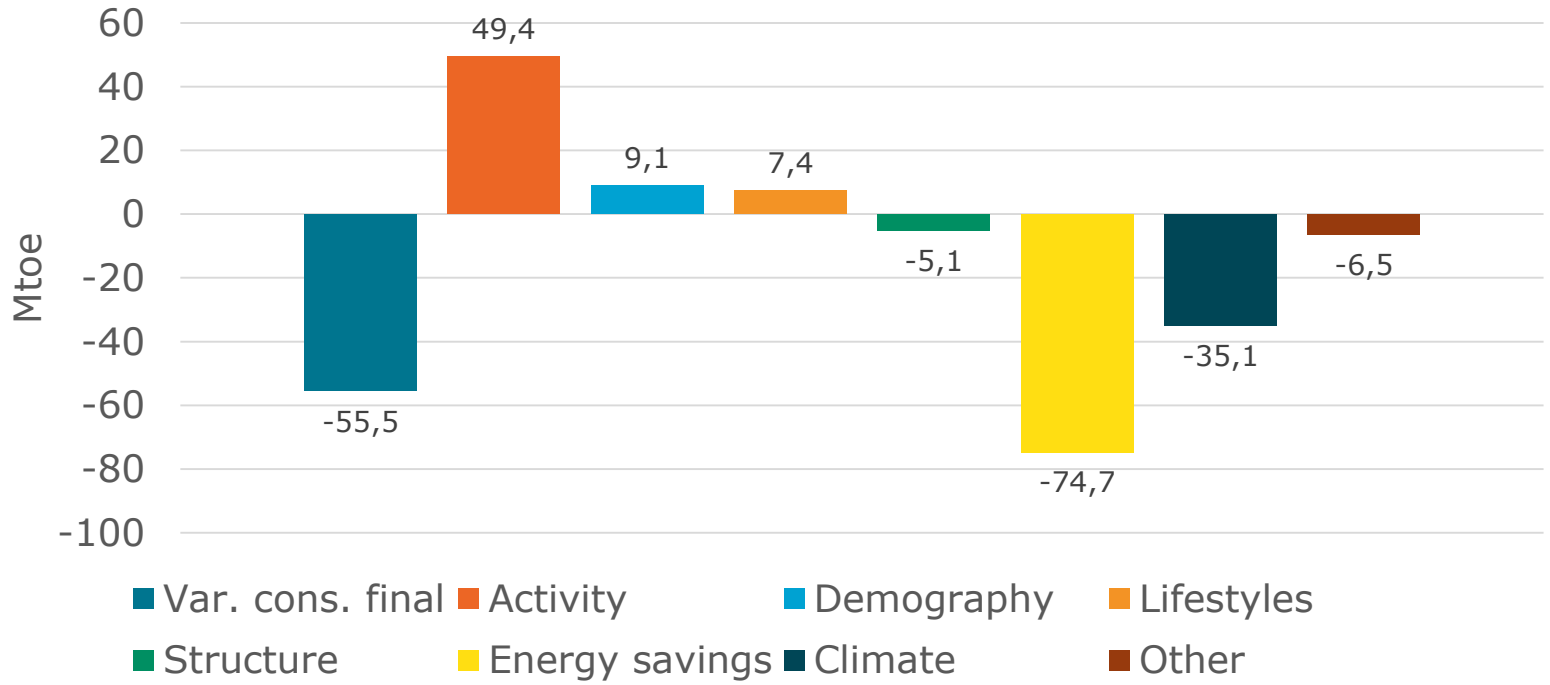


http://www.indicators.odyssee-mure.eu/decomposition.html

▪Between 2010 and 2016, 3 main factors contributed to raise the final energy consumption: 1) economic activity (by 50 Mtoe) demography (9 Mtoe) and lifestyles (appliance ownership and larger dwellings) (7 Mtoe). All these two factors have a lower impact than before.

▪Four factors offset these effects and contributed to lower consumption by 110 Mtoe, among which the largest are energy savings (75 Mtoe) and the colder climate in 2015 compared to 2010 (35 Mtoe). The magnitude of the climate is becoming quite large compared to the other factors.

