

Final Results of Energy Data Analysis Phase 2: Energy Efficiency Indicators Development

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Use of Energy Efficiency Indicators in Europe

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- ▶ **1. Introduction to EEI**
- 2. EU experience with EEI
- 3. Conclusions and lessons learnt

Why energy efficiency indicators?

Energy efficiency indicators are used to monitor trends in energy consumption and assess the impact of energy efficiency policies:

- at the level of a **country** or region, in total, by economic sector or by sub sector or end -use (top-down indicators);
- at the level of **participants to an EE program** (buildings, factories) (bottom-up indicators) ;

What are energy efficiency indicators?

- Energy efficiency indicators can range:
 - From simple **energy intensities** to GDP or Value Added (i.e. monetary indicators) (e.g. kWh or toe/\$) → top-down indicators.
 - To physical indicators of **specific consumption** (e.g. kWh/m² or toe/t) → both top-down and bottom-up indicators

- Energy efficiency indicators are based:
 - “**Top-down**” indicators” are calculated from **national statistics** on energy use and activity.
 - “**Bottom-up**” indicators are based on data collected at **a micro level** (i.e. at building or factory level), from energy consumption reporting or surveys

What can we learn from indicators?

- Simple indicators will describe trends in energy use,... and energy efficiency, if detailed enough;
- Indicators help understanding the energy consumption trends in an end-use, sub-sector or sector: they can show what is due to energy efficiency, to economic factors, to life styles, to fuel substitutions by comparing different types of indicators, for instance:
 - Comparing trend in energy use per household in final and useful energy will show the impact of **fuel substitutions**;
 - Comparing the industrial intensity with an intensity at constant structure will show the effect of **changes in the structure** in industrial activities;
 - Comparing trend in energy use per household and per m² will show the impact of change in dwelling size, and thus the effect of **life style**;

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ODYSSEE in Europe: the precursor for top-down energy efficiency indicators ⁷

- ODYSSEE indicators were introduced more than 20 years ago to monitor EE trends and cover now the 28 EU countries + Norway, with around 200 indicators by country of various complexity (<http://www.odyssee-mure.eu>);
- They are used by the EU Commission **to monitor the results achieved** in terms of **energy savings** (and now also on **energy consumption level**) and check if each EU country is on track compared to its targets.
- They are also used by national administrations for **monitoring their own EE targets**, usually with more detailed EEI, to understand which sectors or end-uses are responsible of possible deviation from the targets and identify corrective policy measures.
- They are also increasingly used by national administrations for **benchmarking** their own EE performance with the most advanced countries.
- Finally, they are used to **forecast the impact of EE policies** on energy demand with end-use models.

Monitoring of official targets in the field of energy efficiency: European Commission

- The **Energy Service Directive** (ESD) of 2006 has set a **target of 9% energy savings** in 2016 compared to the average consumption over 2001-2005 for each of the 28 EU member countries, with **reporting obligation on** energy savings achieved;
- For the calculation of energy savings, harmonised calculation using top-down and/or bottom-up methods are recommended; for top-down method, use of a set of 25 indicators to calculate energy savings, directly taken from ODYSSEE indicators; for the second reporting in June 2011, **~ ¾ of EU countries used Top-Down methods** (i.e. indicators) to report their energy savings.
- In 2012, a new directive called Energy Efficiency Directive (EED) imposed in addition submission of **national targets** of savings and consumption for 2020, plus an **annual reporting** of set of indicators*, plus a submission of National Energy Efficiency Action Plan (NEEAP) every 3 years with an **assessment of energy savings** up to 2020 with EEI.

