

6. Development of Evaluation and Monitoring Methods :

Top down methods



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6.1 Top-Down methods

- ESD Annex IV

*“A top-down calculation method means that the amount of energy savings is calculated using the **national or larger-scale aggregated** sectoral levels of energy savings as the starting point”.*

“In developing the top-down calculation method used in this harmonised calculation model, the Committee shall base its work, to the extent possible, on existing methodologies such as the ODEX model”.

- In other words, top-down methods rely on **energy efficiency indicators** calculated from national statistics (also called “top-down indicators) (e.g. ODYSSEE indicators)

6.2 Calculation of energy savings according to ESD with top-down methods (1/3)

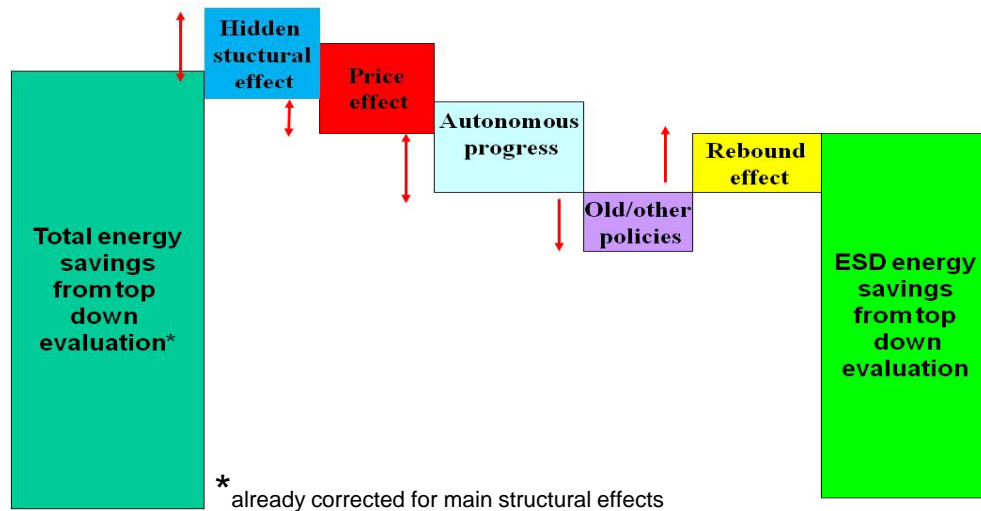
- In top-down methods, **total energy savings** are calculated from statistical indicators, by removing the influence of factors that are not linked to energy efficiency
 - ↑ case of ODYSSEE with energy consumption indicator of a sub-sector
- The measurement of **energy savings according to ESD** definition is then carried out by removing from total energy savings, the energy savings linked to “**other factors**” than energy efficiency improvement measures

*“Adjustments to be made for **extraneous factors**, such as degree-days, structural changes, product mix, etc. to derive a measure that gives a **fair** indication of total energy efficiency improvement” (ESD Annex IV)*

6.3 Calculation of energy savings according to ESD with top-down methods (2/3)

- **In principle**, the effect of the following “**other factors**” could be considered for correction:
 - Other residual hidden structure effects, not yet corrected in the indicators used to calculate the total energy savings.
 - Price-induced energy efficiency progress linked to increase in international market prices (tax component can be generally linked to policy measures).
 - Autonomous energy efficiency progress (e.g. autonomous technical trends that would take place even in the absence of EEI measures).
 - others: earlier policies, other policies and direct rebound effects (mainly for cars and households).
- **In practice**, corrections will depend on what is feasible, from a statistical view point, and on decision of the Commission and /or ESD Committee

6.4 Calculation of energy savings according to ESD with top-down methods (3/3): possible effects to be cleaned from total energy savings and not linked to ESD eligible measures



6.5 Classification of top-down methods in EMEEES

- Methods can be classified according to the statistical indicator used to calculate the energy savings:

Type of method	Example of existing indicator
TD 1 Monitoring of market diffusion indicator of energy saving technology or transport mode	Modal share for transport of goods, stock of solar water heaters (ODYSSEE indicators)
TD 2a Monitoring of specific energy consumption indicator of an equipment	New cars, electricity consumption per appliance (kWh/year) (ODYSSEE indicators)
TD 2b Monitoring of unit energy consumption indicator of a sub-sector (e.g. thermal uses, electricity uses in household, industry or services)	Electricity consumption per employee in service, heating fuel consumption per household (kWh/year) (ODYSSEE indicators)
TD 3 Total energy consumption (econometric modelling)	Evaluation of the effects of energy taxation (e.g., DE, SE)

6.6 Top-down methods planned in EMEEES

- **Residential sector**
 - (i) Building shell and heating systems (unit energy consumption indicator)
 - (ii) Household electricity use excluding thermal uses (i.e. electric appliances as a whole including lighting) (unit energy consumption indicator)
 - (iii) Specific white goods (e.g. cold appliances, dryers) (specific energy consumption indicator)
 - (iv) Solar thermal collectors (market diffusion indicator)**

- **Transport sector**
 - (i) New cars (specific energy consumption indicator)**
 - (ii) Improvement of the car, bus and truck stock (unit energy consumption indicator)
 - (iii) Modal shift in passenger transport (market diffusion indicator)
 - (iv) Modal shift in goods transport (market diffusion indicator)**

6.7 Top-down methods planned in EMEEES

- **Industry sector**
 - (i) Industrial thermal energy use (excluding electricity) (unit energy consumption indicator)
 - (ii) Industrial electricity consumption (unit energy consumption indicator)
 - (iii) Industrial CHP (market diffusion indicator)

- **Tertiary sector**
 - (i) Building shell and heating systems (unit energy consumption indicator)
 - (ii) Electricity end- uses excluding thermal uses (unit energy consumption indicator)**

- **General policy instruments**
 - (i) Energy taxation

6.8 Methods to clean total top-down energy savings from other factors (1/3)

- In developing the methods for the case studies, total energy savings have finally be cleaned from two different factors:
 - the autonomous trend
 - market price increases
- Econometric analysis is then used to quantify the impact of these two factors
- ESD savings are calculated by difference between total energy savings and savings linked to these two factors

6.9 Methods to clean top-down energy savings from other factors (2/3)

$$\ln ES = a + b T + c \ln P + d \ln A + e \ln ES_{-1} + K$$

with:

ES : energy saving indicator

b: trend, **T**: time,

c : price elasticity, **P**: energy price (2 components: ex-tax price and tax),

d: elasticity to macro economic variable **A** (e.g. GDP) to capture the impact of business cycles

- **Estimation of the regression coefficients** (in blue) is made over a period up to the most recent year before the effects of EEI measures is visible.
- Then, the impact of the different effects is removed using the regression coefficients over the period on which ESD savings are calculated (e.g. 2008-2016)

6.10 Methods to clean top-down energy savings from other factors - example (3/3)

