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Energy audits —

Part 3: Guidance for conducting an energy audit using ISO 50002-1 in processes

FDIS stage

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO ~~documents~~document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

~~Attention is drawn~~ISO draws attention to the possibility that ~~some of~~ the ~~elements~~implementation of this document may ~~be~~involve the ~~subject~~use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents~~.~~. ISO shall not be held responsible for identifying any or all such patent rights. ~~Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see).~~

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 301, *Energy management and energy ~~savings~~savings*.

~~This first edition, along with ISO 50002-1 and ISO 50002-2, cancels and replaces the first edition ISO 50002:2014.~~

A list of all parts in the ISO 50002 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

An energy audit can help an organization identify opportunities to improve energy performance. It can be part of a site-wide energy management system (EnMS). This document provides guidance for conducting an ISO 50002-1-based energy ~~audits~~audit of processes.

There are many types of processes in industry and commerce. In general, energy is used:

— directly by a process~~,~~ (e.g. ~~(~~furnaces~~,~~ direct fired dryers);

— indirectly by a process (e.g. heat exchange, distillation, extrusion), including the specific conditions of production (e.g. start-up, shut-down, product change over, cleaning, maintenance, laboratory and product transfer);

— directly by a commercial organization, (e.g. meal preparation process, TV broadcasting process, data centre process, coffee roasting);

— utility processes (e.g. motor driven systems (fans, pumps, motors, compressors, etc.), steam, hot water), including on-site power plants;

— product or service changeover, (e.g. change of production feed or production quality, start-up, shut down, cleaning-in-place, sterilization);

— other processes (e.g. sterilization in hospitals, fume cupboards, laboratories).

~~NOTE~~ The energy audits covered by this ~~international standard~~document may be independent from energy performance certification.

~~In this document, the following verbal forms are used:~~

- ~~"shall" indicates a requirement;~~
- ~~"should" indicates a recommendation;~~
- ~~"may" indicates a permission;~~
- ~~"can" indicates a possibility or a capacity.~~

Energy audits —

Part 3:
Guidance for conducting an energy audit using ISO 50002-1 in processes

1 Scope

This document gives guidance on how to apply ISO 50002-1 to carry out energy audits of a process. It is intended to be used in conjunction with, and is supplementary to, ISO 50002-1.

If buildings are included in the scope of the energy audit, the energy auditor can choose to apply ISO 50002-2.

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 50002-1, *Energy audits — Part 1: General requirements with guidance for use*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 50002-1 and the following apply.

ISO and IEC maintain ~~terminological~~terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
audit client
~~the audit client (the~~ person or organization ~~who~~that commissions an energy audit~~)~~

Note 1 to entry: to entry. The audit client can be the owner, operator, process licensor and/or the service provider.

3.2
process
~~a process is a~~ set of interrelated or interacting activities that use inputs to deliver an intended result

Note 1 to entry: to entry. This can include one or more production lines, laboratories, research centres, packaging and warehouse sections with specific operational conditions and site transportation. An energy audit can be conducted on selected processes or systems in an organization or *site* (3.4) or on all processes in an organization or site.

3.3
production process
all the steps, or some of the steps, necessary to manufacture a product, ~~or an~~ intermediate product, ~~or a~~ by-product~~,~~ or ~~a~~ co-product, or to deliver a service

Note 1 to entry: Production process can include specific facilities for health, safety and ~~environment~~environmental pollution control.

3.4
site
processes (3.2) within the boundary of the organization

Note 1 to entry: This may include processes for pollution treatment, energy recovery and waste management.

3.5
utility
generation and distribution of energy necessary for the *process* (3.2) and ~~auxilliary~~auxiliary

4 Principles of energy auditing

The principles of ISO 50002-1 apply.

5 Performing an energy audit

5.1 General

The general requirements of ISO 50002-1 apply.

5.2 Planning

In processes, the audit client and the auditee can be different. Their roles and responsibilities in the process can also be different. For example, a process can be owner operated and maintained by a single organization. The process can also be owned, operated and maintained by different organizations.

The energy auditor should obtain a preliminary description of the site and the process from the organization or from a site visit.

NOTE 1 The preliminary contact can be by telephone, webinar, meeting or other remote interactive discussions.

The energy audit scope and boundaries should be defined and agreed between the energy auditor and the audit client. At a minimum:

a) the audit client should have operational control of the process, or should have the ability to influence and seek the cooperation of the operator; ~~and~~

b) the energy audit scope should cover energy use within the process and/or the interaction of energy use with other energy use within the process. Optimization of some energy use while excluding others can give misleading results.

Considerations for the audit scope and boundary include:

— processes included in the energy audit;

NOTE 2 A process can be defined as the whole process, part of a process, part of a system or a component.

— whether or not outsourced utilities are included in the energy audit;

— depending on the thoroughness of the energy audit, the need for a detailed energy audit to be carried out for specific processes should be checked. ~~The level of detail required by the audit client will impact on" to the following:~~; in this case, reference should be made to the relevant standard.