*http://ec.europa.eu/energy/efficiency/eed/reporting_en.htm

Example of calculation of energy savings for ESD monitoring with top-down indicators: households

Energy savings compared to 2007

Indicator	End-use		2008	2009
P1	Space heating	ktoe	3776	5645
P2	Space cooling	ktoe	0	0
P3	Water heating	ktoe	286	480
P4	Electrical appliances			
	Refrigerators	ktoe	11	23
	Freezers	ktoe	7	14
	Washing machine	ktoe	0	0
	Dish washers	ktoe	0	0
	TV	ktoe	0	386
	Dryers	ktoe	0	4
P5	Lighting	ktoe	-18	1103
	Total 2 with preferred indicators	ktoe	4080	7654
		GWh	47447	89004

Energy Efficiency Directive (EED) : mandatory annual submission of indicators (Annex XIV)

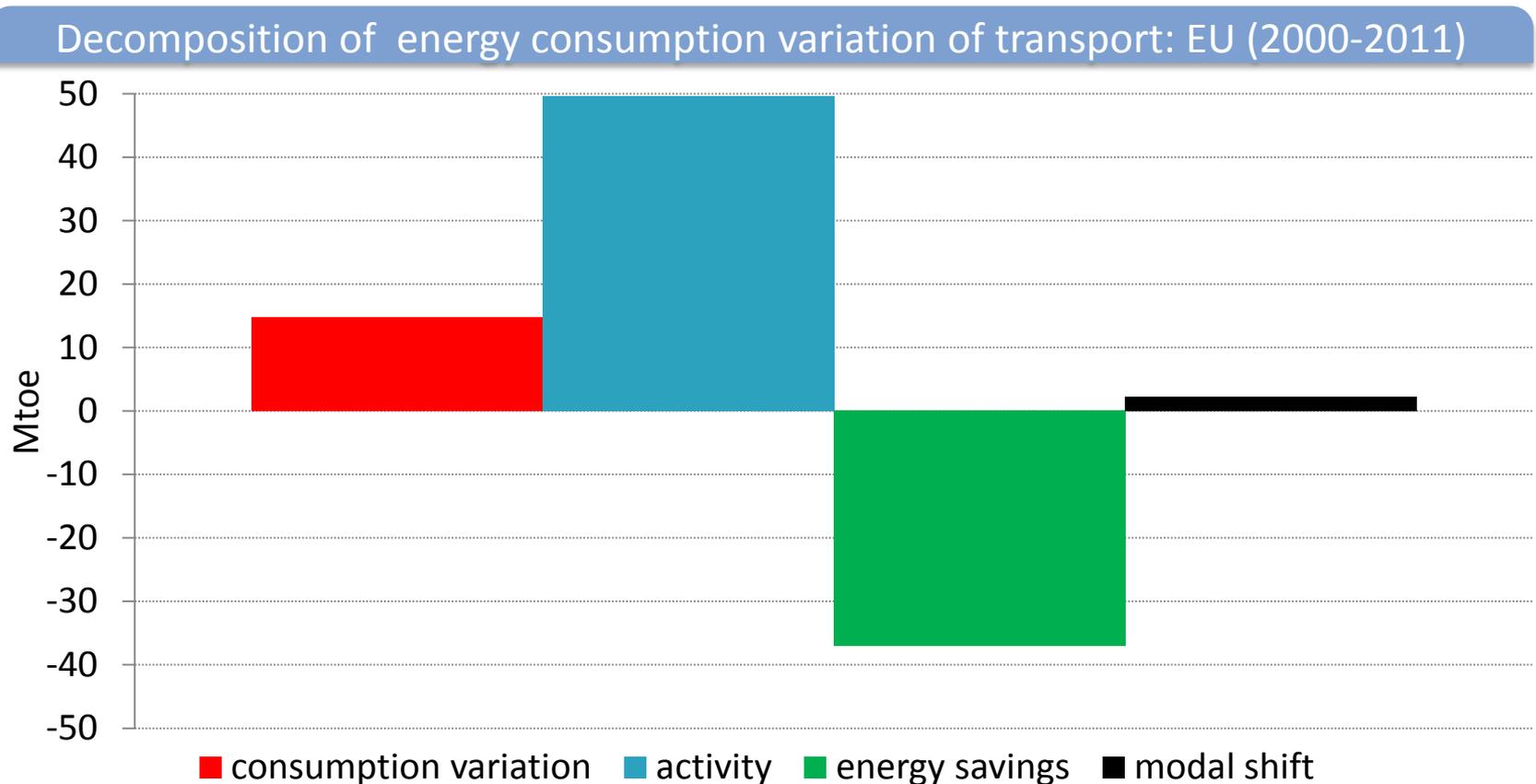
- (i) primary energy consumption;*
- (ii) total final energy consumption;*
- (iii) final energy consumption by sector :*
 - industry*
 - transport (split passenger and freight*
 - households*
 - services;*
- (iv) gross value added by sector*
 - industry*
 - services;*
- (v) disposable income of households;*
- (vi) gross domestic product (GDP);*
- (vii) electricity generation from thermal power generation;*
- (viii) electricity generation from combined heat and power;*
- (ix) heat generation from thermal power generation;*
- (x) heat generation from CHP;*
- (xi) fuel input for thermal power generation;*
- (xii) passenger kilometres (pkm), if available;*
- (xiii) tonne kilometres (tkm), if available;*
- (xiv) combined transport kilometres (pkm + tkm), in case (xii) and (xiii) are not available;*
- (xv) population.*

