SLOVENSKI STANDARD
SIST EN 17267:2019

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Načrt za merjenje in nadzorovanje energije - Načrtovanje in izvajanje - Načela za zbiranje podatkov o energiji

Energy measurement and monitoring plan - Design and implementation - Principles for energy data collection

Plan für die Energiemessung und -überwachung für Organisationen - Gestaltung und Umsetzung

Plan de mesure et de surveillance de l'énergie - Conception et mise en oeuvre - Principes pour la collecte des données énergétiques

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Energy measurement and monitoring plan - Design and implementation - Principles for energy data collection

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European foreword

This document (EN 17267:2019) has been prepared by CEN/CLC/JTC 15 “Energy measurement plan for organizations”, the secretariat of which is held by AFNOR.

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of an identical text or by endorsement, at the latest by January 2020, and conflicting national standards shall be withdrawn at the latest by January 2020.

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Introduction

Existing energy management standards often refer to the measurement of energy as an important improvement of energy performance, but do not detail how a measurement and monitoring plan should be designed and implemented:

— EN 16247-1:2012, Energy audits: in specific cases an energy audit requires to get specific data measurement (§ 5-2 b) 5-3, 5-5). An energy measurement plan has to be set up in order to collect this data. But there are no guidelines given on how to design or implement an energy measurement plan: The future standard will help to fulfil this step;

— EN 15900:2010, Energy Efficiency Services: the energy efficiency service has to be based on collected data (4-1 b). If there is not available or reliable data an energy measurement plan is needed;

— ISO EN 50001:2018 states in 6-6: "The organization shall define and implement an energy data collection plan appropriate to its size, its complexity, its resources and its measurement and monitoring equipment. The plan shall specify the data necessary to monitor the key characteristics and state how and at what frequency the data shall be collected and retained." EN 17267 provides principles for the design and implementation of an energy data collection plan;

— ISO 50006:2014, "Energy management systems — Measuring energy performance using energy baselines (EnB) and energy performance indicators (EnPI) — General principles and guidance", provides some recommendation related to measurement (§ 4.2.6.2);

— ISO EN 50015:2014, describes the process of "Measurement and verification" (M & V) to help organizations determine and validate in a systematic way the improvement of its energy performance, within specified boundaries. As can be seen in Clause 5.2 [h) k) l) m)], the M&V process relies upon a number of measurements, without giving the methodology on how to organize the measurement. To ensure the quality of these measurements (reliability, accuracy as well as appropriateness) a "measurement plan" is needed.

The measurement and monitoring plan should be considered as a tool to facilitate the operational implementation of those cited standards.

1 Scope

This document specifies the requirements and principles for the design and implementation of an energy measurement and monitoring plan for an organization in order to improve its energy performance. The measurement and monitoring plan defines a measurement system for monitoring and analysing the energy performance of an organization, taking into account its influencing factors.

This document applies to all forms of energy, to all energy uses and to all types of organizations. It does not apply to domestic dwellings.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

ISO 50001:2018, *Energy management systems — Requirements with guidance for use*

ISO 50006:2014, *Energy management systems — Measuring energy performance using energy baselines (EnB) and energy performance indicators (EnPI) — General principles and guidance*

3 Terms and definitions

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

3.1 Definitions related to energy management systems

3.1.1
energy management system
EnMS
set of interrelated or interacting elements of an organization to establish an energy policy, objectives, energy targets, action plans, and process(es) to achieve the objectives and energy targets

[SOURCE: ISO 50001:2018]

3.1.2
energy performance indicator
EnPI
measure or unit of energy performance, as defined by the organization

Note 1 to entry: EnPI(s) can be expressed by using a simple metric, ratio, or a model.

Note 2 to entry: See ISO 50006 for additional guidance.

[SOURCE: ISO 50001:2018]

3.1.3
energy performance improvement
improvement in measurable results of *energy efficiency*, or *energy consumption* related to *energy use*, compared to the *energy baseline*

[SOURCE: ISO 50001:2018]

3.1.4
energy baseline
EnB
quantitative reference(s) providing a basis for comparison of *energy performance*

Note 1 to entry: An energy baseline is based on data from a specified period of time and/or conditions, as defined by the *organization*.

Note 2 to entry: One or more energy baselines are used for determination of *energy performance improvement*, as a reference before and after, or with and without implementation of energy performance improvement actions.

