Tour of the database

Jane Rusbjerg
Training seminar - 28 May 2018
Topics

Presentation of website

ODYSSEE – an indicator or two
PROJECT OVERVIEW

The Odyssey-Mure project is co-ordinated by ADEME with the technical support of CEA, H2020 programme of the European Commission and is part of the activity of the Odyssee Platform. It is supported by Energiebaunhofer, ISINNOVA and ECN. The project relies on two complementary internet databases, that are regularly updated by the Eurostat subscribers. Mure, managed by ISINNOVA, that contains a description, with their impact evaluation whenever available, of all energy efficiency measures implemented at EU or national level.

ODYSSEE AND MURE DATABASES

The project relies on two complementary internet databases, that are regularly updated by the Eurostat subscribers:

- **Mure**: managed by ISINNOVA, that contains a description, with their impact evaluation whenever available, of all energy efficiency measures implemented at EU or national level.
- **Odyssee**: managed by Enredata, that contains detailed energy efficiency and CO2 emissions.

Projects' Reports:

- National reports (once to twice a year):
  - Project objectives
  - Measurement methodology
  - Energy consumption, their drivers (activity indicators) and their related activity measures

PROJECT OBJECTIVES

The general objective of the project is to provide a comprehensive monitoring of energy consumption and efficiency trends as well as an evaluation of energy efficiency policy measures by sector for EU countries and Norway:

- Evaluate and compare energy efficiency progress by sector, and relate this progress to the observed trends in energy consumption.
- Contribute to the evaluation of national energy efficiency policy measures and analyse the dynamics of implementation over the NEAAPs.

To provide results in an interactive and attractive way to decision makers and actors involved in energy efficiency, the project has developed specific data and policy tools. The originality of the project is to cover all sectors and end-uses with an homogeneous and harmonised approach and to provide an overall picture of the trends and measures by sector.

PARTNERS

News: In 2017, three new partners from Belgium (Ministry of Economy and Energy), Serbia (Institute Nikola Tesla Belgrade) and Switzerland (University of Geneva, University of Zurich of Applied Science) have joined the project.

A network of 37 partners from 31 countries participate to the Odyssey-Mure project, usually national Efficiency Agencies or their representatives within the European network of energy efficiency agencies (EnE):

- **Austria**
- **Belgium**
- **Belgium**
- **Bulgaria**
In the framework of Odyssee-Mure, Enerdata with support from Fraunhofer ISI will coordinate 10 webinars mainly targeted at public authorities (at national, regional or local level). Webinar hosted by Leonardo will be scheduled every 2 months from November 2016, and will be based on the Odyssee-Mure policy briefs on energy efficiency.

Webinars are grouping by sector:

- 4 webinars on industry (November 2016 to May 2017)
- 3 webinars on cross cutting (July 2017 to December 2017)
- 3 webinars on buildings (January 2018 to June 2018)

For each sector, one webinar will be dedicated to present energy efficiency trends while the others will present best practices in energy efficiency policy.

**LAST WEBINARS**

**1 MARCH 2018**

**Multi-level governance: linking up local, regional and national levels for delivering integrated sustainable energy action planning and projects**

This webinar provided an overview on the practice, that goes by the name of Multi-Level Governance (MLG), firstly defining and framing the concept of governance and then showing how the MLG scope and mechanism vary according to the leading governance style.

**Speakers:** Stefano Faberini (ISINNOVA)

**Recording:** [View the webinar recording online.](#)

**Presentation:** [Download the presentation as PDF](#).

The webinar is based on a Odyssee-Mure brief published in February 2018: Multi-level governance: linking up local, regional and national levels to deliver integrated sustainable energy action plans and projects.

**1 DECEMBER 2017**

**Impact of the economic crisis on the EU’s industrial energy consumption**

This webinar presented the impact of the economic crisis on the EU’s industrial energy consumption and addressed the following key questions:

- To what extent is the decrease in the EU’s industrial energy consumption after the economic crisis due to energy efficiency improvements?
- What has been the impact of changes in production level of industrial branches?

**Speakers:** Francis Altendorf (Econotec)

**Recording:** [View the webinar recording online.](#)

**Presentation:** [Download the presentation as PDF](#).

The webinar is based on a Odyssee-Mure brief published in April 2017: Impact of the economic crisis on the EU’s industrial energy consumption.