“In sectors where energy consumption remains stable or is growing, Member States shall analyse the reasons for it and attach their appraisal to the estimates” → decomposition of energy consumption drivers

Explanation of energy consumption variation: case of transport

▪ Energy consumption of transport increased by 15 Mtoe between 2000 and 2010: Increase in traffic of passenger and goods contributed to raise consumption by 50 Mtoe. Energy savings have offset part of the impact of traffic increase, by decreasing consumption by 37 Mtoe.

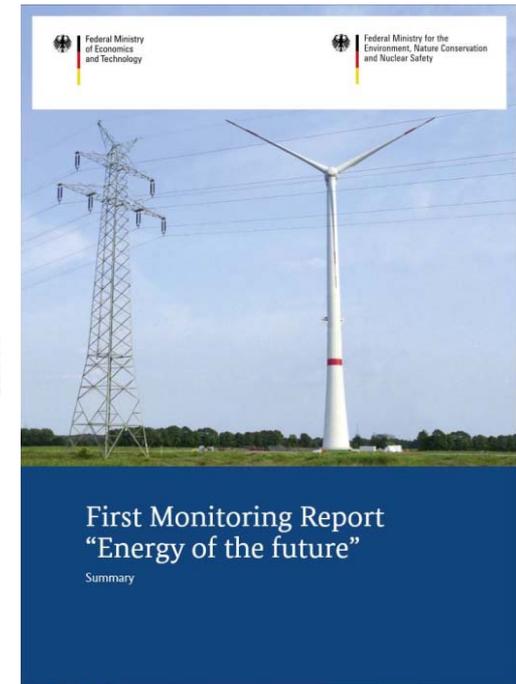
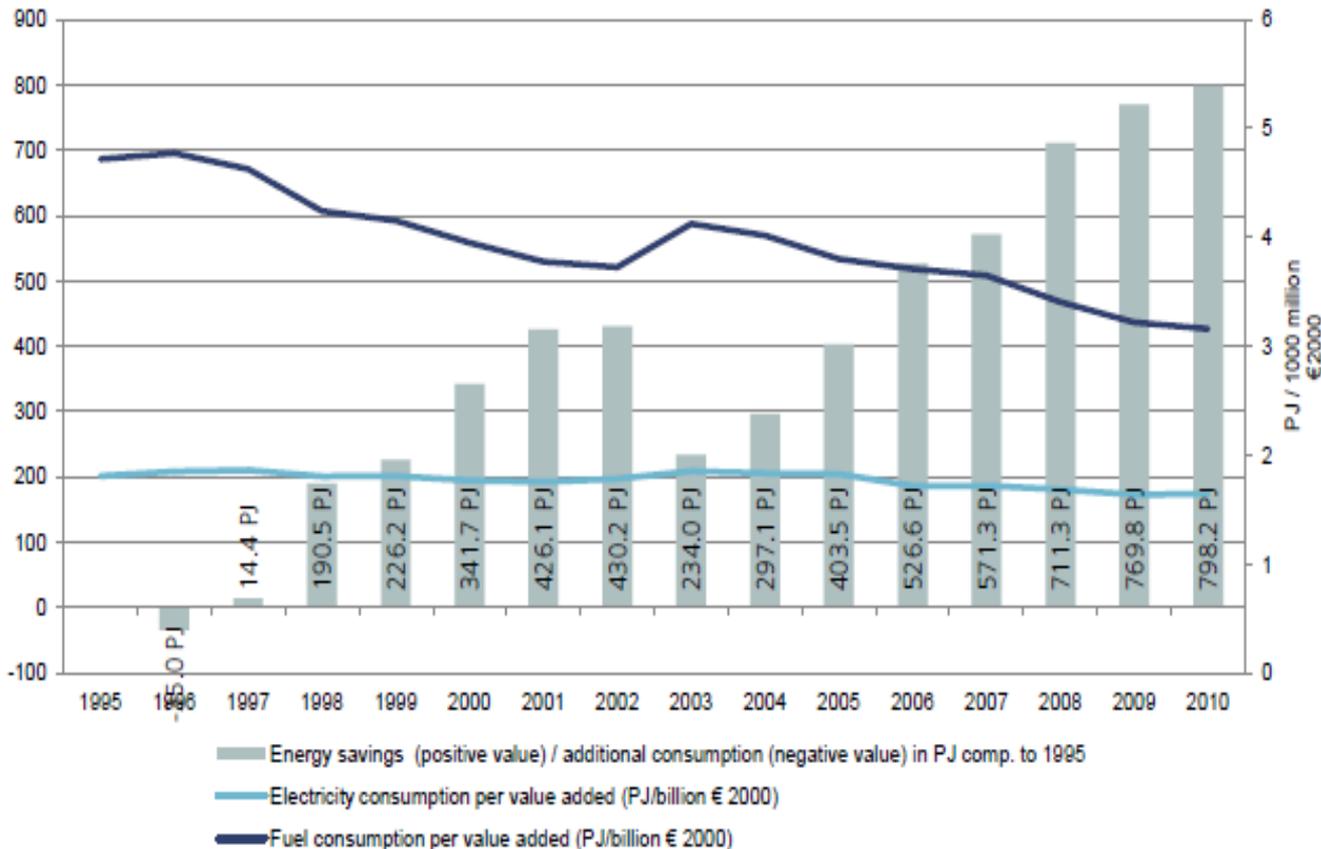
The decreasing share of public transport (modal shift) increased consumption by 2 Mtoe.



