

Regional training of *ODYSSEE-MURE* *Understanding energy efficiency indicators*

1-Introduction : Needs of Stakeholders for Energy Efficiency Indicators

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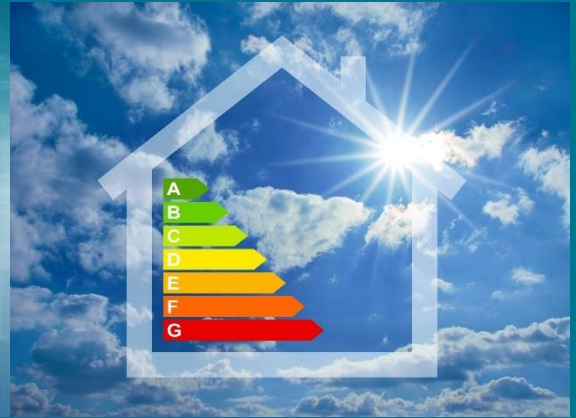
1. What are energy efficiency indicators?
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ODYSSEE DATABASE



KEY INDICATORS





What are Energy Efficiency Indicators ?

Energy efficiency indicators to monitor and measure energy savings?

- Energy efficiency indicators are used to assess the progress in energy efficiency and to measure energy savings.
- The most common indicators are rather simple and relate the energy consumption to an indicator of economic activity (or consumption unit) measured in **physical values** (tons, employee, m²) → **specific or unit consumption**.
- They can also be completed with indicators of market penetration of energy saving technology or practice, that can be converted in energy unit.
- At an aggregate level they are also related to indicators of activity measured in monetary values (GDP, Value Added → indicators of **energy intensities** (e.g. kWh/€, toe/€))

Examples of simple sectoral energy efficiency indicators

Types of indicator	Examples
Specific/ unit energy consumption	litre/100km, household electrical appliance (kWh/year), consumption per m ² or employee in services, heating consumption per m ² or household (eg kWh/m ² or /employee or household)
Market penetration of energy saving technology or practice	Share of public transport for passengers, of rail/water for goods, of solar water heaters, of cogeneration, of LED etc...

Why so many EE indicators are needed?

For a given sector or end-use several indicators can be considered, for different reasons:

- Energy efficiency has different meaning and frontiers (economic versus technical efficiency).
- EE P&Ms are designed and implemented at the level of end-use and equipment (e.g. labels or standards on heating, lighting), or branch (e.g. voluntary agreements, audits). Therefore the monitoring of each P&M requires **detailed indicators** (eg kWh/m² for new buildings with building codes; kWh per refrigerators for labels/standards; gCO₂ or toe per km for Bonus-malus).
- Interpretation of indicators is **more powerful when combined**; for instance comparing trend in energy use per household and per m² will show the impact of change in dwelling size.
- Alternative indicators are often necessary to cope with possible data gaps.

Top-down vs bottom-up energy efficiency indicators?

- These energy efficiency indicators can be defined at two levels:
 - **Individual consumers:** building or factory level ("micro level") (e.g. from reporting of designated consumers, surveys or audits); they are usually referred to as "bottom-up" indicators (BU); such indicators are usually used to assess the impact of a specific energy efficiency programme.
 - **National (or regional) level** based on statistics of energy use and activity by sector, sub-sector or end-use representative of the country or region ; in that case, they are referred to "top-down" (TD) indicators.
- Both types of indicators are expressed in the same unit (for instance kWh/m² for buildings) but their **scope and interpretation** differ: TD indicators measure **total** energy efficiency improvement whereas BU indicators try to assess the improvement or savings coming from **policy measures**

Top-down vs bottom-up energy efficiency assessment: example of Solar Water Heaters

- **Top down:** assess total energy savings from solar water heaters.
 - Savings = **total area** of solar water heaters (SHW) **installed in the country** * average saving per m²
 - Total area of SWH based on national statistics of annual sales and cumulated over the period
 - Average saving per m² based on solar radiation and hours of use of SWH (heat supplied by SHW)
- **Bottom-up:** assess the savings linked to a specific policy program (e.g. subsidies):
 - Savings = total area of **subsidized** solar water heaters installed in the country benefiting from the subsidy * average saving per m²
 - Average saving per m² : same as for top down

From simple TD indicators to advanced indicators

- Usual TD indicators are useful to describe trends, but cannot **explain** the observed trends.
- For instance the energy consumption per household shows how the overall energy efficiency of households is changing but a **decrease does not necessarily mean** that energy efficiency is improving from a technical viewpoint.
- To enrich the interpretation and better monitor energy efficiency trends, more complex indicators are needed (“**advanced indicators**”).
- These indicators **do not need additional data**: they just use the same data as the usual indicators but include additional calculations.

Six types of advanced energy efficiency indicators

1. **Energy efficiency index** to measure EE improvements at sector level.
2. **Energy savings** to quantify the amount of energy saved over a period or for given year .
3. **Financial indicators** to show the financial benefit of energy savings for households.
4. **Benchmarking indicators** to assess how each country performs compared to other countries?
5. **Decomposition of energy consumption variation** to show how energy efficiency improvements have impacted the energy consumption of the country?
6. **Avoided CO2 emissions** to show what is the effect of energy efficiency improvement on CO2 emissions.





Workshop agenda

Content of training on indicators

- How to analyse and benchmark energy efficiency trends by sub-sector?
 - What are the best indicators to use?
 - What data are required and what are the usual sources?
 - How to interpret their trends?
- How to analyse and benchmark energy efficiency trends and performance by sector?
 - Introduction to energy efficiency index or ODEX
 - How to calculate ODEX ?
 - How to calculate energy savings ?
 - Benchmarking and scoreboard tools
- How to show the contribution of different factors in the variation of energy consumption (decomposition tool)?
- How to compare countries: benchmarking and scoreboard tools