Note 3 to entry: See ISO 50015 for additional information on measurement and verification of energy performance.

Note 4 to entry: See ISO 50006 for additional information on EnPIs and EnBs.

3.1.5
energy management team
person(s) with responsibility and authority for effective implementation of an *energy management system* and for delivering *energy performance improvement*

[SOURCE: ISO 50001:2018 modified:note 1 was deleted]

3.1.6
relevant variable
quantifiable factor that impacts energy performance and routinely changes

EXAMPLE Weather condition, operating condition (indoor temperature, light level), working hours, production throughput.

[SOURCE ISO 50001:2018]

3.1.7
static factor
identified factor that impacts energy performance and doesn't routinely change

EXAMPLE 1 Examples of static factors can include facility size, design of installed equipment. To be completed.

EXAMPLE 2 A example of a change in static factor could be a change in a manufacturing process raw material from aluminium to plastic and may lead to a non-routine adjustment.

[SOURCE ISO 50001:2018]

3.1.8
influencing factor
factor that has an influence on energy performance, either a relevant variable or a static factor

3.1.9
boundary
physical or site limits and/or organizational limits as defined by the organization

[SOURCE: ISO 50001:2018]

3.1.10
significant energy use
energy use accounting for substantial energy consumption and/or offering considerable potential for energy performance improvement

[SOURCE ISO 50001:2018]

3.2 Definitions related to energy measurement and monitoring

3.2.1
measurement
process that consists in physically obtaining one or more values which can be reasonably assigned to a quantity

Note 1 to entry: Measurements do not apply to qualitative properties.

Note 2 to entry: A measurement implies the comparison of quantities, including the counting of entities.

[SOURCE: ISO/IEC GUIDE 99:2007, modified. Deletion of the NOTE 3]

3.2.2
device
material element or assembly of such elements intended to perform a required function

Note 1 to entry: to entry: A device may form part of a larger device.

[SOURCE: ISO/IEC GUIDE 99:2007]

3.2.3
measuring device
device intended to be used for taking measurements, alone or combined with one or more auxiliary devices

[SOURCE: ISO/IEC GUIDE 99:2007]

3.2.4
measurement point
location of the sensing function(s) of a measuring device

3.2.5
measurement system
set of measuring devices, means of reading and recording time-stamped values resulting from the measurement, and the means of utilizing these values

[SOURCE: ISO/IEC GUIDE 99:2011, modified. Deletion of the qualifier “complete”. Replacement of “measuring instruments” by “measuring devices”. Replacement of “other equipment” by “means of time-stamped reading and recording and means of utilizing these values”]

3.2.6
measurement and monitoring plan
all tasks organized in time including the design, setting up, utilization, maintenance and improvement of a measurement system and its monitoring functions

3.2.7
metering
continuous integration of quantities measured as a function of time

Note 1 to entry: The integration can be carried out on a measurement of active or reactive electrical power, flow of fluid, number of parts, etc.

3.2.8
monitoring
determining the status of a system, a *process* or an activity

Note 1 to entry: To determine the status, there can be a need to check, supervise or critically observe.

Note 2 to entry: In an *energy management system* monitoring can be a review of energy data.

[SOURCE: ISO 50001:2018]

3.2.9
installation monitoring
continuous assessment of the installation in order to ensure availability and reliability of energy flows as well as the performance and the durability of the installation

Note 1 to entry: Installation monitoring can reveal malfunctions that affect energy performance. To facilitate monitoring, thresholds and alarms can be put in place on the parameters to be monitored.

EXAMPLES In the case of steam production: outgoing pressure, quality of the make-up water, etc. or to monitor an electrical installation: power factor, voltage, and harmonics, etc.

Note 2 to entry: This technical concept is complementary to the concept of monitoring as defined in ISO 50001 (see 3.2.8)

3.2.10
parameter to monitor
parameter that is not directly related to energy but which can influence the energy distribution and energy performance in an installation

EXAMPLE Level of harmonics or power factor in an electrical installation, outgoing pressure and dryness fraction for a steam production plant, etc.

3.2.11
zone
geographical or functional space defining a part of the organization

Note 1 to entry: Examples: a zone can be a kitchen (function), or a storage area of 5 000 m^2 (surface area) or a building of 10 000 m^3 (volume space).