Monitoring of national official targets in the field of energy efficiency: case of Germany

- Monitoring of Energy transition targets (“Energiewende”) through a set of 49 Indicators monitored by independent members of Expert Commission, among which several EEI

Energy savings and energy intensities in industry in Germany



Benchmarking energy efficiency performance with EEI: case of France

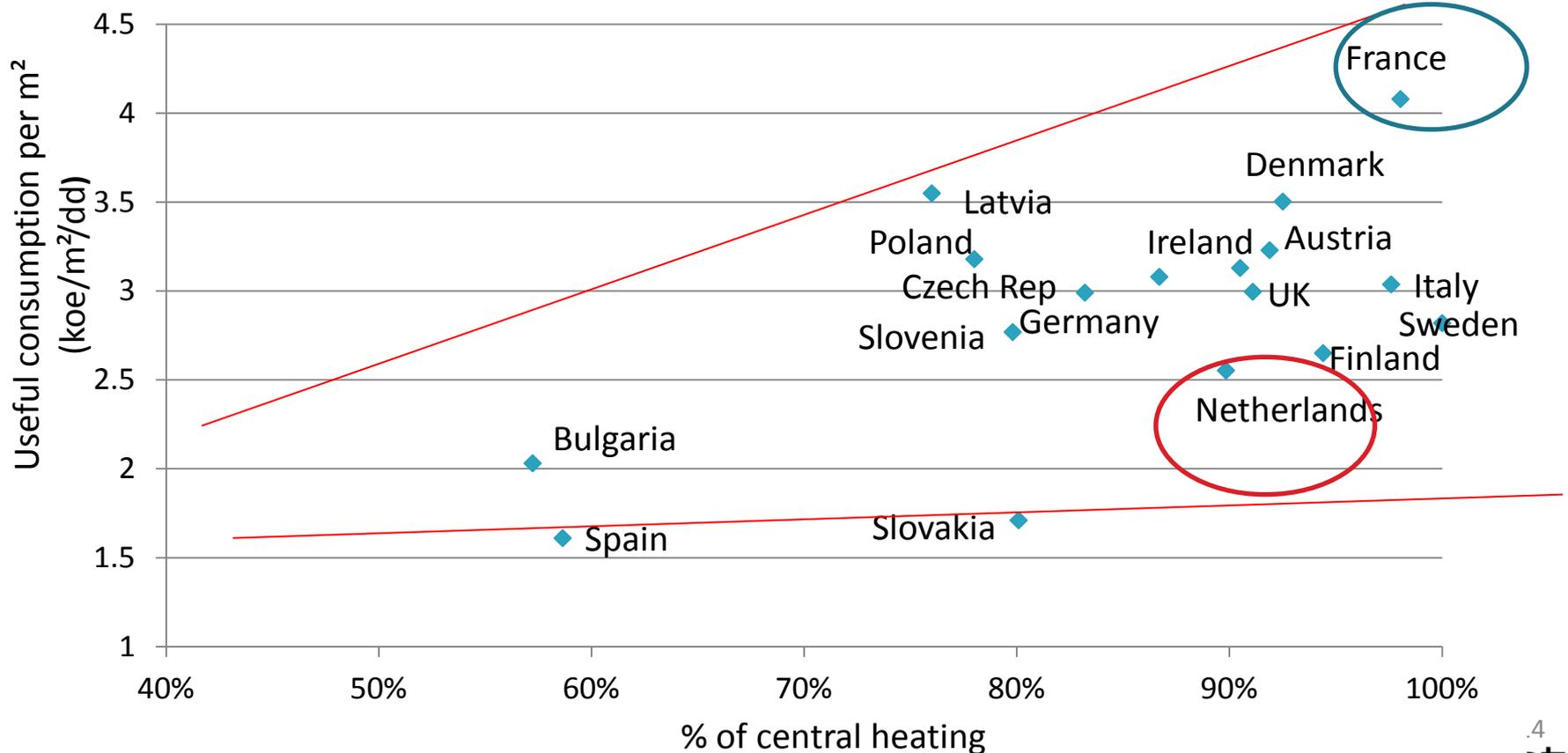
- Indicators can serve to make a diagnosis as to the energy efficiency performance of countries compared to best practices → very important for EE policy makers as it shows what **potential** exist and what **measures** could be taken .
- For that purpose, **comparable indicators** are needed, i.e. indicators that are cleaned from factors not linked to efficiency (“benchmark indicators “)
- ADEME, the French national energy efficiency agency extensively uses ODYSSEE indicator to benchmark France with European best practices for its internal strategy and for designing new policy measures. It has already worked extensively on:
 - .Household space heating*
 - Household electrical appliances*

