The ODYSSEE-MURE Tool on Multiple Benefits of Energy Efficiency

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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
<table>
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<th>Category</th>
<th>Sub-category</th>
<th>Indicator</th>
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<tr>
<td>Energy and Resource Management</td>
<td>Energy savings</td>
<td>Annual energy savings</td>
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<tr>
<td><strong>Environmental</strong></td>
<td>Saving of fossil fuels</td>
<td>Saving on fossil fuels; extension of range of fossil fuels</td>
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<tr>
<td><strong>Environmental</strong></td>
<td>Impacts on RES targets</td>
<td>Lowering of RES target; replacement of RES capacity; reduced need for interconnectors</td>
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<td>Local air pollution</td>
<td>Emission factors for avoided local pollutants (incl. electricity)</td>
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<td>Social</td>
<td>Alleviation of energy poverty</td>
<td>Impact of savings on energy cost shares in household income</td>
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<td>Living comfort</td>
<td>Health and well-being</td>
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<td><strong>Social</strong></td>
<td>Disposable household income</td>
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<td>Innovation and Competitiveness</td>
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<td><strong>Economic</strong></td>
<td>Competitiveness</td>
<td>Indicators on foreign trade with EE products</td>
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<td><strong>Economic</strong></td>
<td>Turnover of energy efficiency goods</td>
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<td>Economy (Macro)</td>
<td>Impact on GDP</td>
<td>Impact of energy savings on GDP growth</td>
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<td>Economic</td>
<td>Employment effects</td>
<td>Input-Output (I/O) analysis</td>
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<td>Economy (Micro)</td>
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<td><strong>Economic</strong></td>
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<td>Valuation of buildings and companies for different end-uses according to energy efficiency benefits</td>
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<td>Energy Security and Energy Delivery</td>
<td>Energy security (A)</td>
<td>Import dependency (conversion to primary energy necessary)</td>
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<td><strong>Economic</strong></td>
<td>Energy security (B)</td>
<td>Impact on supplier diversity (Herfindahl-Hirschman-Index)</td>
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<td><strong>Economic</strong></td>
<td>Impact on integration of renewables</td>
<td>Demand-response potentials by country</td>
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</table>
First results for selected indicators

**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
Results for selected indicators

_Economy (Macro): (Gross) Employment effects of energy efficiency_

- Based on input-output tables provided by eurostat
- 19 EU countries at the moment
Results for selected indicators

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

Based on Top-down savings:

Impacts on employment in Germany

<table>
<thead>
<tr>
<th>Sector</th>
<th>Fulltime Equivalents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturing</td>
<td>80284</td>
</tr>
<tr>
<td>Construction</td>
<td>62419</td>
</tr>
<tr>
<td>Trade, transport, others</td>
<td>13126</td>
</tr>
<tr>
<td>Energy</td>
<td>-1500</td>
</tr>
<tr>
<td>Total</td>
<td>154330</td>
</tr>
</tbody>
</table>

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Results for selected indicators

Economic: Economy (Macro): (Gross) Employment effects of energy efficiency
Based on bottom-up savings

KfW Energieeffizient Sanieren: impacts on employment in Germany

- Manufacturing: 9061
- Construction: 36243
- Trade, transport, others: 5342
- Energy: -1476
- Finish: 49170

Fulltime equivalents
Tackling of multiple benefits in other H2020 project: the COMBI project

Project background & objectives
Quantification of multiple impacts of EE

- Quantification & monetization of multiple impacts
- By EU member state & 21 EEI actions
- Common framework scenarios: based on 21 energy efficiency improvement (EEI) actions
- Extended Cost-Benefit analysis

Ex-ante view on MBs
Modelling approach
Launch of the COMBI MB tool at the COMBI final conference on 17 May in Brussels

<table>
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<th>Resources</th>
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<tbody>
<tr>
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<td>health</td>
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<td>Fossil fuel/ETS prices</td>
<td>energy security</td>
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<tr>
<td></td>
<td>unused extraction</td>
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<td>Terms of Trade</td>
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</table>

Coordinated by Wuppertal Institut

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Tackling of multiple benefits in other H2020 project: the M-Benefits project

M-BENEFITS- Valuing and Communicating Multiple Benefits of Energy-Efficiency Measures

Aim:
Development of methods and tools to include multiple benefits in energy-efficiency investment decision of companies

Additional contribution of the project (start: March 2018)
- View of an investor in a private or public company
- Additional company-specific multiple benefits are considered (e.g. improved product quality, greater flexibility, reduced production time and losses, reduced risks)

The MB tool of ODYSSEE-MURE and M-Benefits will be presented at the COMBI final conference on 17 May in Brussels
Web facility on MB:EE

Live demo in Browser

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

Back up
Multiple Benefits of Energy Efficiency

- Social
- Environmental
- Economic
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

- Social
- Environmental
- Economic
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

- Social
  - Living comfort
  - Industrial productivity
  - Asset value

- Economic
  - Economy (Micro)
  - Economy (Macro)
  - Employment effects
  - Impact on energy prices
  - Impact on GDP
  - Innovation & Competitiveness
  - Innovation impacts
  - Turnover of energy efficiency goods

- Environmental
  - Energy & Resource Management
  - Global & Local Pollutants
  - Saving of fossil fuels
  - GHG savings
  - Local air pollution
  - Energy security & Energy Delivery
  - Energy security
  - Energy security
  - Impact on integration of renewables
  - Competitiveness
  - Competitiveness

- Economic
  - Public budgets

- Environmental
  - Disposable household income
  - Alleviation of energy poverty
  - Energy poverty

- Economic
  - Multiple Benefits of Energy Efficiency