

# Movicon in energy efficiency management: the ISO 50001 standard

The importance of energy consumption within the company reflects the importance of the world energy crisis due to a growing demand and the consequent problems relating to energy supply, high costs, environmental pollution and the greenhouse effect.

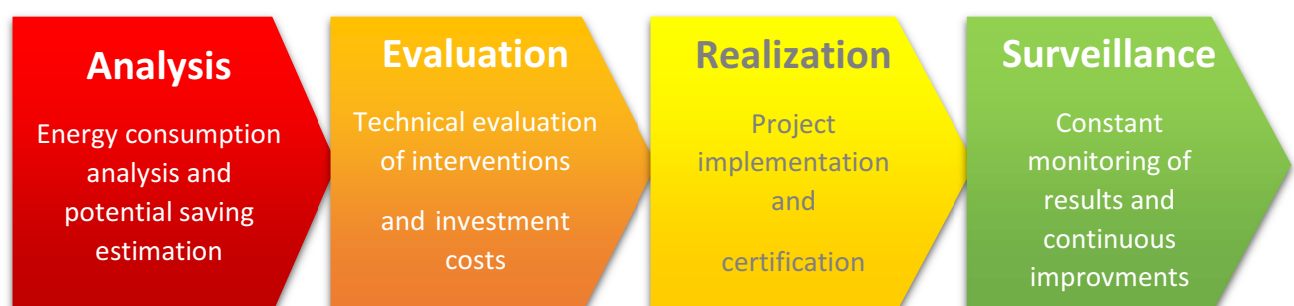


It is increasingly becoming more essential for industrial manufacturing companies to install energy management systems to improve the efficient use of energy and reduce consumptions. Energy efficiency and consumption reductions both constitute an important role in production costs that can easily exceed 10-15% of overall company expenditures. In addition, the introduction of stricter norms have led companies to adopt new energy efficiency standards as defined in the recent ISO50001 normative, introduced in June 2011 to replace the UNI EN 16001. This normative relates to the Energy Management standards on energy consumption and finalizes the most appropriate actions to take for implementing continuous energy efficiency improvement, that has become a major objective for most manufacturing companies. This certification enables companies to reduce energy costs by improving energy efficiency and therefore obtain considerable economical returns while reducing pollution and increasing their public image by contributing towards reducing depletion of energy resources and mitigating worldwide effects of energy use, such as global warming. The ISO50001 standard represents an opportunity for all manufacturing companies to confront energy problems

effectively in order to establish new policies capable of improving efficiency through investments aimed at rapid returns and important benefits as a consequence.

By implementing the ISO 50001 standard in your company you will be able to monitor and improve the processes of energy usage by concentrating on solutions designed for major efficiency favoring energy recovery that can result numerous and important above all in the industrial sector. For example, by taking greater care in making sure that motors and boiler pumps work more efficiently, or recovering energy used in production processes will enable a reduction in consumption which economically will lead to savings in terms of both energy and costs. Energy efficiency management is the most effective solution for reducing costs linked to energy consumption while reducing the release of greenhouse gas emissions into the atmosphere at the same time. You will be able to reap the economic and environmental benefits while fulfilling environmental protection commitment at an international level.

However increasing energy efficiency by targeting energy consumption involves making many decisions as well as change of habit and behavior which involve technical and human resource interventions. In addition, the wisest thing to do would be installing and setting up an optimum energy management system. Furthermore and just as important, these actions need to be supported and integrated with energy sustainability policies that encourage the use of alternative and cleaner energy sources or the modification of what exiting energy sources are used for and how it is used. Great efforts should also be made to pursue an economy based on a combination of technology, improved energy performance and careful management of ecologically and economically sustainable energy. Unfortunately, a solution to satisfy these objectives cannot be obtained by a simply deciding to purchase just any type of management tool: careful and continuous management combined with the full commitment of all company personnel constitute the fundamental ingredients to achieving effective energy consumption control and increase energy performance. Once this has been recognized it is important to start implementing the right tools and encourage an energy saving state-of-mind throughout all the organization activities that interest all corporate resources in particular those that deal with processes that need high to maximum power to run. Even though the ISO 50001 standard specifies guidelines and requirements for an efficient energy management system to help companies plan and establish improved energy efficiency, it is also concerned with effort made by company management to improve efficient energy performance with the proactive involvement across all company levels.