*See reports at <http://www.odyssee-mure.eu/publications/other/>

Benchmarking energy efficiency performance for space heating: case of France

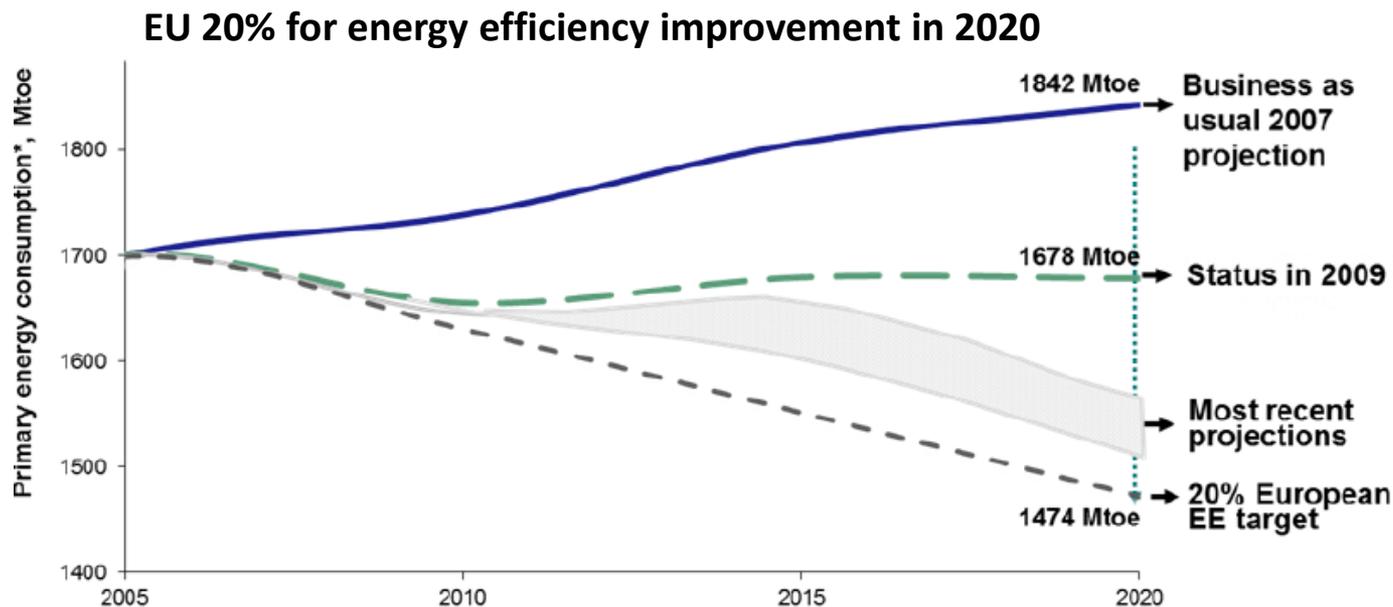
The indicator below, that is cleaned from differences in dwelling size, climate and fuel mix, shows that households in France consume on average 60% more than in The Netherlands for space heating? Why?

Specific consumption per m² and degree-days (dd) for household space heating (useful energy)



Energy efficiency indicators are also a tool to assess the impact of EE policies and the energy savings potential

- End-use models (e.g. MEDEE, MAED, LEAP, MURE, INVERT...), using energy efficiency indicators as key data are used to assess the **impact of EE policies** and/or evaluate the **long term potential** for energy efficiency improvement



Forecast of the impact of energy saving by measure (case of Ireland for NEEAP 3)

	2020
Alternative Measures	
SME programme	27
Large Industry Energy Network	123
2008 Building Regulations	183
2011 Building Regulations	91
2016 Building Regulations	43
EE boiler regulation for replacement boilers	100
Smart Meters	63
Accelerated Capital Allowances (ACA) Public and Private	113
VRT/Motor tax	30
Home Renovation Tax Incentive	TBC
CO2 tax	TBC
Supplier obligation target	550
Total per annum savings	1323

1. EU experience with indicators
- ▶ **2. Conclusions and lessons learnt**

Conclusion from the European experience: need of data

- Policy makers need detailed data and indicators to monitor the impact of their actions, to prepare new policy measures and to assess long-term energy savings potentials
- Data needed are not just merely the usual energy statistics from the energy balance but more detailed data by end-use
- Strategies have to be defined to collect such data ... in a permanent way:
 - by combining detailed surveys every 2 to 3 years with modelling or lighter surveys in between the survey years
 - by imposing reporting requirements to utilities, equipment manufacturers , utilities → exchange of international experience is very useful in that matter.

