ISO 50001

Energy management systems

A practical guide for SMEs

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Foreword

Economic growth relies on energy. As large parts of the developing world embark on industrial growth and participation in global trade, rising energy costs and the foreseen sizeable increase in demand make energy efficiency an important priority.

Firstly, energy efficiency makes good business sense since it entails cost savings and improvements through optimized use of resources and reduced waste. It leads to improved energy performance; it increases the reliability of operations and processes; it strengthens security of supply and reduces exposure to energy price rises and fluctuations. Energy efficiency ultimately leads enterprises to higher profits and additional benefits such as credibility, prestige and customer trust that also have an important market value.

Secondly, energy efficiency contributes to mitigating the negative impact of energy use and consumption on the environment, both at local and global level. The endowment and renewal rate of natural resources, including energy, cannot keep up with the current patterns of economic growth; a more resource-conscious approach is needed to do more with less, encouraging greater use of sustainable energy solutions and striking the right balance between growth and resource utilization.

Estimates indicate a 30-40 % energy efficiency improvement potential across most economic sectors of many countries around the world, with currently available technologies. This potential of cost-effective energy savings remains largely untapped, especially in the case of small- and medium-sized enterprises' (SMEs), and it represents a major productivity and environmental loss.

Energy costs are very often a significant part of an SME's budget. Managing and using energy efficiently can contribute to substantial gains over time. While individual SMEs have a relatively small energy consumption, their efficiency improvement potential is usually much higher than that of large energy consumers. Considering the high number of SMEs in any economic sector or supply chain, collective efficiency improvement measures can have a major impact on energy costs for the sector and the nation at large, as well as substantial beneficial effects on the environment.

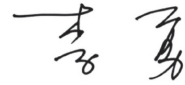
Despite sizeable opportunities for cost-effective energy savings and efficiency improvements, SMEs lag behind in implementing measures and reaping the benefit of potential reductions in operating costs. SMEs very often lack information, competencies, methodologies and resources to both identify and implement practical measures that can bring about such substantial savings and gains.

To trigger interest in energy efficiency and with a view to helping SMEs take actions to overcome many of the barriers that prevent them from implementing practical measures and saving energy, ISO, ITC and UNIDO have decided to join forces and prepare this Guide "ISO 50001: Energy management systems — A practical guide for SMEs".

This guide intends to help SMEs understand the requirements of the ISO 50001 standard for energy management systems, become familiarized with the main components of such systems and acquire the skills needed to identify and implement concrete energy efficiency improvement measures.

We hope that this guide with its CD-based software will serve as a practical tool and a useful resource for SMEs in their efforts to improve their competitiveness and increase their participation in international trade, while contributing more effectively to sustainable development.

Arancha GONZALEZ
Executive Director
ITC



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Introduction

The International Standard ISO 50001 — *Energy management systems — Requirements with guidance for use* enables organizations to establish the systems and processes necessary to improve energy performance, including energy efficiency, use and consumption. ISO 50001 provides a framework of requirements for organizations to:

- develop a policy for a more efficient use of energy,
- fix targets and objectives to meet the policy,
- use data to better understand and make decisions about energy use,
- measure the results,
- review how well the policy works, and
- continuously improve energy performance and management.

ISO 50001 is based on the management system model of continual improvement also used for other well-known standards such as ISO 9001 or ISO 14001. It is therefore easier for organizations to integrate energy management into their overall efforts to improve quality and environmental management.

This handbook, in the form of a checklist, aims to provide practical guidance to SMEs on developing and implementing an energy management system based on ISO 50001. Using this handbook to implement an energy management system will help your organization to improve its energy performance, helping to reduce energy consumption and costs.

The handbook is presented in 22 chapters organized in four parts, each covering a particular aspect of ISO 50001, with a brief explanation of the relevant requirement and guidance on how to incorporate the requirement into an energy management system geared to the needs of SMEs.