Drivers of final energy consumption variation (EU): 2010-2016



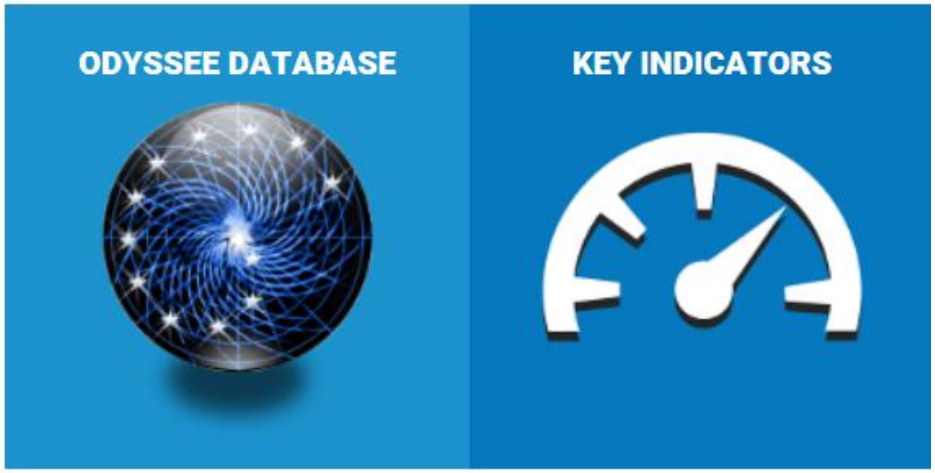
http://www.indicators.odyssee-mure.eu/decomposition.html

The ODYSSEE tools on energy efficiency indicators

The ODYSSEE tools on energy efficiency indicators

ABOUT THE ODYSSEE DATABASE

The Odyssee indicators are accessible under different data tools: the full data base, the key indicators facility, as well as five specific data facilities that focus on specific issues and provide some interpretation: market diffusion, decomposition, benchmarking, energy saving and indicator scoreboard. The access to the data base is restricted, whereas all other data tools are in public access.



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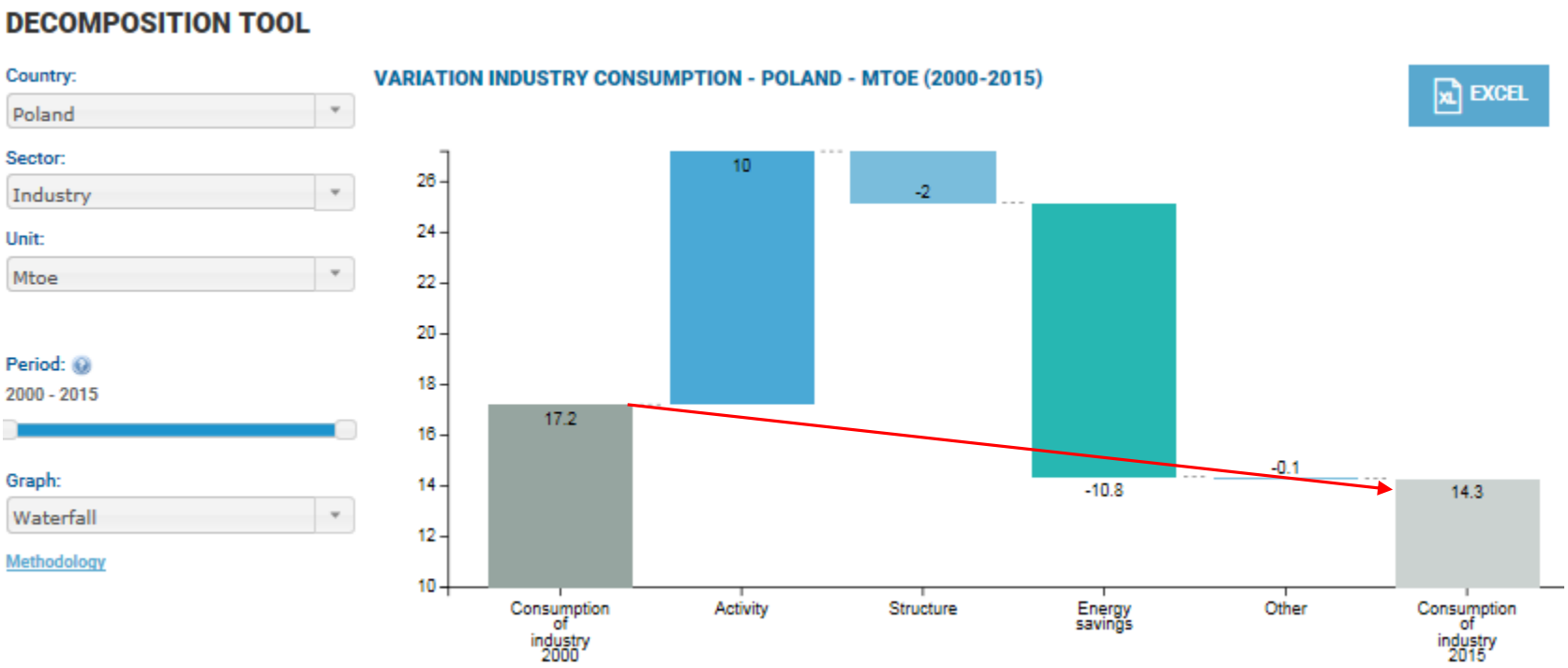
Decomposition facility

