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ISO/DIS 17742

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Energy Efficiency and Savings calculation for Countries, Regions and Cities

Méthodes générales de calcul de l'efficacité et économies d'énergie pour les pays, villes et régions

ICS: 27.010

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 17743 was prepared by Technical Committee ISO/TC 257, *Energy savings*,.

Introduction

ISO TC 257 aims to provide standards used to quantify the energy savings covering regions, cities, organizations and projects.

This International Standard is provides a framework with definitions, types of information used to quantify the energy savings in order to enable consistency for the standards developed by ISO TC 257.

Figure 1 illustrates the relationship between the different working groups of ISO TC257..

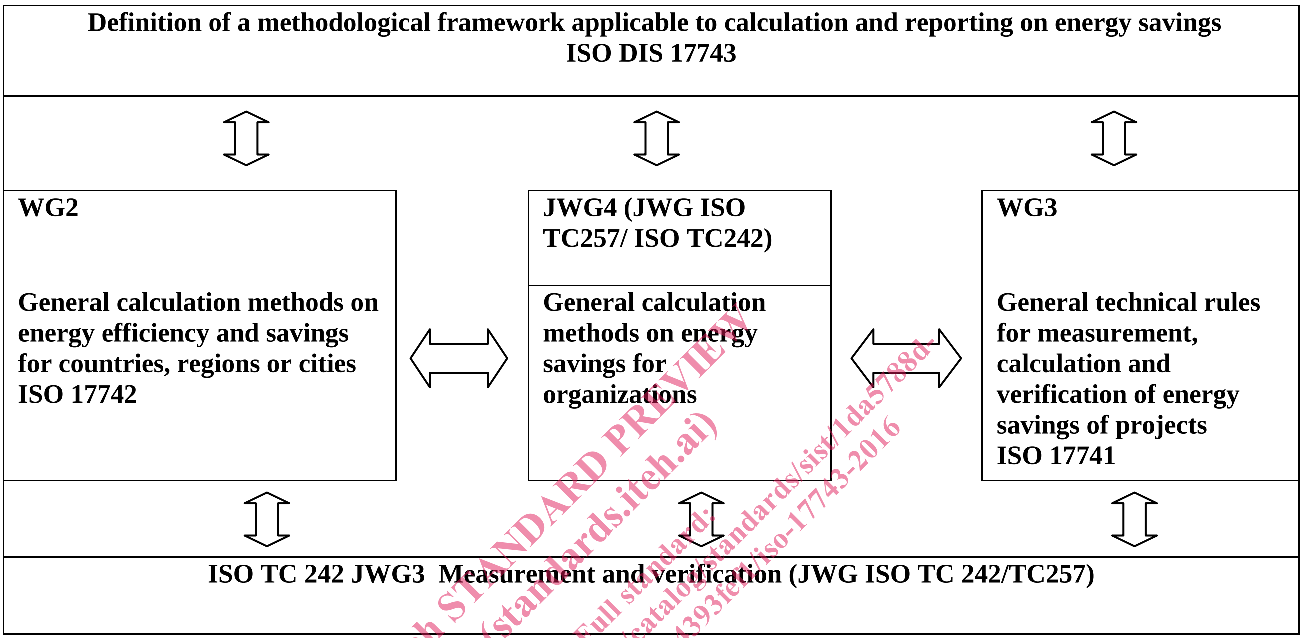

Figure 1 – Work program of ISO TC 257

This International Standard may be used by any stakeholder (policy maker, decision maker, company, organization, NGO, etc) that aims to quantify energy savings.

Energy savings — Definition of a methological framework applicable to calculation and reporting on energy savings

1 Scope

This standard establishes methodological framework that applies to the calculation of energy savings from existing (implemented) and prospective measures and actions which intend to save energy. This framework standard will be applicable to other standards in the field of energy saving quantification.

This International Standard addresses the following in the context of energy savings:

- terminology,

- definition of the system boundaries

- principles for the determination of a baseline,

- principles for establishment of energy performance indicators,

- data used

- principles for reporting,

The development of the methodology for measurement and verification of the energy savings is not in the scope of this standard.

The methodology of construction of the scenarios for future energy saving measures and actions is not in the scope of this standard.

The development of methodology for measurement and verification of the energy savings is not in the scope of this standard.

2 Normative references

The following referenced document is indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

No normative references. Useful standards are presented in the Bibliography

3 Terms and Definitions

For the purpose of this standard, the following terms and definitions apply.

3.1
energy
capacity of a system to produce activity

Note 1 to entry: Commonly the term energy is used for electricity, fuel, steam, heat, compressed air and other like media.

Note 2 to entry: The coherent SI unit of energy is joule, (J).

SOURCE [ISO/IEC/DIS 13273-1]
SOURCE note 2 [ISO 50001]

3.2
energy consumption
quantity of *energy* (3.1)applied

[Source ISO IEC DIS 13273-1,3.1.15]

Note: energy consumption can be quantified before/after or/and with/without any energy performance improvement action

3.3
energy savings
reduction of *energy consumption* (3.2) compared to an energy baseline

Note 1 to entry: Energy savings can be effective or expected.

Note 2 to entry: Energy savings may be the result of implementation of an action(s) or of autonomous progress

3.4
energy baseline
quantitative reference(s) providing a basis for comparison of *energy performance* (3.5)

[SOURCE ISO/IEC/DIS 13273.1, 3.1.10, note 3 suppressed]

Note 1 to entry: An energy baseline usually reflects a specified period of time.