The handbook does not need to be read in one go. Each question is formulated to be answered as 'Yes' or 'No'. By answering 'Yes', you confirm that you understand that issue and have included it in your energy management system. Answering 'No' means that you are not sure about that aspect and the handbook will provide you with additional information and guidance to address the issue.

Commitment

Chapter 1 — *Energy management* describes how your organization can develop a systematic continuous improvement method rather than have an *ad hoc* approach to energy management.

Chapter 2 — *Scope and boundaries* helps you to define which energy sources and uses are included, and which parts of the organization are included.

Chapter 3 — *Energy policy* helps you to develop and periodically review the energy policy document, stating your organization's commitment to achieving energy performance improvement as defined and signed off by top management.

Chapter 4 — *Resources* helps you to ensure that relevant personnel understand their roles, responsibility and authority, and are resourced and supported in their roles in the implementation of the energy management system. It also considers other resources such as financial and data requirements.

Planning

Chapter 5 — *Planning* helps you to develop plans to reduce energy consumption.

Chapter 6 — *Legal and other requirements* helps you to identify and document all the legal and other requirements affecting your organization's energy use, consumption and efficiency.

Chapter 7 — *Energy review* takes you through all the steps that are necessary when carrying out an energy review.

Chapter 8 — *Performance measurement* covers energy consumption, relevant variables, energy performance indicators and baselines.

Chapter 9 — *Target setting and action plans*, based on available energy-saving opportunities, helps you to develop targets and action plans.

Implementation

Chapter 10 — *Awareness, training and competence* enables you to help people that affect the energy consumption of the organization to understand their roles and to be competent in their use of energy.

Chapter 11 — *Communication* helps you to ensure that relevant people are aware of the Energy Management system activities and have an opportunity to contribute to the improvement of energy performance.

Chapter 12 — *Documentation* helps you to ensure that critical documents and records pertaining to energy performance and the energy management system are maintained and available to those requiring them.

Chapter 13 — *Operational control* helps you to ensure that all significant energy-using equipment and systems are maintained and are operated efficiently.

Chapter 14 — *Energy-efficient design* helps you to ensure that new projects or changes with a potentially significant energy impact are evaluated from an energy perspective.

Chapter 15 — *Procurement* helps you to ensure that the procurement of energy, equipment and services is managed to reduce costs and improve performance.

Checking

Chapters 16 — *Monitoring, measurement and analysis* helps you check energy performance indicators, operating parameters and other performance-related data and information.

Chapter 17 — *Evaluation of compliance with legal requirements and other requirements* helps you appraise your fulfilment of the legal requirements you identified in Chapter 6.

Chapter 18 — *Internal audit* helps you check if the system you have set in place is working

Chapter 19 — *Nonconformities* provides different approaches to manage nonconformities.

Chapter 20 — *Management review and continual improvement* helps you monitor, audit, and check the people are using the system as intended.

Chapter 21 — *Demonstrating conformity* focuses primarily on the third-party certification process carried out by an independent and competent body and provides guidance on the steps involved.

Chapter 22 — *Integration with other management systems* looks at the benefits and factors to take into account when using more than one management system.

This handbook does not include the text of ISO 50001:2011, therefore, it is recommended that users obtain a copy from their national standards body or from ISO.

1 Energy management

1.1 Does your organization understand the benefits of managing its energy consumption?

☐ Yes ⇢ Go to next question

☐ No ⇢ See guidance below

Many organizations think of energy consumption as a fixed overhead that can't be controlled nor reduced. But energy consumption can be managed and reduced with the right approach. Organizations that make a commitment to improvement by following the principles of good management make significant energy savings, often without investment in new technology. This guide will provide guidance on how to apply good management practice in the improvement of energy consumption in accordance to the International Standard, ISO 50001.

Some of the direct financial benefits of managing energy effectively are:

- reduced cost of energy consumption,
- reduced environmental impact from the use of energy and reduced CO_2 emissions,
- reduced exposure to rising energy prices,
- increased availability of utility services. For example, if the consumption of compressed air in a factory is reduced, there will be more compressed air available for productive use elsewhere,
- increased production reliability and production output/yields, and
- improved equipment performance.