This facility enables to display the different effects (i.e. the drivers for energy consumption):

- by country;
- by sector (primary, power, total final or end-use sector);
- for a selected period (since 2000);
- in various units (ktoe, TJ, GWh and %)



A text appears below to explain the meaning of the drivers shown.

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The comparison tool: main principles

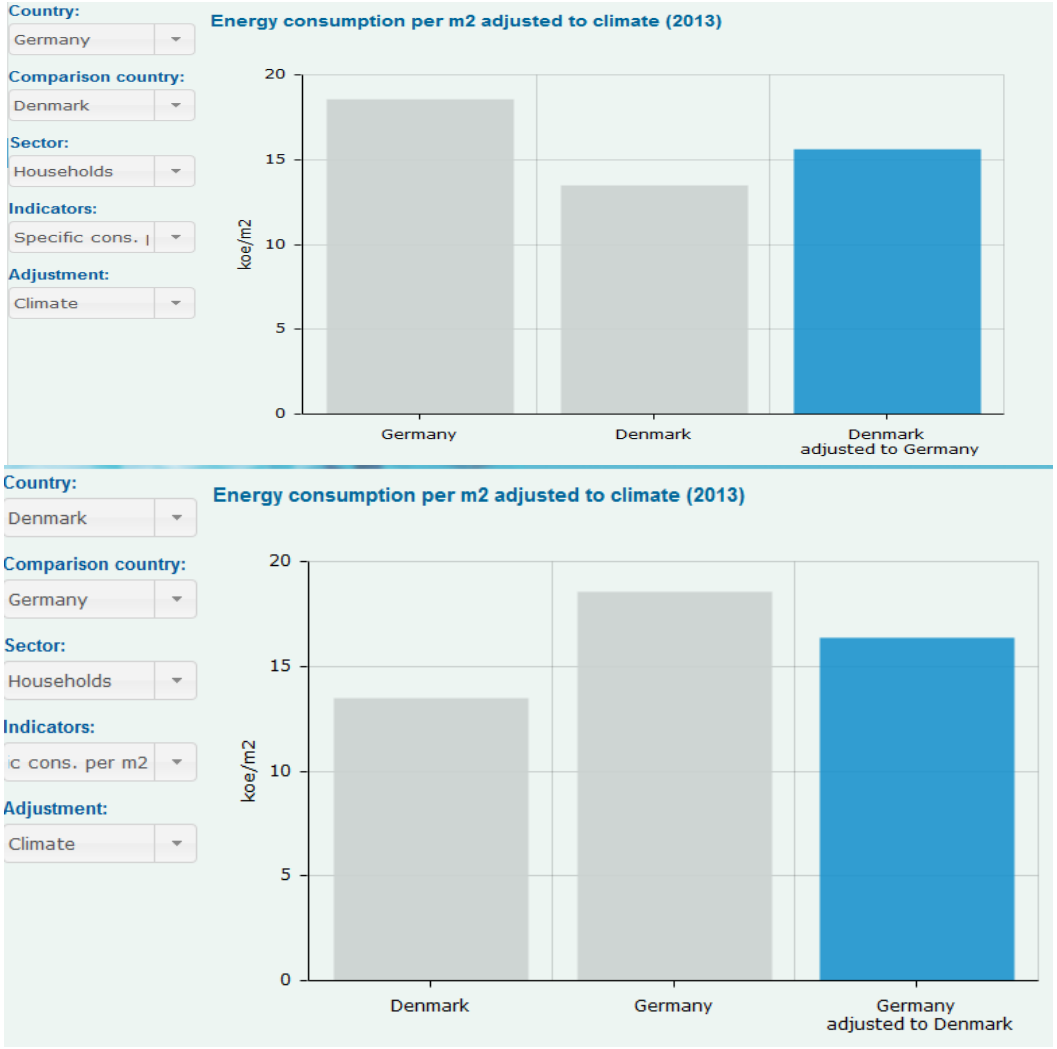
- The objective of this tool is to enable country X to compare with the country(ies) of its choice by adjusting the different indicators to its own characteristics.

