

Evaluation and Monitoring for the EU Directive
on Energy End-Use Efficiency and Energy Services

Principles of Energy Savings Calculation in the Bottom-up Methodology

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Brussels, 15 October 2008

evaluate
energy savings^{EU}

coordinated by



Wuppertal Institute
for Climate, Environment
and Energy

supported by

Intelligent Energy  Europe

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Harmonisation Bottom-up

- Using countries own monitoring system
- Common principles of
 - Bottom-up calculation: 4 steps
 - Documentation
- Cost efficiency and continue improvements: 3 Levels of efforts related to data and methods

4 Steps in Bottom-up calculation

- Step 1: Unitary gross annual energy savings
 - Baseline
 - Normalisation factors
- Step 2: Total gross annual energy savings
- Step 3: Total ESD annual energy savings
 - Double counting
 - Multiplier effect
- Step 4: Total energy savings ESD period
 - Energy Savings Lifetime

Documentation Bottom up

- Documentation on unitary gross savings
 - Equations
 - Baseline
 - Normalisation factors
 - Default and country specific values (including energy savings lifetime)
- Documentation on total ESD savings including handling double counting
- Country specific reports on selected topics

3 Levels of efforts

Level 1: Minimum efforts

- Starting level
- Only few national data are available
- Simple equations
- Conservativeness in EU default values

Level 2: Moderate efforts

- Level for most Energy Efficiency Improvement Actions
- Country specific data: up-to-date surveys, samples, registries, (statistics)
- Additional parameters in equations
- Documentation for a minimum set of information and justifications

Level 3: Enhanced efforts

- Level for EEI actions that have country specific additional energy savings impact
- More additional parameters or country specific values
- Data and justifications in detail
- Standard report for documentation is available

Bottom-up Calculations, Step 1

- 1.1 Formula for unitary gross annual energy savings
- 1.2 Baseline issues
- 1.3 Normalisation factors
- 1.4 Selection of calculation methods
- 1.5 Conversion factors
- (1.6 Rebound effects)

Six bottom-up methods for energy data

Type of method	Example of existing method
1 Direct measurement	EPS building standards (NL), ex post validation; Energy Performance Contracting
2 Analysis of energy bills and energy sales data	Electricity Savings Trust (DK)
3 Enhanced engineering estimates	Energy audit programme (FI); Energy Performance Contracting
4 Mixed deemed and ex-post estimate	Energy Efficiency Commitment (UK): Government estimate of real savings
5 Deemed estimate (may include some participant data)	White certificates activities (FR, IT) (Energy Efficiency Commitment (UK): proof of supplier target achievement)
6 Bottom-up modeling based on surveys	Effect of building codes (e.g., DE, NL)

Step 1.2 Baseline issues

Option A: replacement of existing equipment

- Baseline= before (all savings)
- Baseline = without measures (additional savings)

Option B: retrofit and add-on

- Baseline = before (all and additional savings)

Option C: new building or appliance

- Baseline = **reference situation** (all and additional savings)

Options for reference situations

- Existing stock and average annual energy consumption
- Existing market and average annual energy consumption
- Legal minimum energy performance and related average annual energy consumption
- Better than market (e.g. Best Available Technology)
- For all: choice between static or dynamic

Step 1.3 Normalisation factors

- Weather conditions
 - Normalisation to standard (normal degree-days in standard year)
 - Normalisation in pre- and post-situation
- Plant throughput, occupancy levels etc.
 - Normalisation post-situation is assumed to be the most common situation
 - Normalisation to pre-situation or both (e.g. to reference period) is also an option

Case Applications, Targets

- Are the four steps calculation model and 3 levels of efforts applicable?
 - Equations
 - Data collection
 - Baselines
 - Documentation
 - Monitoring effort
- What are default values?
- Guidelines for harmonisation practicable?

Default values in case applications

In Step 1: for unitary gross annual energy savings

- 14 case applications with default values
- of these, nine for gross annual energy savings per appliance or m² or in % of the energy consumption of participants
- another five with values for some parameters of the calculation

In Step 4: Application of lifetimes

- Usually, CEN CWA 27 values adopted

How to set default values?

Guiding principles:

- default values are to be conservative +
- reliability of the value according to available data

Different level of reliability coefficient:

- for “**reliable**” default values (= representative at EU level): **80%**
- for “**realistic**” values (= based on studies, but non-representative): **50%**
- for “**pure estimates**” (= based on expert’s opinion or on 1 experience): **25%**

Products

- The developing process for harmonised bottom-up methods (the cook book)
- Case applications
 - summaries
 - 20 case applications
- Final report: General bottom-up data collection, monitoring and calculation methods
- Presentations, articles, discussion papers
- Website www.evaluate-energy-savings.eu

Conclusions

- Four steps and Three level approach is a good tool for harmonisation
- Guiding principles for calculation and documentation are practicable
- Continue learning process
 - Decreasing uncertainty
 - Increasing efficiency

Conclusions

- Default values for energy savings
 - Conservativeness as principle
 - Level of conservativeness, is open for discussion
- Guidelines for all: a bridge too far
 - Too much descriptions
 - Concentrate on:
 - Priorities to reach level 2 of effort
 - Other areas than appliances