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Beräkning av energieffektivisering och energibesparing, top-down- och bottom-upmetoder

Energy Efficiency and Savings Calculation, Top-down and Bottom-up Methods

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EUROPEAN STANDARD

EN 16212

NORME EUROPÉENNE

EUROPÄISCHE NORM

August 2012

ICS 27.010

English version

Energy Efficiency and Savings Calculation, Top-down and Bottom-up Methods

Efficacité énergétique et calcul d'économies - Méthodes top-down (descendante) et bottom-up (ascendante)

Energieeffizienz und -einsparberechnung - Top-Down- und Bottom-Up-Methoden

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Contents

Page

Foreword.....	4
Introduction	5
1 Scope	6
2 Normative references	6
3 Terms and definitions	6
4 Characteristics of top-down and bottom-up methods.....	11
4.1 Characteristics	11
4.2 Energy efficiency improvement measure	12
4.3 Type of energy savings.....	13
4.3.1 Total, autonomous and policy induced savings	13
4.3.2 Baseline and additional savings	15
4.4 Type of data used	16
4.5 System boundaries.....	16
5 Top-down saving calculations	17
5.1 Energy efficiency indicators.....	17
5.1.1 General.....	17
5.1.2 Structure effects and disaggregation.....	17
5.1.3 Indicator choice and savings definition	18
5.2 General calculation of top-down energy savings.....	18
5.2.1 Calculation approach	18
5.2.2 Definition of indicator types	18
5.2.3 Calculation of indicator values.....	19
5.2.4 Calculation of energy savings per indicator.....	21
5.3 Other issues in the calculation of top-down savings	23
5.3.1 General.....	23
5.3.2 Calculation alternatives	23
5.3.3 Energy consumption units	24
5.3.4 Miscellaneous	25
6 Bottom-up saving calculations	25
6.1 Elaboration on the object of assessment	25
6.1.1 Elementary unit of action and unitary energy savings.....	25
6.1.2 Baseline options for end-use actions.....	26
6.1.3 Saving types from bottom-up calculations.....	27
6.2 General calculation of bottom-up energy savings	27
6.2.1 Calculation approach	27
6.2.2 Step 1: Calculation of unitary gross annual energy savings	29
6.2.3 Step 2: Calculation of total gross annual energy savings	34
6.2.4 Step 3: Calculation of total annual energy savings	35
6.2.5 Step 4: Calculation of remaining energy savings for target year	37
6.2.6 Calculation of overall bottom-up energy savings, taking into account overlap	38
Annex A (informative) Examples of energy efficiency indicators	40
A.1 Introduction	40
A.2 Sectors and indicators	40
A.2.1 Sectors covered	40
A.2.2 Choice of indicators on energy savings	40
A.3 Indicators for the residential sector.....	41
A.3.1 General.....	41
A.3.2 Space heating.....	42

A.3.3	Water heating	43
A.3.4	Large appliances	43
A.3.5	Lighting and other appliances	43
A.3.6	Total electricity consumption	43
A.3.7	Total non-electricity consumption	43
A.4	Indicators for the service sector	44
A.4.1	General	44
A.4.2	Total energy consumption	44
A.4.3	Total electricity consumption	45
A.4.4	Total non-electricity consumption	45
A.4.5	Fuels and delivered heat for space heating	45
A.4.6	Electricity for lighting or air-conditioning	45
A.4.7	Electricity for ICT and other equipment	45
A.5	Indicators for the transportation sector	45
A.5.1	General	45
A.5.2	Fuel use in cars	46
A.5.3	Fuel use in road freight transport	47
A.5.4	Energy use for other modes	47
A.6	Indicators for the Industry sector	47
A.6.1	General	47
A.6.2	Energy-intensive industry	48
A.6.3	Other industrial branches	48
Annex B	(informative) Level of detail and data handling in bottom up calculations	49
B.1	Levels of detail in savings calculations	49
B.2	Harmonisation and data handling	50
Annex C	(informative) Bottom up application for buildings; boiler replacement	52
C.1	Introduction	52
C.2	Potential examples of calculations	53
C.3	Example for category 2: Replacement of heating supply equipment in residential and tertiary buildings	54
C.3.1	Step 1: calculation of unitary gross annual energy savings	54
C.3.2	Step 2: total gross annual energy savings	57
C.3.3	Step 3: total annual energy savings	57
C.3.4	Step 4: total remaining energy savings for target year	58
	Bibliography	59

SS-EN 16212:2012 (E)

Foreword

This document (EN 16212:2012) has been prepared by Technical Committee CEN/CLC/TC JWG 4 “Energy Efficiency and Energy Savings Calculation”, the secretariat of which is held by NEN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by February 2013, and conflicting national standards shall be withdrawn at the latest by February 2013.

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Introduction

Due to uncertainties of energy supply and the need to limit the greenhouse effect, European countries have adopted policies to increase the energy efficiency and to develop the use of renewable energy sources. The amount of energy to be saved in each state separately, and overall for the European Union (EU), has been notified in international agreements. In recent years the EU has adopted several Directives as part of the efforts at EU level to improve energy efficiency. An example is the Directive 2006/32/EC on energy end-use efficiency and energy services (ESD). The ESD establishes for 2016 a national indicative energy savings target, equal to 9 % of final energy consumption in five years before 2007. This target is to be reached through energy services and other energy efficiency improvement measures.