There are also additional indirect benefits resulting from the operational improvements that will occur. There is almost always additional financial value arising from energy savings. These often exceed the financial value of the energy saved. These indirect benefits will vary from industry to industry and with the type of improvements made. Typical examples include:

- improved control of operations leading to improved productivity and stability of operations,
- reduced noise in many cases,
- improved comfort levels in buildings including temperature, ventilation, lights, etc.,
- reduced maintenance costs arising from better operation of equipment and machinery,
- reduced downtime,
- reduced waste production,
- reduced water consumption, and
- compliance with applicable legal requirements and other requirements.

Other potential benefits to small-to-medium enterprises (SMEs) and other organizations include improved teamwork and management practices.

Reducing energy costs does not usually have any negative effects on the organization, its operations or its people. This is unlike most other forms of cost reduction that typically have direct and indirect effects on many people; employees, and contractors.

Reducing energy consumption can be achieved in many ways. This checklist outlines a methodology that will lead to continual and sustained energy reduction through a systematic approach.

In brief, this means:

- developing a commitment to improve energy consumption at all levels in the organization,
- developing plans to identify the changes and opportunities that will reduce energy consumption,
- implementing these plans, and
- monitoring and verifying that improvements have been achieved.

Improvement plans are continuously added to and implemented. Managing energy is not a project by itself; it is a practice involving a set of measures and tools an organization will use in its day-to-day activities.

The term energy performance improvement can have many interpretations. In most cases, it simply means consuming less energy for the same level of output. There are also cases in growing organizations where improved performance can mean energy demand growing at a slower rate than production output. Measuring energy performance can be a complex topic but this checklist will highlight the main points, problems, solutions and indicators to do this effectively.

Organizations of all sizes and in all sectors have been successful in reducing their energy consumption and improving their energy performance. The most successful are those who make the appropriate commitment and involve the right resources in their activities. In the early years of implementing a systematic approach to energy management, most savings can be made at little or no cost or investment.

It is important to realize that these improvements do not involve compromising production output, quality, safety, comfort or other organizational requirements, including occupational health and safety requirements.

1.2 Do you fully understand the importance of commitment in achieving sustainable improvements in energy performance?

- ☐ Yes ⇢ Go to next question
- ☐ No ⇢ See guidance below

The major barrier to achieving energy savings is lack of commitment in the organization. It requires a high level of commitment at all levels in the organization to making the changes necessary to achieve these improvements.

It is not difficult to reduce the energy consumption of typical organizations. It is not normally a technical challenge as, in many instances, energy savings can be made by investing in new technology. Large savings can also be achieved by examining how existing equipment is used, ensuring it is operated it in a more

efficient way, and reducing energy and other waste. The latter is usually the best place to start if you are interested in long-term sustainable improvements.

Gaining commitment from top management is a prerequisite to the successful implementation of an energy management system (EnMS). The implementation requires commitment of time and human resources especially. It requires that energy-saving opportunities are given some priority as part of the normal daily activities and decision-making of the organization. It is also about getting "energy" into the routine conversations and decision-making of the organization. It requires that barriers to improvement are identified and reduced or removed.

Lack of commitment is often manifested through:

- Difficulty and procrastination in making operational decisions to save energy. This is often an issue that goes beyond energy consumption, and is often shared with other activities needing improvement.
- Resistance to change due to a variety of reasons, including lack of sensitization, lack of knowledge or laziness. Sometimes people may fear loss of reputation, in that if the change results in improvement then this may be perceived as personal failure to not have addressed this earlier. These attitudes need to be changed through communication of the benefits of improved energy performance and through other change-management practices.
- Inadequate allocation of time on the part of top management to take an interest in the potential and actual benefits of energy management and energy efficiency improvements, or to provide necessary resources or to promote action to improve.

It is very easy to declare that you are committed and interested but the reality is often very different. Real change requires more effort and real input.