- The tool shows for the last year available a graph showing the actual indicator values and the indicator after adjustment to the characteristics of country X.

- The user selects:

1. the country to benchmark (X),
2. the countries to which country X will be compared ("comparison countries") (multi-selection available),
3. the sector,
4. the indicator for which the adjustment will be made (selection proposed),
5. the type of adjustment (among a selection proposed).

The comparison tool: example



The first graph shows what would be the energy consumption per m2 scaling the household consumption of Denmark to the average climate of Germany.

The second graph shows what would be the energy consumption per m2 scaling the energy consumption of Germany to the climate of Denmark.

The new “Multiple Benefits” tool in the ODYSSEE-MURE project

The new tool on multiple benefits in ODYSSEE-MURE

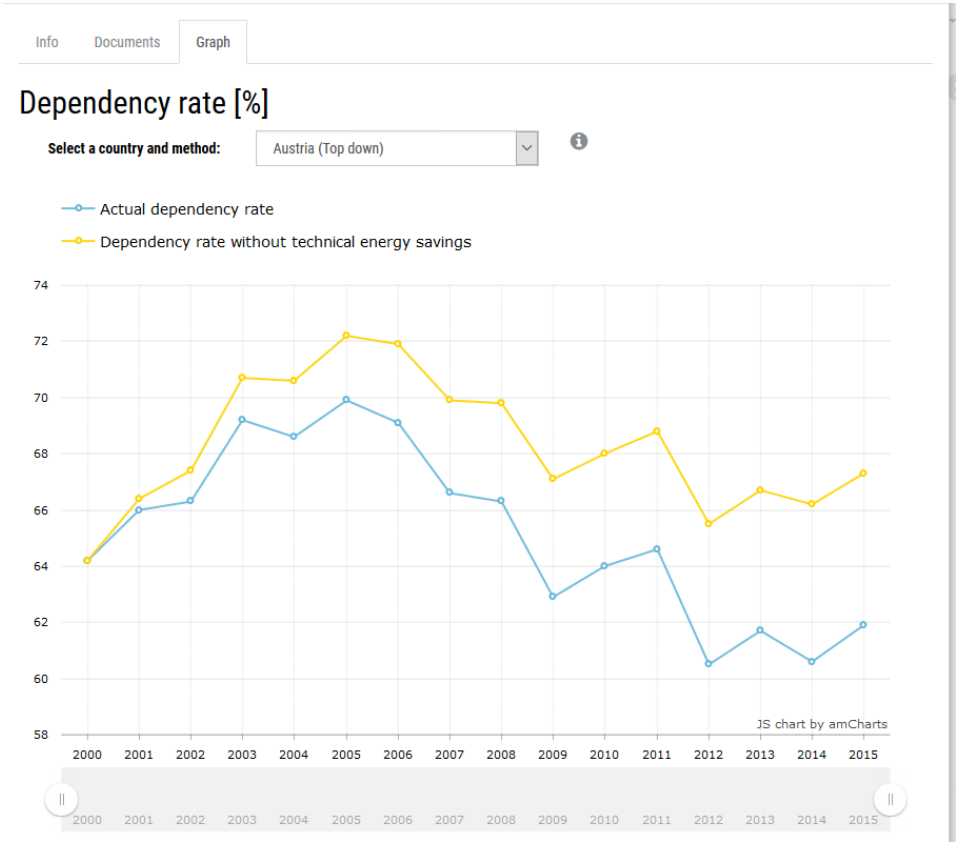
- **Aim**: Improve capacity building on multiple benefits of energy efficiency (MB:EE)
- Set of 19 Indicators
  - 3 main groups: *environmental, economic, social*
  - 8 sub groups
- Application for 31 countries (EU28 plus Norway, Switzerland and Serbia) where possible due to data availability
- Calculation of multiple benefits based on energy savings → both top-down savings (from ODYSSEE) and bottom-up savings (from MURE) are considered
- **Ex-post view** on multiple benefits mainly based on statistical data