## The Energy Managers

The normative introduces an internal company model with the mission to manage and rationalize the use of energy: the energy manager was introduced in Italy with the 10/91 law entitled “Responsible for the conservation and rationalized use of energy”, which is compulsory only for those companies whose energy consumption exceeds 10,000 toe (ton of oil equivalent) in the industrial sector and 1000 toe in the non-industrial sector. The duties of the energy manager entail:

- Identifying actions, interventions, procedures and anything else necessary for promoting the rationalized use of energy consumption;
- Provide energy consumption balance sheet estimates for the following year based on economic parameters and usage of end energy users;
- Produce energy consumption progress reports showing interventions implemented with Government contributions

## The international ISO 50001 normative

The ISO 50001:2011 was published in 2011 by the International Organization for Standardization as a new international standard for energy management.

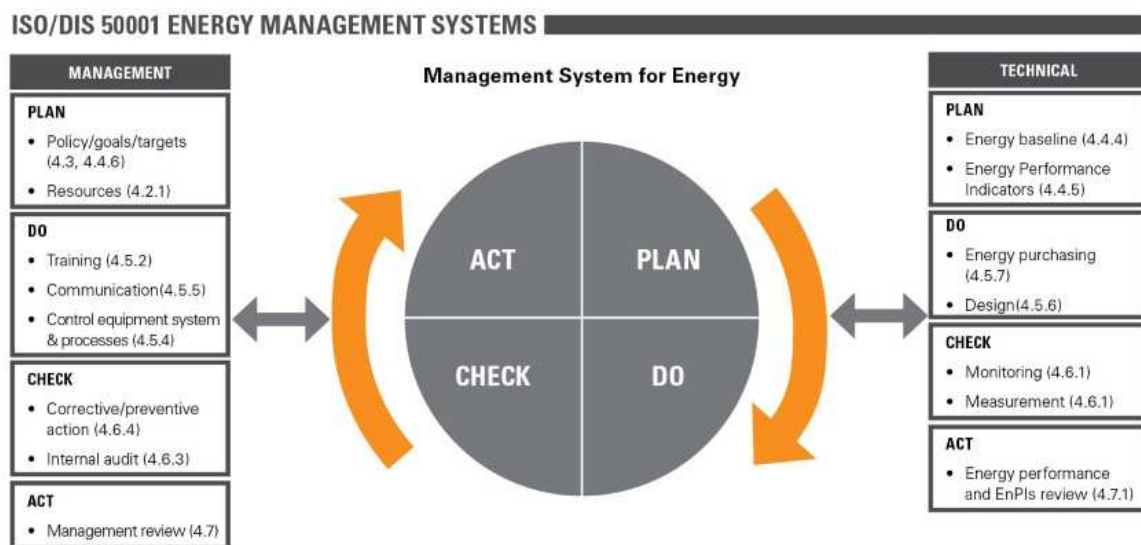
The ISO 50001 is valid at international and worldwide level and replaces the previous EN 16001:2009 normative published by CEN/CENELEC, European Committee for Standardization, which had exclusive validity only within Europe. The ISO standard focuses on corporate organization performance regarding energy efficiency across all company related levels throughout the supply chain and stipulates that companies should encourage suppliers to also comply. The purpose of this standard is to provide company organizations a framework to refer to when planning and integrating energy performances within the everyday management of their organizational practices.

Furthermore it seeks to promote the best methods to use for managing energy efficiently in order to reduce hothouse gas emissions. In this way, at worldwide level, organizations will be equally able to refer and implement the one standard for a univocal methodology for identifying and implementing improvements.