Conclusion on the European experience: indicators and policies

- Greater use of indicators by policy makers increases the **quality** and **quantity** of data and indicators ;
- Indicators need to be permanently **adapted** to meet policy requirements
➔ regular need of new indicators;
- Indicators should be **easy to understand** by policy makers...
 - This does not mean that they should be too simple
 - Good communication is important

Conclusion on the European experience: communication : new indicators facilities in ODYSSEE

ODYSSEE is developing 5 “indicator facilities” to increase communication and better answer policy needs (<http://www.odyssee-mure.eu/data-tools>)

The screenshot displays the ODYSSEE-MURE website interface. At the top right, there are social media icons for Google+ (8+1) and a 'Partners' link with a person icon. The main navigation menu includes 'Overview', 'Data Tools', 'Publications', 'News', and 'Contact'. A green downward-pointing triangle is positioned below 'Data Tools'. The main content area is divided into several sections: a left sidebar with the 'Odyssee' logo and a globe icon, and a central text block explaining that indicators are accessible through various data tools, including a full database, key indicators, and five specific facilities: market diffusion, decomposition, benchmarking, energy saving, and an indicator scoreboard. The 'Access to the data base is restricted, whereas all other data tools are in public access.' Below this, a row of five colored boxes represents the specific facilities: 'MARKET DIFFUSION' (pink), 'DECOMPOSITION' (teal), 'BENCHMARKING' (blue), 'ENERGY SAVING' (orange), and 'ENERGY EFFICIENCY INDICATOR SCOREBOARD' (purple). The last three boxes (Benchmarking, Energy Saving, and Energy Efficiency Indicator Scoreboard) include the text 'Coming Soon ...' and gear icons. To the right of these boxes are two larger blue boxes: 'ODYSSEE DATABASE' with a globe icon and 'KEY INDICATORS' with a speedometer icon.

ODYSSEE-MURE

Overview Data Tools Publications News Contact

Odyssee

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.

MARKET DIFFUSION

DECOMPOSITION

BENCHMARKING

ENERGY SAVING

ENERGY EFFICIENCY INDICATOR SCOREBOARD

Coming Soon ...

Coming Soon ...

Coming Soon ...

ODYSSEE DATABASE

KEY INDICATORS

Conclusion on the European experience: what did we gain from the regional cooperation?

- What did we gain from the regional cooperation?
 - Increase the availability of data: each country learning from the others experience;
 - Harmonisation of data for a large number of countries and thus increase the quality of benchmark
 - Allow the adoption of international standard (CEN/ISO)*
 - Enrich methodologies by adapting and transferring the experience of the most advanced countries (climatic correction , agriculture etc.).

- ODYSSEE a model for other regions?
 - ODYSSEE experience has already been transferred and adapted in:
 - 4 North African countries with MEDENER (Algeria, Lebanon, Morocco and Tunisia)
 - 20 Latin American countries with UN/ECLAC (BIEE project)
 - A similar project for ASEAN to enable benchmarking of Thailand ?

*A European standard on energy savings has been adopted by the European Standardisation Organization (CEN) relying on the experience with ODYSSEE indicators for top-down calculation; extension at world level with an ISO standard under consultation process.

Conclusion from the European experience : need of a good dissemination

Dissemination of results is important through :

- **National seminars** to present the results to a wide audience, as is done today, so as to show how data are used ;
- A **dissemination of the data base** to various institutions providing data through a dedicated and **user friendly web interface**, linked to the Excel data file, as this has been done in several countries;
- A **publication of indicators** with national statistics, as planned by DEDE

Thank you

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<http://www.enerdata.fr>

<http://www.odyssee-indicators.org>

<http://www.wec-indicators.enerdata.eu>

Conclusion on the European experience: communication : new indicators facilities in ODYSSEE

ODYSSEE is developing six “indicator facilities” to increase communication and better answer policy needs (<http://www.odyssee-mure.eu/data-tools>)

1. A “**decomposition facility**” to display in an interactive way the different factors behind changes in energy consumption (e.g. economic growth, lifestyle changes, energy savings, model shift).
2. A “**short term indicators facility**” to enable the update of energy savings to year n-1.
3. A “**market diffusion facility**” to show the most recent trends in the market share of energy efficiency and renewables technologies and practices .
4. A “**benchmarking facility**” to enable any country to compare easily its energy performance with the country of its choice by adjusting different factors to the situation of its own country.
5. An “ **energy saving facility** “, compiling top-down energy savings, energy savings potential and energy saving targets.
6. An energy efficiency indicator “ **scoreboard facility**”, to map out the energy efficiency position of each country, globally and by sector.