If deadlines are not met and improvements not made, then this is often a clear indication that either energy management is not a priority issue for the organization or that enough effort and time are allocated to it. This is applicable to all levels of the organization.

The existence of an EnMS without the necessary level of commitment does not guarantee improvements and therefore the reduction of the consumption. Many organizations go through the motions of implementing management systems,

have all the required documentation but do not really make them part of daily work practices, hence do not derive the maximum benefits from the systems.

Building effective commitment at all levels of the organization is covered in more details in later parts.

1.3 Does your organization have any form of EnMS?

- ☐ Yes ⇢ Go to next question
- ☐ No ⇢ See guidance below

The idea behind an EnMS is to have a systematic approach that will be sustainable and nurture a culture of continuous improvement. ISO 50001 is a very good starting point and gives an effective methodology to developing an EnMS. Because it is an ISO standard, it has global recognition.

It is easy to develop an EnMS that has all the components to conform to the requirements of ISO 50001. However, in most organizations, culture change is required to improve performance in a sustainable way. This means understanding the internal barriers the organization will face, deciding how the organization will address these barriers, and embed improved practices into daily behaviour.

Managing energy consumption can be achieved by using a planned and structured system appropriate to the organization. This will include:

- Making a commitment to improve and change. This is often the most difficult part.
- Planning where you need to improve. This includes investigating opportunities related to people, technology and data analysis.
- Undertaking day-to-day activities and improvements to reduce energy consumption.
- Checking if everything is working to plan. Is performance really improving and is everyone doing what is expected of them?
- Continuing to build commitment. Take actions to further improve the system and your commitment to it. Ensure that improvements made are sustained.

ISO 50001 is structured to include all of these components.

There are a wide variety of approaches to managing energy and reducing its consumption. Some organizations don't think energy use can be reduced and don't take any steps to improve this but most make some efforts to improve. With rising energy prices and increasing levels and stringency of regulation now a global fact of life, more and more companies are realizing that some action is required. Most organizations develop their own approaches to managing energy. Some are effective and beneficial but many stop working after an initial surge of enthusiasm (see Appendix A).

1.4 Do you know how all the parts of an effective energy management system fit together?

- ☐ Yes ⇢ Go to next question
- ☐ No ⇢ See guidance below

Although the initial development of an EnMS is normally a one-off project with defined tasks and schedule for completion, the use of the management system is not a project. It needs to become a routine part of daily operations for all those with roles in the system. It is an on-going process of continual improvement. This improvement applies to both energy performance and improvement of the systems and processes used to manage it.

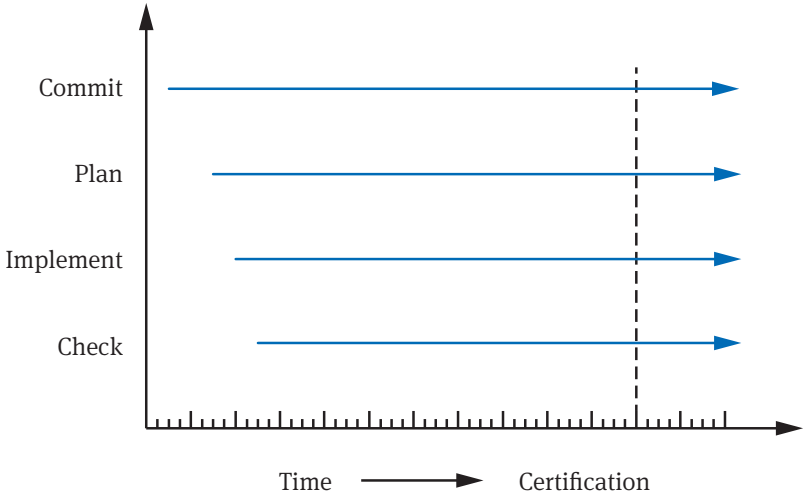

Figure 1 — Implementation timeline (Source: GEN Europe)