The standard is structured on the Deming cycle model using the Plan-Do-Check-Act approach. The Deming cycle is the baseline on which the philosophy for continuous improvement uses as a baseline to promote energy efficiency management in four stages:

- PLAN: energy management action plan (necessary for identifying problems or objectives and propose strategies and targets);
- DO: implement the energy management action plans;
- CHECK: analyze (monitor and measure processes of management plan actions and evaluate results and differences against the proposed strategies and targets);
- ACT: take actions to continually improve on accomplished energy performance targets.

ISO 50001 also supplements the four stage cycle with other guidelines: to confront energy problems it is important to identify certain aspects of the organization's energy consumptions focusing on those deemed most significant to analyze and evaluate how critical detected weak points are; this is followed by defining the chosen actions and putting them into action based on the proposed objectives and targets (PLAN). After having accomplished the targeted measurements (DO), these are then evaluated for their effectiveness (CHECK) and any detected weak points are then reviewed. Based on the check stage the plan cycle is then repeated by defining new goals and targets (ACT).



An energy management system presents an important opportunity for those who want to confront and improve energy efficiency within their organization with success by permitting:

- An systematic approach in defining energy goals and targets and identify the appropriate tools to achieve them;
- Identification of the action needed for improvement;
- Compliance to all mandatory requirements;
- Cost reductions relating to energy consumptions.

The voluntary approach element of this standard further permits organizations the freedom to establish their own targets and goals and relevant corrective and preventive actions.

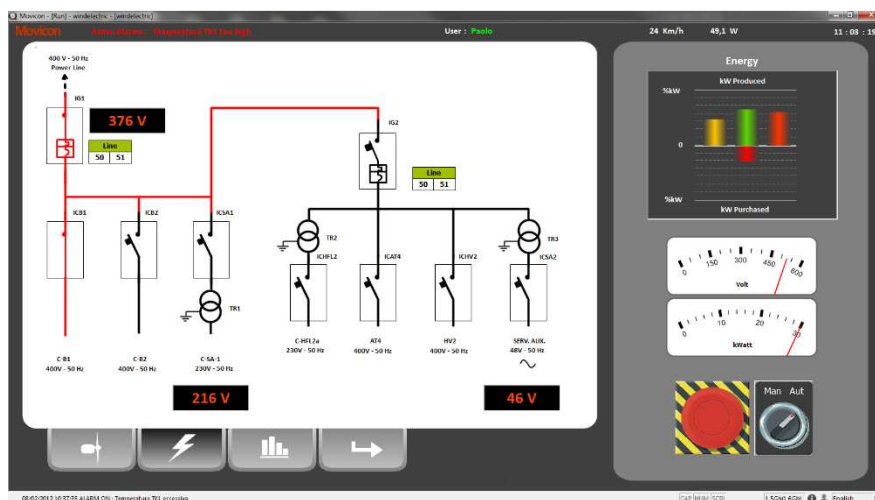
The implementation of an Energy Management system provides organizations the advantage to enhance competitiveness, especially when dealing with less dynamic competitors, by improving organization efficiency, public image and relations with stakeholders such as customers, assurance companies, creditors, public institutions plus other entities involved.

## Movicon™ a key tool in Energy Management Systems

The major part of the activity performed by management systems involve the use of an automatic data collection and monitoring system. It is virtually impossible to perform corrective operations when you do not have the correct and precise information on energy consumption situations available. Based on principle it is entirely impossible to improve what you cannot measure. This is why a Management System should provide a monitoring tool that enables the monitoring and managing of:

1. All sources of energy supply (electricity, water, gas, etc.)
2. Environment parameters correlated to consumptions and/or production (temperature, humidity, luminosity, etc.)
3. Process parameters (steam, compressed air, levels, operating status)

The Movicon™ monitoring and control system enables the instant collection of all the measurements relating to consumptions, environment and process parameters, in a native, integrated and expandable mode. Movicon™ makes it possible to connect and integrate with measuring devices, consumption meters, environment sensors and existing production systems, with minimum impact to get maximum results.



The Movicon™ platform openness makes it easy to integrate and expand it as a monitoring system. These conditions are necessary for long term investments which enable minimum impact on investment costs and unmatched economical returns in terms of precision, reliability and management simplicity.

