SLOVENSKI STANDARD
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Načrt za merjenje energije in nadzorovanje organizacij - Načrtovanje in izvajanje

Energy measurement and monitoring plan for organisations - Design and implementation

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

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ICS:

03.100.01	Organizacija in vodenje podjetja na splošno	Company organization and management in general
27.010	Prenos energije in toplote na splošno	Energy and heat transfer engineering in general

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Energy measurement and monitoring plan for organisations - design and implementation

Plan de mesure et de surveillance de l'énergie - Conception et mise en oeuvre

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

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/CLC/JTC 15.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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CEN-CENELEC Management Centre:
Rue de la Science 23, B-1040 Brussels

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European foreword

This document (prEN 17267:2018) has been prepared by Technical Committee JWG 9 “Energy measurement plan for organizations”, the secretariat of which is held by AFNOR.

This document is currently submitted to the CEN Enquiry.

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 plan should be 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 50001:2011 states in 4-6-1: “an energy measurement plan appropriate to the size and complexity of the organization and its monitoring and measurement equipment shall be defined and implemented”. But there are no guidelines given on how to design or implement an energy measurement plan: The future standard will help to fulfil this requirement.

— ISO EN 50015:2014 describes the process of “Measurement and verification” (M and 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 methodology 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 factors that influence its operations.

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 50006, *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
measurement
process that consists in physically obtaining one or more values which can be reasonably assigned to a quantity

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

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

[SOURCE: ISO/IEC GUIDE 99:2011, modified. Deletion of the NOTE 3]

3.2
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 99:2011]

3.3
measuring device
device intended to be used for taking measurements, alone or combined with one or more auxiliary devices

[SOURCE: ISO/IEC GUIDE 99:2011]

3.4
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 DIS 50001:2017]

3.5
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 DIS 50001:2017]

3.6
measurement point
location of the sensing function(s) of a measuring device

3.7
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”]

3.8
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

3.9
metering
continuous integration of quantities measured as a function of time

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

3.10
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 50015:2014]

3.11
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 50015:2014]

3.12
influencing factor
either a relevant variable or a static factor

3.13
monitoring
continuous evaluation of measurements or signals, with the aim of reporting potential system malfunctions and possibly to provide alarm indications

Note 1 to entry: to entry: Examples of measurements to monitor in an electrical installation are the power factor, voltage, harmonics, etc.

3.14
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.

3.15
boundary
physical or site limits and/or organizational limits as defined by the organization

[SOURCE: ISO 50001:2011]

3.16
zone
geographical or functional space defining a part of the organization

Note 1 to entry: 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).

3.17
significant energy use
energy use accounting for substantial energy consumption and/or offering considerable potential for energy performance improvement

[SOURCE ISO 50001:2011]

3.18
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]

3.19
measurement repeatability
measurement precision under a set of repeatability conditions of measurement

[SOURCE: ISO/IEC GUIDE 992011]

3.20
repeatability condition
condition of measurement, out of a set of conditions that includes the same measurement procedure, same operators, same measuring system, same operating conditions and same location, and replicate measurements on the same or similar objects over a short period of time

Note 1 to entry: to entry: A condition of measurement is a repeatability condition only with respect to a specified set of repeatability conditions.

Note 2 to entry: to entry: In chemistry, the term "intra-serial precision condition of measurement" is sometimes used to designate this concept.

[SOURCE: ISO/IEC GUIDE 99:2011]

3.21
uncertainty
non-negative parameter characterizing the dispersion of the quantity values being attributed to a measurand, based on the information used add the examples

[SOURCE: ISO/IEC GUIDE 992011]

3.22
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: to entry: Sensitivity of a measuring system can depend on the value of the quantity being measured.

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

[SOURCE: ISO/IEC GUIDE 99:2011]

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 efficiency gains made over time;

— identify potential improvements

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

A measurement system brings together the elements described in Figure 1, according to the needs of the organization:

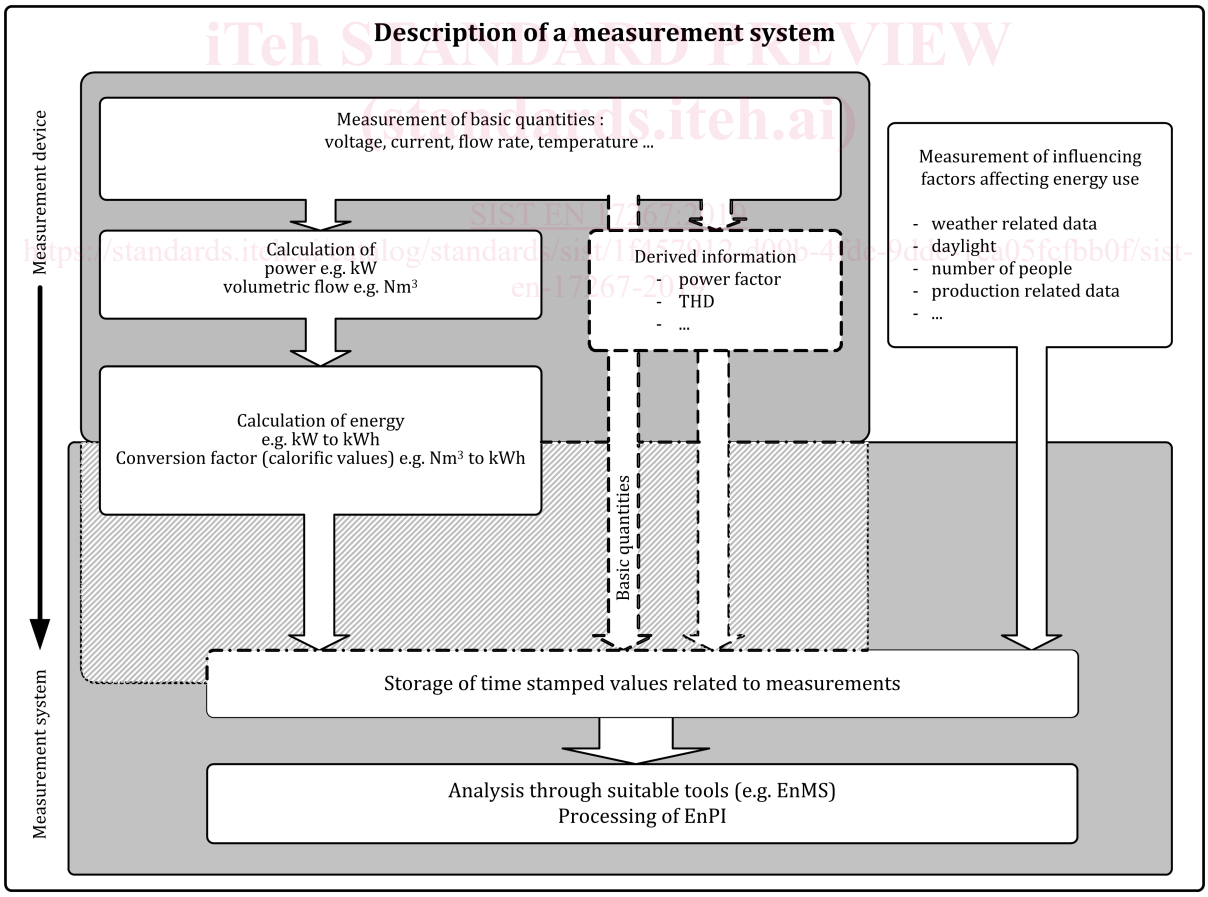

Figure 1 — Description of a measurement system

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 5.2 to 5.7 when putting in place a measurement and monitoring plan, as described in the following figure:

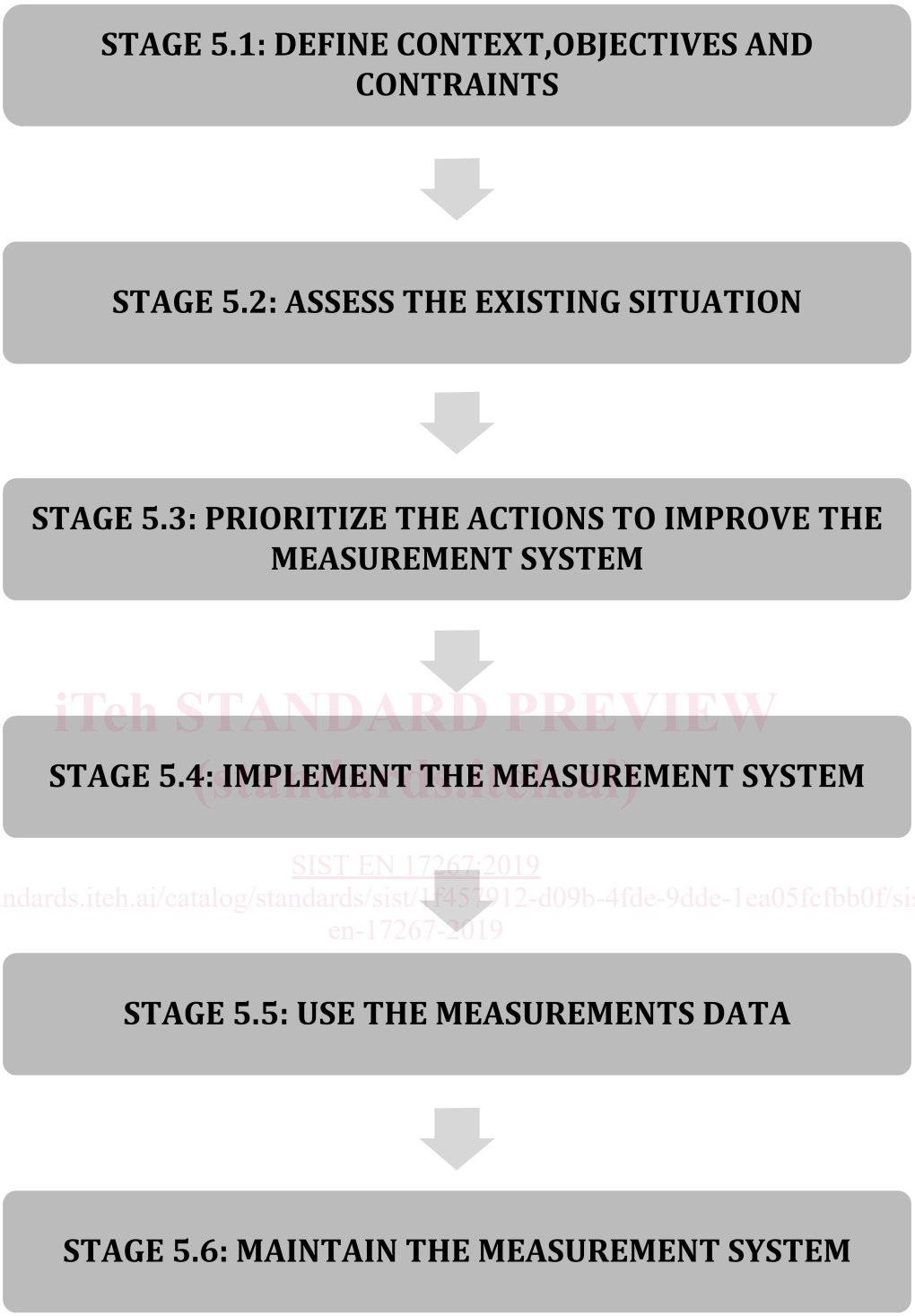

Figure 2 — The stages of a measurement and monitoring plan

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;

— "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;

— etc.

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 and its according to the needs and targeted objective;

— 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.

5.2.3 Motivations of the organization

The organization shall design its measurement and monitoring plan such that it contributes to the improvement of its energy performance.

By putting in place a plan, the organization may obtain benefits such as:

— improve the monitoring of energy consumptions;

— detect anomalies or drifts;

— facilitate operation and maintenance;

— implement a proactive approach to improving energy performance;

— meet the legal requirements and other requirements relative to energy;

— implement the recommendations of the energy audits.

5.2.4 Boundaries of the measurement and monitoring plan

The organization shall define the boundaries of the measurement and monitoring plan, and more specifically the sites and the zones.

NOTE 1 See Annex A for an explanation on the notion of zones.

NOTE 2 For electrical applications, another way to define boundaries is using the notion of mesh (see IEC 60364-8-1)

5.2.5 End purpose of measurements

The organization shall define the end-purpose of each measurement within the measurement and monitoring plan, such as:

— calculate an Energy Performance Indicator (EnPI) (as described in ISO 50006) and follow its development over time;

— establish an energy baseline (as described in ISO 50006);

— verify the savings;

— monitor the energy performance of an equipment, a process or an installation.

Additional measurements of influencing factors are in the scope of the standard, to complete the information provided by energy meters. Yet it should be verified that all the measuring points included in the measurement and monitoring plan are intended to improve the energy performance of the organization. Parameter measurements that have no direct or indirect influence on energy consumption are not included in the boundaries of the energy measurement and monitoring plan.

5.2.6 Users of the plan

The organization shall identify the specific needs of each type of user of a measurement and monitoring plan, including but not limited to:

— top management: defines the organization objectives relative to energy management in general and energy measurement and monitoring in particular including the budget and priorities;

— energy manager: provides expertise related to energy management, at site or organizational level. The measurement and monitoring plan is one of the tools he uses to implement an efficient energy management system. The energy manager is responsible for making sure the scope of measured data are consistent with energy management objectives;

— operating and maintenance staff: tasked with using the measurement system to check and ensure efficient operation by taking corrective measures in the event of deviations in energy performance, by eliminating energy losses and performing corrective and preventive maintenance to reduce deterioration in energy performance. The operating and maintenance personnel can use the