Category	Sub-category		Indicator
	Energy and Resource Management		
Environmental		Energy savings	Annual energy savings
Environmental		Saving of fossil fuels	Saving on fossil fuels; extension of range of fossil fuels
Environmental		Impacts on RES targets	Lowering of RES target; replacement of RES capacity; reduced need for interconnectors
	Global and Local Pollutants		
Environmental		GHG savings	Annual CO_2 savings linked to energy savings
Environmental		Local air pollution	Emission factors for avoided local pollutants (incl. electricity)
Social	Energy poverty		
Social		Alleviation of energy poverty	Impact of savings on energy cost shares in household income
	Living comfort		
Social		Health and well-being	Externalities linked to health impacts
Social		Disposable household income	Shares of energy costs in household income
Economic	Innovation and Competitiveness		
Economic		Innovation impacts	Patent indicators
Economic		Competitiveness	Indicators on foreign trade with EE products
Economic		Turnover of energy efficiency goods	Production statistics
	Economy (Macro)		
Economic		Impact on GDP	Impact of energy savings on GDP growth
Economic		Employment effects	Input-Output (I/O) analysis
Economic		Impact on energy prices	Price elasticities
Economic		Public budgets	State income from employment based on energy savings
	Economy (Micro)		
Economic		Industrial productivity	Semi-quantitative classification of impacts
Economic		Asset value	Valuation of buildings and companies for different end-uses according to energy efficiency benefits
	Energy Security and Energy Delivery		
Economic		Energy security (A)	Import dependency (conversion to primary energy necessary)
Economic		Energy security (B)	Impact on supplier diversity (Herfindahl-Hirschman-Index)
Economic		Impact on integration of renewables	Demand-response potentials by country

Example for calculation /1/

Energy security (A): **Reduction of import dependency**

- Based on top-down energy savings (ODYSSEE)