#### Consumption measurements:

The energy is measured by identifying the cost centers. The targeted measurements provide clear and precise identification of each cost center, such as company in coming raw materials.

#### Energy efficiency:

Manage energy saving by increasing efficiency through identifying and removing the causes of wasted energy. This can be done automatically (i.e. load shedding) or by identifying and reporting with alarms.

#### Environment and process measurements:

It is necessary to measure and manage all those parameters closely connected to energy consumptions in order to optimize the running of processes in order to save energy and enhance profitability of production plant system and machines.

#### Energy Automation:

Integrating the system in the company organization is important for managing automation processes with the intention to optimize targeted energy consumption. For example, reduced energy consumption and efficiency can be achieved by starting up and shutting down systems on demand, managing load shedding during periods of peak consumption, managing process run and operation calendars and schedulers, notifications of anomaly conditions and their persistence.

#### Remote control management:

The possibility to manage measurements, statuses and anomaly from different workstations located wherever and whenever. This will reduce intervention time, management and maintenance costs. The remote control management includes real-time event notification to on-call duty staff, system access via the web using internet browsers or mobile devices such as smartphones and tablets.

#### Diagnostics:

It is important to manage, visualize and record all reporting and anomaly needed for simplifying maintenance and prevention. Diagnostics can also be used for monitoring energy quality to control service downtimes, constant energy flow disruption and other.

#### Auto energy production:

Connecting and retrieving information from auto energy production systems (cogeneration, photovoltaic, wind power and biomass energy) will enable system improvement, control of profitability and system functioning or malfunctioning.

## Data collection system considerations

Section 4.6 of the ISO 50001 normative refers to implementing the right tools to use in the Management System for monitoring and measuring energy parameters and performance (EnPIs). These are the essential and most fundamental features of any management system. According to the “You cannot correct what you cannot measure” principle, it is necessary to be equipped with a data acquisition and analysis system that is capable of retrieving measures relating to energy consumptions, environment and process parameters efficiently and transparently. The more information available to the Energy Manager, the more effective actions to improve energy efficiency will be. This will promote quicker investment returns that transform into positive economic gains.



Using the Movicon™ data collection system will enable you to take advantage and reap the following benefits:

- Open, expandable, flexible and modern platform.
- Available with hundreds of different I/O drivers capable of connecting to all meters, analyzers and control devices installed in building.
- Powerful and open visualization graphics for building layout designs with all the symbol graphics you will ever need available from a vast variety of libraries containing a rich supply of integrated symbols and objects; plus the option to totally customize graphics as needed.
- Integrated, simple and powerful logic for managing data aggregations, calculations or functions for measures, or command actions (i.e. load shedding or alarms).
- Powerful alarm management with event notification to on-call duty staff. Alarms handle dynamic values that can be grouped or filters by area, severity and much

more. Notification management using SMS, Email, Voice sent with alarm event, message and attached files.

- Powerful purposely integrated and ready-to-use functions for commands and scheduling, statistical data values managed automatically, alarm statistics analysis, programmed maintenance.
- Powerful historical data logging management open to any relational database type desired. Archives support SQL Server, Oracle, MySQL and others.
- Integrated Trends, Graphs and Reports for representing measured values dynamically or historically. Powerful reports can be created and managed with graphs showing consumptions, comparisons, filtered by time ranges or period plus other types of analysis, calculations and functions for displaying different value calculations, averages or variances, cost and saving percentages.
- Data protection, redundancy, user and password management, protection integration with company network domains.
- Integration with company IT level, made possible with DB connectors with dynamic variables or OPC technology. Therefore possible to integrate and communicate with company administrative or managerial systems (ERP, MES, SAP and others).
- Web access to all system functions. Movicon provides a Web Client functionality that is used for accessing Electric Management Systems by smartphone or tablet, locally or over the internet.

A data collection, monitoring and analysis system can be developed upon the above points using the Movicon™ platform. By using Movicon™ the Energy Management Team will be able to confidently manage the information needed for carrying out the various analyses. The information resulting from these analyses will enable system managers to perform any necessary remedial action to gain significant energy efficiency improvement, reduce costs and contribute to improving the environment.