3.2.12
measurement accuracy
closeness of agreement between a measured quantity value and a true quantity value of a measurand

Note 1 to entry: The concept "measurement accuracy" is not a quantity and is not given a numerical quantity value. A measurement is said to be more accurate when it offers a smaller measurement error.

Note 2 to entry: The term “measurement accuracy” should not be used for measurement trueness and the term measurement precision should not be used for ‘measurement accuracy’, which, however, is related to both these concepts.

Note 3 to entry: "Measurement accuracy" is sometimes understood as closeness of agreement between measured quantity values that are being attributed to the measurand.

[SOURCE: ISO/IEC GUIDE 99:2011]

3.2.13
repeatability (of results of measurements)
closeness of agreement between the results of successive measurements of the same measurand, carried out under the same conditions of measurement, i.e.:

— by the same measurement procedure;

— by the same observer;

— with the same measuring instruments, used under the same conditions;

— in the same laboratory;

— at relatively short intervals of time

Note 1 to entry: The concept of "measurement procedure" is defined in VIM 2.5.

[SOURCE IEV 311-06-06]

3.2.14
stability
ability of a measuring instrument to keep its performance characteristics unchanged during a specified time interval, all other conditions being the same

[SOURCE IEV 311-06-12]

3.2.15
durability, <of an item>
ability to perform as required, under given conditions of use and maintenance, until the end of useful life

[SOURCE IEV 192-01-21]

3.2.16
uncertainty
non-negative parameter characterizing the dispersion of the quantity values being attributed to a measurand, based on the information used

[SOURCE: ISO/IEC GUIDE 99:2007]

3.2.17
sensitivity
quotient of the change in an indication of a measuring system and the corresponding change in a value of a quantity being measured

Note 1 to entry: Sensitivity of a measuring system can depend on the value of the quantity being measured.

Note 2 to entry: The change considered in a value of a quantity being measured shall be large compared with the resolution.

[SOURCE: ISO/IEC GUIDE 99:2007]

3.3 Symbols and abbreviations

COP	Coefficient of Performance
EnMs	Energy management system
EnPI	Energy Performance Indicator
M&V	Measurement and verification
EnB	Energy baseline
PF	Power Factor
THD	Total harmonic distortion
U	voltage
U_{nb}	voltage unbalance
Toe	ton of oil equivalent
f	frequency

4 General characteristics of a measurement and monitoring plan

4.1 Purpose of a measurement and monitoring plan

The purpose of the measurement and monitoring plan is to design, apply, use and maintain the measurement system which enables the organization to:

— measure the energy performance to ascertain that it complies with the targets;

— analyse the causes of potential drifts in energy consumption;

— monitor the relevant parameters of the installation;

— sustain the energy performance gains made over time;

— identify potential improvements.

The measurement and monitoring plan may be used on its own. It also provides practical principles and guidance on how to collect data for ISO 50001, in line with the requirements stated in its 6-6 section (“The organization shall define and implement an energy data collection plan appropriate to its size, its complexity, its resources and its measurement and monitoring equipment. The plan shall specify the data necessary to monitor the key characteristics and state how and at what frequency the data shall be collected and retained.").

4.2 Relation between the measurement and monitoring plan and the measurement system

Figure 1 brings together the elements of a measurement system, to be adapted according to the needs of the organisation:

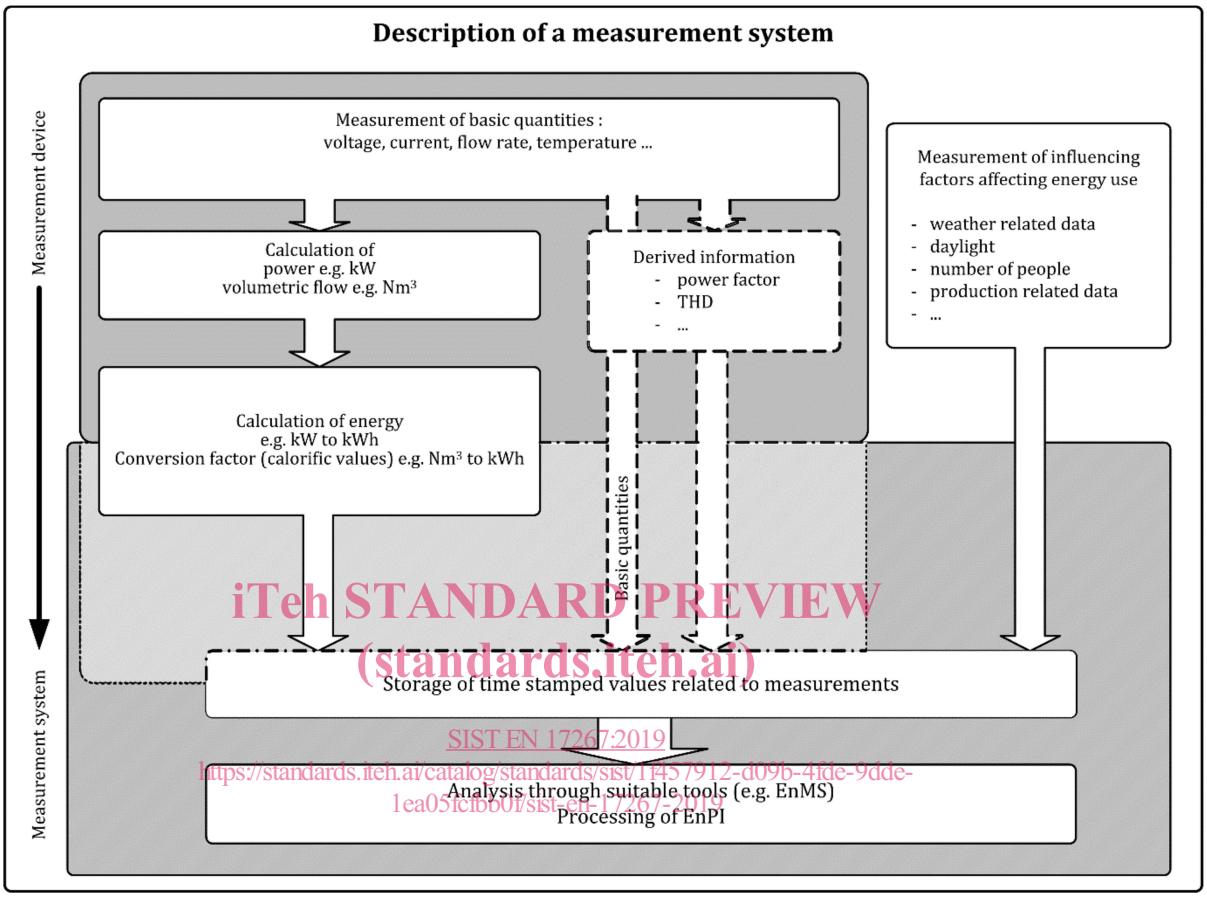

Figure 1 — Description of a measurement system

4.3 Process to maintain the measurement and monitoring plan

The implementation of the measurement and monitoring plan is an iterative process.

The organization shall put in place a periodic review of its plan in order to reach its objectives.

5 The stages of a measurement and monitoring plan

5.1 General

The organization shall carry out the stages 1 to 6 defined in 5.2 to 5.7 when putting in place a measurement and monitoring plan, as described in the following figure:

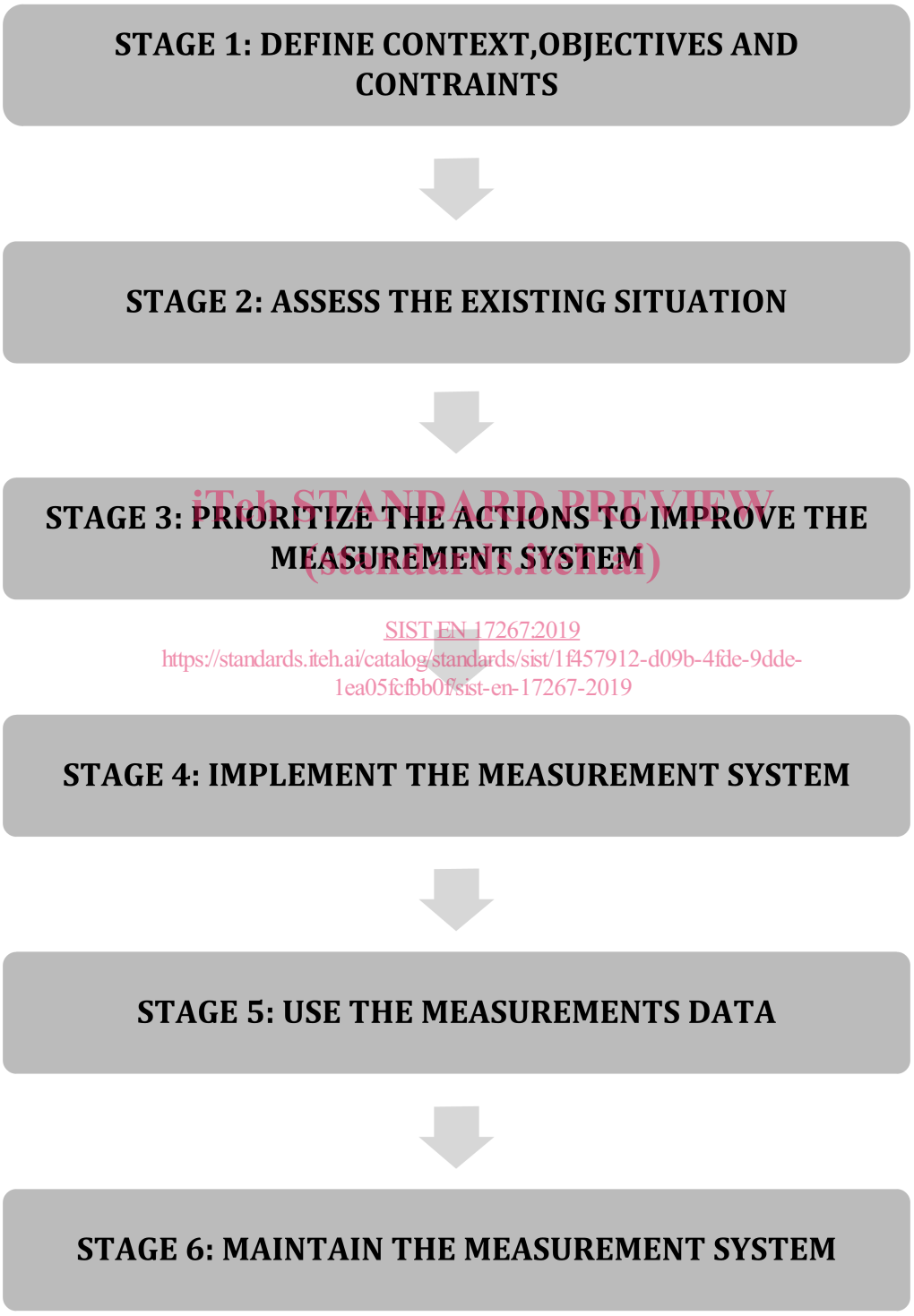

Figure 2 — The stages of a measurement and monitoring plan

The figure doesn't imply a linear approach and users of the standard may loop back to a stage in an iterative process.

5.2 Stage 1: Define context, objectives and constraints

5.2.1 Objectives

— Ensure that the motivations, implications and objectives of organization are clearly defined;

— ensure that the key characteristics of operations that determine energy performance are measured, analysed and monitored at planned intervals;

— ensure that the organizational, technical and financial contexts will allow the creation and maintenance of a measurement and monitoring plan.

5.2.2 Context of the measurement and monitoring plan

The measurement and monitoring plan is meant as a tool to help organizations to improve and monitor their energy performance and support the verification of the savings.

The measurement and monitoring plan should be used for the implementation of an ISO 50001 energy management system:

— an energy management system in ISO 50001 requires that the key characteristics of energy performance are measured, monitored and analysed at regular intervals, as part of an energy data collection plan;

— "measurement and verification" (M&V) methods, as defined in ISO 50015, help the organization determine and validate in a systematic way the improvement of its energy performance, within specified boundaries. The M&V process relies upon a number of measurements. To ensure the quality of these measurements (reliability, accuracy as well as appropriateness) a "measurement and monitoring plan" is therefore needed.

The measurement and monitoring plan may support the use of other standards relative to energy management, such as:

— energy audits (as described in EN 16247): an energy audit requires to get specific data measurement;

— energy efficiency services (as described in EN 15900): an energy efficiency service has to be based on collected data.

However, an organization wishing to deploy a measurement and monitoring plan faces a number of obstacles, including:

— the design of the plan, defining its content according to the needs and objectives;

— the evaluation of the cost/benefits of implementing the plan, acting as a decision-aid;

— the technical difficulties associated with the implementation of the plan.