The formulation of policies and targets has led to the need for harmonised monitoring and evaluation methods on energy savings at international level and at European level. In addition many countries that get involved in the monitoring of the energy savings achieved, or the impact of implemented policies and measures, need these calculation methods as well.

This European Standard covers the following topics:

- the methodology and general rules of calculation;
- terminology and definitions;
- parameters and data, including data quality and data sources.

This European Standard covers both top-down and bottom-up calculation methods. The top-down method is based on energy indicators (e.g. mean gas consumption per dwelling) which are often calculated from statistical data. The bottom-up method considers end-user actions and facilitating measures to enhance energy efficiency. For top-down the standard uses the results of earlier indicator work in the Odyssee project and in the framework of the ESD. For bottom-up the standard builds on the results of the EMEEES project, initially done in the framework of the ESD implementation. These results are the starting point for this standard which is general in nature and applicable to a larger category of purposes and users than the EU-driven ESD.

NOTE 1 The ODYSSEE project develops and updates energy efficiency indicators that can be used to calculate top-down energy savings for the 27 EU countries plus Norway and Croatia.

NOTE 2 The EMEEES project dealt with the definition of top-down and bottom-up calculation methods to monitor the ESD savings.

The top-down and bottom-up calculation methods are presented as two separate calculation methods. Using a combination of top-down and bottom-up methods is not part of this standard. However, the differences and application of both methods will be highlighted.

This European Standard provides a general framework for calculating energy savings. For top-down, examples of specific calculations per indicator are presented separately. For bottom-up, one specific application case, on building energy use, is presented as example.

After normative references (Clause 2) and terms and definitions (Clause 3) the characteristics of the top-down and bottom-up methods are presented in Clause 4. The top-down calculation method is described in Clause 5 and the bottom-up calculation methods in Clause 6. Annex A provides some example indicators that may be used in top-down calculations. Annex B deals with the level of detail at which bottom-up methods can be applied. Annex C describes the bottom-up example case for buildings.

SS-EN 16212:2012 (E)

1 Scope

This European Standard provides a general approach for energy efficiency and energy savings calculations with top-down and bottom-up methods. The general approach is applicable for energy savings in buildings, cars, appliances, industrial processes, etc.

This European Standard covers energy consumption in all end-use sectors. The standard does not cover energy supply, e.g. in power stations, as it considers only final energy consumption.

This European Standard deals with savings on energy supplied to end-users. Some forms of renewable energy "behind-the-meter" (e.g. from solar water heating panels) reduce supplied energy and therefore can be part of the calculated energy savings. Users of the standard should be aware that this renewable energy behind the meter can also be claimed as energy generated.

The standard is meant to be used for ex-post evaluations of realised savings as well as ex-ante evaluations of expected savings.

This European Standard provides saving calculations for any period chosen. However, short data series may limit the possible periods over which savings can be calculated.

The standard is not intended to be used for calculating energy savings of individual households, companies or other end-users.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

CWA 15693:2007, *Saving Lifetimes of Energy Efficiency Improvement Measures in bottom-up calculations*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply:

3.1

adjustment factor

quantifiable parameter affecting energy consumption

[SOURCE: CEN/CLC/TR 16103:2010]

Note 1 to entry: Adjustment factors are mainly used in the bottom-up method.

EXAMPLE Weather conditions, behaviour related parameters (indoor temperature, light level) working hours, production throughput.

3.2

baseline

energy consumption calculated or measured, possibly normalised, in the situation without an end-use action

Note 1 to entry: The baseline provides a reference against which measurements can be taken or compared.

Note 2 to entry: The baseline can contain other actions but not the action under consideration.

3.3

bottom-up savings

energy savings calculated with bottom-up methods

3.4

bottom-up method

determination of energy savings from end-user actions using unitary savings and elementary units of actions

3.5

diffusion indicator

indicator showing the penetration of energy saving systems (e.g. efficient equipment or efficient mode of transport) with given savings per system

EXAMPLE Number of solar water heaters, efficient lamps or electrical appliances with a label A+ or A++, percentage of passenger transport by public modes or transport of goods by rail and water.

3.6

double counting

claiming energy savings more than once for two or more facilitating measures that focus on the same end-user action

Note 1 to entry: In most cases, the savings due to the combined effect of two facilitating measures will be lower than the sum of the savings from the separate effects.

Note 2 to entry: Double counting can be the result of overlap.

3.7

driver

quantity that is assumed to define the change in energy use under consideration in top-down methods

Note 1 to entry: A driver can be an activity (e.g. production) but also a state of a system (e.g. floor space).

3.8

elementary unit of action

entity for which unitary energy savings can be defined and summed up

Note 1 to entry: Generally it relates to an energy using system or a participant in an energy savings programme.

3.9

end-use action

energy efficiency improvement measure implemented on the site of an end-user

3.10

energy carrier

substance or phenomenon that can be used to produce mechanical work or heat or to operate chemical or physical processes

[SOURCE: ISO 13600:1997]

Note 1 to entry: The energy content of energy carriers is given by their gross (=higher) calorific value.

EXAMPLE Coke, petrol, gas, district heat and electricity.

3.11

energy consumption

amount of energy used

[SOURCE: CEN/CLC/TR 16103:2010]