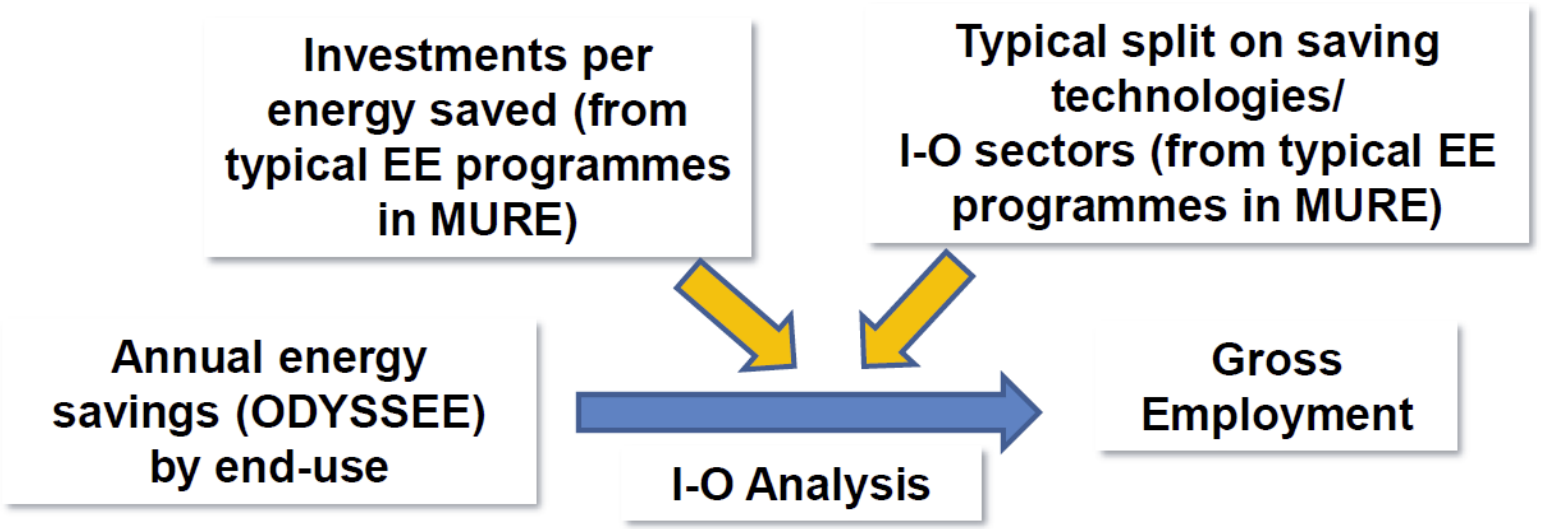
- This ratio is first calculated with the observed primary energy production and consumption ("actual dependency rate")
- and secondly in a fictive situation without the energy savings ("dependency rate without savings").

Source: Enerdata

Example for calculation /2/

Economy (Macro): **(Gross) Employment effects of energy efficiency**

- **Based on input-output tables provided by eurostat**
- **19 EU countries at the moment**



Web facility on MB:EE

Live demo in Browser

LINK

Back up

http://bfig1.de/mbee/en/ → The MB-website will be integrated into the official ODYSSEE-MURE website in the end of June 2018.

Multiple Benefits of Energy Efficiency

Multiple Ben

About MB:EE | Multiple Benefits of Energy Efficiency

This tool represents a quantitative indicator approach to measure multiple benefits of energy efficiency (MB-EE) developed as part of the ODYSSEE-MURE project. It aims to show the different aspects of energy efficiency beyond energy savings and give a more holistic view on its benefit.

The MB-EEs are classified into three groups: environmental, economic, and social –related MBs. The first group contains most relevant and direct aspects of energy efficiency such as energy savings and reduced GHG emissions. The second group comprises, among others, positive macro-economic impacts on economic growth, for innovation and competitiveness as well as import dependency. The third group of impacts covers aspects such as health benefits, poverty alleviation and employment.

To use the tool just click on a group of benefits you are most interested in and browse the different aspects. To see a group as a whole just click on “Map View” and choose the group you like.

Multiple Benefits of Energy Efficiency

MB:EE | Energy savings

Info | Documents | Graph

Info

For a number of our indicators the energy savings calculated from the ODYSSEE database (top-down savings) or the MURE database (bottom-up savings) are important starting points. In ODYSSEE, energy savings are calculated based on the unit consumption at the level of up to 30 sub-sectors or end-uses. Savings from international air transport and ETS sectors in industry are included as well. In industry and freight transport, savings may be negative for some years due to a deterioration of energy efficiency; this is due to capacity effects in industry and freight transport in times of economic recession. They are derived from the ODEX, an indicator that measures the energy efficiency progress by sector. For each sector, this index is calculated as a weighted average of subsectoral indices of energy efficiency progress. Such sub-sectors are branches of the sectors industry or service, end-uses for households or modes for transport.

The bottom-up savings provided by the MURE database originate from policy evaluation studies on a national level and National Energy Efficiency Plans (NEEAP) as well as Article 7 notifications published by each Member state. For the indicators in our framework we use, if suitable, both top-down and bottom-up energy savings, as they provide different but equally interesting perspectives.

Multiple Benefits of Energy Efficiency

Thank you for your attention

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