**7 SEPTEMBER 2017**

**How are Member States implementing Articles 7 and 8 of the Energy Efficiency Directive?**

This webinar provided an overview of the requirements of two important articles of the EED, and their implementation by Member States – Article 7 on energy efficiency obligation schemes, and Article 8 on energy audits and energy management systems.

**Speakers:** Anna-Lisa Kasar (Ricardo Energy & Environment) and Rebecca Turner (Ricardo Energy & Environment)

**Recording:** [View the webinar recording online.](#)
Odyssee

Database on energy efficiency indicators and energy consumption by end-use and their underlying drivers in industry, transport and buildings.
Some selected indicators
- how to calculate

Decomposition
Facility displays the various factors behind changes in energy consumption.

ODEX – energy efficiency index
Combination of the different assessments of energy efficiency progress by end-use to get one trend for the whole sector.
Since 2007 the reduction of activity (-30 Mtoe) is the main driver of the decrease of consumption (-50 Mtoe);

- Energy savings had a much lower impact since 2007 (3.4 Mtoe/yr compared to 7.6 Mtoe/yr over 2000-2007).
- Structural effects had a low impact on the consumption variation.

---

**Energy savings:** technical savings; based on specific consumption per unit of production (in physical terms or production index)

**Other:** “negative” savings due to inefficient operations

---

Variation of industry consumption: 2000-2007

Activity: 2007-2015

Structure

Energy savings

Other
Decomposition - industry

Industrial energy consumption is changing under the influence of various factors:

- Change in total industrial activity, measured with the production index (IPI) (“activity effect”);
- Structural changes, i.e. the fact that the production* of individual branches with different specific consumption are not growing at the same rate (e.g. if production of machinery is growing much faster cement production, this will decrease the overall consumption of industry, all things being equal, as machinery less energy intensive);
- Technical energy savings (i.e. change in the branches’ specific energy consumption) (calculated from ODEX);
- Other effects: mainly "negative" savings due to inefficient operations in industry.

*Production measured in physical units or with IPI
Example of decomposition, calculation

<table>
<thead>
<tr>
<th>Year</th>
<th>Energy consumption (Mtoe) E</th>
<th>Production (Mt) Q</th>
<th>Specific consumption (Mtoe/Mt) E/Q</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>0.85</td>
<td>10</td>
<td>0.085</td>
</tr>
<tr>
<td>2016</td>
<td>1.2</td>
<td>15</td>
<td>0.080</td>
</tr>
</tbody>
</table>

Consumption variation between 2000 and 2016 = 1.2 – 0.85 = 0.35 Mtoe

- **Quantity effect** = Variation of energy consumption due to the increase in production of cement between reference year (2000) and year t (2016): \((Q[i,t] - Q[i,0]) \times (E[i,0]/Q[i,0]) = (15-10) \times 0.085 = 0.425\) Mtoe

- **Unit consumption effect** = variation of consumption due to variation in unit consumption \((E[i]/Q[i]) = Q[i,t] \times (E[i,t]/Q[i,t] - E[i,0]/Q[i,0]) = 15 \times (0.085-0.080) = -0.075\) Mtoe = energy savings

Consumption variation = quantity + unit consumption effect = 0.425 – 0.075 = 0.35
A glance in the databases

DECOMPOSITION TOOL

Country:  
Select:  

Sector:  
Select:  

Unit:  
Mtoe  

Period:  2000 - 2015  

Graph:  Waterfall  

Methodology

The objective of this tool is to explain the variation of the energy consumption over a given period through a decomposition into various explanatory effects, among which the most important ones are the economic activity and energy savings. The other effects depend on the sector (e.g., lifestyle changes, structural changes).

The user has first to select the country and the sector for which the consumption is decomposed:
- Primary, i.e., gross domestic consumption with or without non-energy uses:
- Final, i.e., total final energy consumption (without non-energy uses);
- Power
- Industry
- Transport
- Households
- Services
- Agriculture

For some sectors, a sub-sector can be selected (e.g., heating for households, cars for transport).