~~— application;~~

~~1) business needs addressed;~~

~~— data collection;~~

~~— analysis;~~

~~— opportunities identification;~~

~~2) opportunities evaluation; and~~

~~3) outputs.~~

~~In this case, reference should be made to the relevant standard (see Bibliography).~~

For energy use not directly related to the process (e.g. storing, packaging, logistics, offices, research ~~centre, laboratory~~centres, laboratories, transport), the energy auditor should agree with the organization on the applicability of ISO 50002-2 (buildings) or ISO 50002-3. (processes); depending on the nature of the activities, the auditor may also rely on the general framework of ISO 50002-1. This ~~choice~~decision and the agreed scope should be clearly stated in the final energy audit report (see 5.8~~5.8).~~).

ISO 50002-1~~,:—,~~ Annex A, describes three different types of energy audit, each having a different level of ~~details~~detail and thoroughness. The ~~agreed~~ level of ~~details and thoroughness~~detail agreed by the parties will have an impact on:

— application;

— business needs;

— data collection;

— analysis;

— opportunities identification;

— opportunities evaluation;

— outputs;

- the time on-site~~;~~
- ~~choice of samples;~~
- ~~level of modelling;~~
- ~~requirements for measurements;~~
- ~~level of metering, including sub-metering;~~
- ~~level of defining the energy performance improvement opportunities;~~
- ~~required energy auditor competence; and~~

— ~~expected deliverables and report format~~.

For each audited process, the energy auditor and organization should agree on the relevant personnel, and their roles which have an impact on energy consumption, and should propose a preliminary list of data to be collected.

5.3 Opening meeting

No additional guidance to ISO 50002-1.

5.4 Data collection

The data collection can be carried out over several stages during an energy audit.

During data collection, the energy auditor should:

a) collect and collate appropriate energy data that support the audit objectives, the required audit scope and the level of thoroughness of the energy audit, including:

   1) site information including building, boundary and other relevant information;

   2) utility information;

   3) production process information;

      i) product specification;

      ii) main processes equipment involved in the process (drawings, other relevant technical data and datasheets);

      iii) current operating conditions (set points) of utilities and production process;

      iv) other considerations that ~~could~~can impact energy performance on a non-routine basis (static factors);

      v) specific conditions and constraints for process and environment (security, pollution, health, etc.);

   1) ~~Information~~information on energy ~~sources~~source types~~.~~:

b) verify the data and information provided by the organization (e.g. the power or the number of pieces of equipment);

c) obtain any missing data; ~~and~~

d) check the quality and plausibility of the data, and ask for correction if significant mistakes or inaccuracies are identified.

NOTE 1 The collected data can be based on invoices, contracts, measurements, calculations from given operating hours and installed capacity (technical characteristics), operation and maintenance documents, meeting with operations and maintenance personnel, etc.

NOTE 2 See Annex A for examples of data that can be collected.

5.5 Measurement plan

5.5.1 General

The energy auditor should review the information collected and provided by the organization. This is carried out to ensure that the information is complete and representative and to identify further information and measurement needs. If the data requested are not available, the energy auditor should define the method to obtain the necessary information (e.g. measurements, estimates, modelling).

It is also possible to identify preliminary opportunities for energy performance improvement or areas for investigation during the site visit.

5.5.2 Preliminary data analysis

The energy auditor should carry out an analysis of the data collected to:

a) undertake a preliminary analysis of the process energy balance on the basis of energy data;

b) establish the relevant variables and static factors;

c) identify significant energy uses (SEUs);

d) establish the relevant energy performance indicators (EnPIs);

e) evaluate the distribution of energy consumption (consumption breakdown) if possible, depending on the measured data available;

f) if there is sufficient information, establish an initial energy reference (energy baseline) to be used for quantifying the impacts of energy performance improvement actions (EPIAs);~~ and~~

g) plan further data collection and measurement to be carried out during field work.

The energy auditor should develop a preliminary list of EPIAs.

5.5.3 Data measurement plan

If there ~~is~~are missing data and information, depending on the scope of the energy audit and level of thoroughness, the energy auditor should:

a) request the missing information from the organization;

b) carry out additional measurements during the site visit;

c) make an assumption about the data based on experience and competence (and provide details in the energy audit report).

Where additional on-site measurement is determined to be feasible, ISO 50002-1 outlines a short list of data that can be measured while on-site.

The energy auditor should also review the collected data (and eventual data measurement) to see whether the energy audit objective(s) and audit scope are still appropriate and can be achieved. If the audit objective and audit scope cannot be achieved, the energy auditor should discuss and agree on an alternative with the organization.

NOTE See Annex B for quality data measurement plans.

5.6 Site visit

5.6.1 Site visits

No additional guidance to ISO 50002-1.

5.6.2 Management of field work

The energy auditor should inspect the processes within the audit scope in order to achieve the audit objective. This includes:

a) collecting any missing data needed for analysis;