Note 2 to entry: An energy baseline can be adjusted using variables affecting energy use and/or consumption such production level, degree days (outdoor temperature), occupancy period, etc

3.5
energy performance
measurable results related to energy efficiency, energy use, and *energy consumption(3.2)*

[SOURCE: ISO/IEC/DIS 13273-1, 3.3.1]2, modified -- modified -- Note 1 and Note 2 to entry have been deleted since the notes were specific to energy management and not transverse].

3.6
energy end user
individual or a group of individuals or organization with responsibility for operating an energy using system

Note 1 to entry: The energy end user may differ from the customer who might purchase the energy but does not necessarily use it.

[Source ISO/IEC/DIS 13273-1, 3.1.12]

3.7
unadjusted energy savings
energy savings without any adjustment

3.8
net energy savings
difference in energy consumption with and without or before and after the energy performance improvement action(s) with the use of adjustment factors

3.9
adjustment factors
quantifiable parameters affecting energy consumption

Example 1: at country level adjustment factors may include free riders, rebound effect and multiplier effect as well as specific factors depending which may impact the quantification of savings (e.g. weather, occupancy, number of produced units,…)

[Remark: adjustment for autonomous savings could be done by adjustment of the baseline (e.g. choosing another reference technology), adjustment for structure effects could be covered by adjustment of observed energy consumption (e.g. correction for working hours). But unadjusted savings can also contain free rider/rebound/multiplier effects

Example 2: weather conditions, behavior related parameters (indoor temperature, light level), working hours, production throughput

4 Energy savings and methods for quantification

4.1 General

The choice for the methods for quantification of the energy saving should be made to be suitable for the intended use of the results.

4.2 Principles

This framework standard introduces the key concepts for calculation of energy savings. Energy savings will be quantified as a difference in energy consumption with and without or before and after the energy performance improvement action(s) selected.

Energy savings are dependent on the system boundary being considered

If an energy performance improvement action results in an increase in the energy consumption, then the energy savings are negative.

Different approaches are used for the quantification of the energy savings based on measurements, calculation or by the use of indicators.

Example: Average floor area of dwellings, energy consumption per m² in residential buildings, average fuel consumption per car

Therefore, this Clause describes the different characteristics of methods as to:

–energy savings (4.3)

- system boundary (s) (4.4);

- type of savings determined and *energy baseline*(4.5- 4,6);

- consideration for type of data used (5);

4.3 Energy savings

Energy savings may result from:

- facilitating measure intended to an end-user action;

- independently taken energy end-user action.

Facilitating measures, such as regulation, subsidy schemes or voluntary agreements, may encourage energy end-users to implement energy performance improvement actions. Facilitating measures do not by themselves result (directly) in energy savings.

Energy end-users may take actions that lead to energy savings. These actions are known as energy performance improvement actions. The energy performance improvement actions may be physical, organisational or behavioural.

Indicator based methods relate energy consumption at a (sub)sectoral level to a variable (one of more) that is statistically representative. The change in the indicator value is used to calculate the savings. These savings are (partly) the result of energy performance improvement actions that focus on the energy use covered by the indicator. Savings consist also of autonomous savings.

Example: the change in energy consumption per m² of the building is due to the combined effect of e.g. the roof/cavity wall insulation, energy efficient windows, and a high efficiency boiler.

End-user actions can be the result of facilitating measures but can also be caused by other factors like high energy prices, autonomous progress, market forces or non-energy government policy. The indicator values incorporate the effect of all relevant facilitating measures. However, the indicators cannot show their combined effect, let alone the individual effect of a facilitating measure.

In cases of facilitating measures the saving effect will be derived from the effect of the end-user actions stimulated (e.g. for audits the end-user actions to implement the energy saving measures mentioned in the audit report. In case of end-user actions the saving effect can be directly calculated, and may or may not be linked to one or more facilitating measures.

In practice most energy savings (measure based) methods focus on aggregated end-user actions, as a result of one or more facilitating measures. For example the overall savings calculated for new dwellings may result from insulation, high efficiency boilers, heat recovery and solar water heaters, due to energy performance standards, subsidies for solar heaters and voluntary agreements with house building companies. For organization or projects the change in energy performance indicators can be used to calculate energy savings as well as direct measurements in the considered system.

4.4 System boundary (s)

The system boundary (s) should be established for the entity to which the energy savings apply, such as country, region, city, multi-site company, a project, an organization, a system or a specific appliance.

The allocation rules between different energy savings improvement actions that apply within the same boundary should be made precise to avoid *double counting.* These allocation rules should, when possible, be aligned with the logical order of energy using systems and processes.

Example: In a building (physical boundary) two actions are implemented: i.e. insulation of the building envelope and change of the central heating boiler. Double counting occurs when their interaction is not taken into account. The logical chain for quantifying the energy savings should consider the reduction in the energy end use firstly due to improvement of the building envelope and then due to the higher efficiency boiler for the reduced heating load.

4.5 Unadjusted and net energy savings

Unadjusted savings are the change in energy consumption. The unadjusted savings are presented in figure 2 as the result of the difference between the natural trend due to growth or evolution without (or before) any energy performance improvement action (Key 2) reduced with the observed or the calculated energy consumption at the target time (Key 7).