Movicon™ is an essential tool for every Energy Efficiency Management System to use on a day to day basis to measure system performance indexes (EnPIs) with precision that comply and contribute to achieving the ISO 50001 certification.





# The content structure of the ISO 50001 standard

The ISO 50001 is divided into 4 points:

- 1. Purpose and Scope;
- 2. Normative References;
- 3. Terms and definitions;
- 4. Energy Management system requirements

Point 4 constitutes the main part of the standard. The fundamental indexes and points are listed below.

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2 Normative References

3 Terms and definitions

4 Energy management system requirements

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*4.4 Energy Planning*

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#### 4.6.5 Control of records

### 4.7 Management Review

#### 4.7.1 General

#### 4.7.2 Inputs to management review

#### 4.7.3 Outputs from management review

ISO 50001 also includes informative annexes: Annex A gives guidance on how to implement the above requirements. Annex B provides a table comparing the requirements of ISO 50001 with other ISO management system standards.

### Point 4.2.1: Top Management

This normative provides top managers with advice on what action to take, such as developing an energy policy within the company, in preparation for integrating an Energy Management System.

In addition to forming an energy management team, the top management should be able to guarantee all the economic and human resources needed; ensure that the action plan is appropriate to their organization by also taking long term energy performances into full consideration; ensure that targets are defined and accomplished with periodic reassessment.

### Point 4.2.2: Management Representative

A new and interesting addition to the norm is the energy management team: the energy manager is no longer expected to work alone but head a team of experts working towards the continuous running and updating of the system.

### Point 4.3: Energy policy

The energy policy is a clear, written and documented declaration from the management defining the actions to deploy in order to obtain energy performance efficiency. The policy establishes the general proposes of the organization's energy management system and contains guidelines on how to improve the use of energy utilities. Compliancy to the targets set by the management is one of the key points of the Energy Management System as the intrinsic interest of the decision-makers alone will accomplish important results with direct positive impact. The energy policy should:

- Be tailored to the nature and size of the organization and the energy consumed by its activities, products and services;
- Include fixed targets to sustain continuous energy efficiency improvement;
- Encourage recognition and compliancy to laws and regulations;
- Provide a framework to establish and review energy consumption objectives and targets;
- Documented;
- Support the purchasing of energy efficient products;

## Point 4.4: Energy Planning

The requirements for energy planning encompass defining and putting an energy policy into action, fixing targets and developing action plans by taking into consideration the relevant legal requirements and information regarding significant energy consumptions. The international standard dedicates three normative points to the development of an initial energy review (4.4.3), establish an energy baseline (4.4.4) and pinpoint energy performance indicators (4.4.5).

## Point 4.5: Implementation and operation

Focuses on the importance emphasized by the standard on energy performance evaluation both in the planning stage (4.5.6), using an approach based on the LCCA methodologies in defining production specifications, and in the process stage of procuring services, products, equipment and energy.

## Point 4.6: Checking Performance

This normative defines importance of monitoring energy performances to which the Plan-Do-Check-Act continual improvement framework should be used as a reference point to work upon. The standard clearly recommends the use of a data collection system to be developed as a measurement and analysis tool.

### Point 4.6.1: Monitoring, measurement and analysis

This defines the criteria and characteristics of the data collection operations. The key points define the need to establish what the energy performance indicators are (EnPIs) and to establish systematic measurement and analysis operations at adequate and fixed scheduled times on a regular basis.

Most specifically, the indicators should ensure information at the least on:

- Total and partial energy consumptions and uses
- Relevant parameters correlated to energy consumptions
- The effectiveness of actions taken in accomplishing fixed targets
- Evaluation criteria of retrieved measures against pre-estimated measurements

The monitoring and measurement results should be appropriately archived and recorded for easy and clear consultation.

In addition, it is necessary to establish a regular and periodic review of all measurement criteria to ensure the continuity of reliable, accurate and repeatable measurements.