Several options are offered:
- Change the period of the decomposition.
- Change the unit in which the energy consumption variation is measured;
- Change the type of graph to visualize the decomposition (waterfall or histogram);
- Make the decomposition at normal climate.
**DECOMPOSITION TOOL**

**VARIATION HOUSEHOLDS CONSUMPTION - DENMARK - MTOE (2000-2015)**

Source: ODYSSEE

The variation of the households energy consumption between two dates is influenced by:

- Climatic difference between these two dates ("climatic effect");
- Change in number of occupied dwelling ("more dwellings");
- "More appliances per dwelling" (electrical appliances, central heating);
- Change in floor area of dwelling for space heating ("larger homes");
- Energy savings, as measured from CDEH;
- Other effects (mainly change in heating behaviors).

Energy savings correspond to technical savings, i.e. to gross savings corrected of negative savings due to inefficient operation of facilities or behaviors.
Decomposition, households

Energy consumption of households between two years, $t$ and $t_0$ is changing under the influence of various factors:

- **Climatic effect** (due to climatic difference between years $t$ and $t_0$);
- Change in number of occupied dwelling ("more dwellings effect");
- Evolution of lifestyles:
  - Average floor area of dwelling for space heating ("larger homes");
  - More appliances (electrical appliances, central heating);
- **Technical energy savings** (calculated from ODEX);
- Change in heating behaviors.
ODEX – Odyssee energy efficiency index

- In ODYSSEE, an energy efficiency index is calculated at sector level (i.e. industry, transport, households) and for all final consumers to assess energy efficiency progress.

- The energy efficiency index by sector combines the trends observed in the various indicators of specific energy consumption by sub-sector or end-use, by weighting indices of specific consumption by sub-sector (or end-use) with the share of each sub-sector in the sector’s energy consumption.

- Indices are used to enable to express specific consumption by sub-sector or end-use in different physical units so as to be as close as possible to energy efficiency evaluation (e.g. toe/ton, toe/IPI for industry, toe per pkm or tkm in transport, toe/m² or kWh/appliance for households).
Calculation of energy efficiency index in 3 steps

1. Calculation of energy efficiency indicators by sub-sector from energy consumption and activity data by sub-sector and conversion in indices;

2. Calculation of weighting factors by sub-sector, i.e. shares of sub-sector’s consumption in total consumption of the sector;

3. Calculation of the energy efficiency index for the sector as a whole.
Principle of calculation of energy efficiency index*

1. **Specific consumption (Index by sub-sector)**

<table>
<thead>
<tr>
<th></th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemicals (toe/100) (index)</td>
<td>8.5 (100)</td>
<td>8.3 (98)</td>
<td>8.2 (96)</td>
<td>8.2 (96)</td>
</tr>
<tr>
<td>Steel (toe/tonne) (index)</td>
<td>0.30 (100)</td>
<td>0.29 (97)</td>
<td>0.26 (87)</td>
<td>0.25 (83)</td>
</tr>
</tbody>
</table>

2. **Energy consumption (Weight)**

<table>
<thead>
<tr>
<th></th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemicals (Mtoe) (%)</td>
<td>20 (50)</td>
<td>20 (48)</td>
<td>20 (44)</td>
<td>22 (46)</td>
</tr>
<tr>
<td>Steel (Mtoe) (%)</td>
<td>20 (50)</td>
<td>22 (52)</td>
<td>25 (56)</td>
<td>26 (54)</td>
</tr>
</tbody>
</table>

3. **Sector index**

<table>
<thead>
<tr>
<th></th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>100</td>
<td>97.4</td>
<td>90.9</td>
<td>88.6</td>
</tr>
</tbody>
</table>

IE\(_{2011}\) = IE\(_{2010}\) x (98/100 x 0.48 + 97/100 x 0.52) = 97.4

IE\(_{2012}\) = IE\(_{2011}\) x (96/98 x 0.44 + 87/97 x 0.56) = 90.9

IE\(_{2013}\) = IE\(_{2012}\) x (96/96 x 0.46 + 83/87 x 0.54) = 88.6  ➔ Energy efficiency improvement of 11.4% between 2010 and 2013 (=100-88.6)

*Fictive example considering only 2 branches of industry*
Thank you for your attention!

Any questions?

Contact information
Jane Rusbjerg: jru@ens.dk