

The ISO 50001 Energy Management Standard: What is it and how is it changing?

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ABSTRACT

The adoption of the ISO 50001 energy management system standard by the International Organization for Standardization (ISO) served to unite the previously separate national standards and provide a structured, globally accepted approach to the management of energy. While the standard has been implemented at over 1000 sites worldwide, recently ISO decided that all their management system standards should be revised by converting them to a uniform high-level structure. The new structure will yield improved results and harmonize different management system standards implemented by an organization. This article will examine the prominent features of an ISO management system, discuss the anticipated changes and present the expected effects of the revisions on implementing organizations.

INTRODUCTION

Improving organizational management methods is one of the surest approaches to increase output, reduce operating costs and improve the bottom-line. The International Organization for Standardization (ISO), is responsible for developing and publishing standards that are recognized and accepted globally. ISO Standards ensure that products and services are safe, reliable and of good quality. ISO Management System Standards (MSS) are resources that document world-class management practices and are recognized worldwide for giving a business a competitive edge, clients confidence in purchased products, goods and services, and providing implementing organizations with leverage in the market place.

ISO Management System Standards including requirements, guides and sector specific variants currently number about fifty and cover a broad range of topics. The first global management system standard, ISO 9000, detailed the establishment of a quality management system within an organization. In the ensuing 25 years since the adoption of this first international quality standard, the ISO developed and published four other widely applied management standards. The most widely known ISO management system standards include:

- ISO 9000 Quality Management
- ISO 14000 Environmental Management
- ISO 31000 Risk Management
- ISO 22000 Food Safety Management
- ISO 50001 Energy Management

The ISO 50001 Energy Management Standard, first released in June, 2011, is the newest management standard and the one of most interest to energy engineers. 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 [1]. Using an established management framework makes it easier for organizations to integrate energy management into their overall efforts to improve quality and environmental management. The following sections will present the theory and common elements of ISO management systems, show management system standard revisions currently underway with projected timeframes for completion, and discuss how proposed changes to the standard could affect energy management in your organization.

ISO MANAGEMENT SYSTEM STANDARDS: THEORY AND COMMON ELEMENTS

Management system standards are based on the Shewhart Plan-Do-Check-Act cycle (PDCA) illustrated in Figure 1. The Shewhart approach to management promotes continual improvement because in addition to the planning and doing tasks, it closes the loop on activity by incorporating checking and acting.

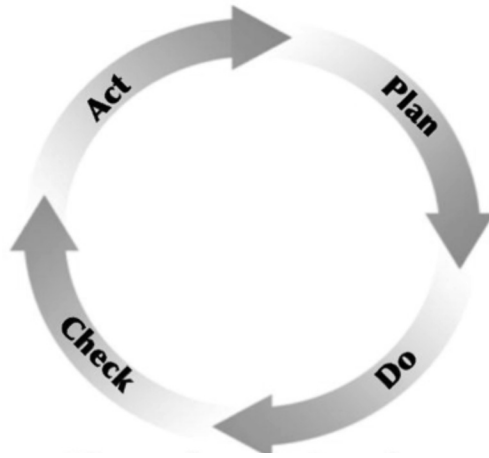


Figure 1. Shewhart cycle [2]

The conventional management approach employed in most organizations without an ISO management structure in place is essentially plan-do as shown in Figure 2. In plan-do energy management, project engineers plan projects and construction personnel then implement them. This approach has a primary focus on action, i.e. doing, with little or no attention on the results of the activity. That is, did the planned activity improve the organization in the area of management concern, or did we just complete another assignment without consideration of the ultimate result?

The organized structure of ISO management system standards is the reason implementation of ISO 50001 was one of the principal requirements to achieve DOE Superior Energy Performance (SEP) certification. A previous edition of Strategic Planning for Energy and the Environment contained a detailed description of the SEP program and described the types and methods of certification available [3].

Checking activities in the ISO 50001 standard address two areas: 1) effectiveness of the energy management system and 2) the efficacy of energy management actions. Effectiveness of the management system is measured by conducting internal audits. Audits are used to identify areas of non-conformity with the standard. Non-conformities are addressed with either corrective or preventive actions.

The efficacy of energy management action plans, often called energy management projects by energy engineering practitioners, is

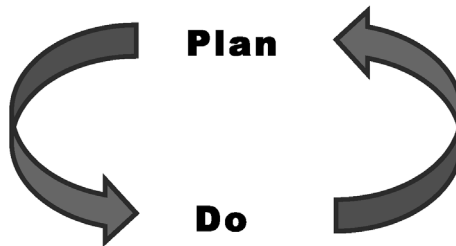


Figure 2. Conventional Management: Plan, Do

determined by monitoring and measuring. Since the objective of energy management is to improve an organization's energy performance, measurement of energy users or monitoring of utility accounts is the accepted technique to quantify performance. Evaluation of energy data following completion of energy projects allows an organization to determine if the planned improvement has been achieved. If expected improvement is not met, diagnostic tests are used to identify and isolate problems so they can be corrected.

The checking function is completed by acting on the findings. Acting is addressed in the standard by management review. Management has the responsibility for action as they are charged with making the decisions, providing resources, demonstrating commitment and working to sustain and continually improve both organizational energy management and energy performance. Management review is a key component to ensure that energy management is suitable, adequate and effective in meeting the organization's energy goals. Management reviews are conducted at regular, planned intervals, and records of the proceedings are maintained for reference.

Because all ISO management systems are modeled on the plan-do-check-act theory of continual improvement, different standards share common elements that impart effectiveness and efficiency. Shared elements offer the prospect of integrating the quality, environment, energy, risk and food safety management into one unified system within an organization. Each standard includes the following common parts:

- Responsibility
- Training, awareness and competence
- Document control
- Records

- Corrective and preventive actions
- Internal audits
- Management review

Corrective and preventive actions and internal audits, components of the checking function, were discussed previously. Likewise management review, the essential part of the action function, was also presented earlier. Responsibility, the assignment of defined roles and authority, is critical to ensure the establishment of an efficient hierarchical structure in an organization. Training, awareness and competence is the part of the management system that makes sure system participants have the necessary skill set to complete required tasks and are cognizant of the management system purpose. Documentation is a necessary part of a management system used to measure and track progress, describe effective work procedures and instructions and train and determine employee competency. Document control is a procedure to ensure that management system documents are up to date and accessible to the appropriate personnel. Records are completed documents used to activate and maintain the system.

ISO-MSS: CHANGES UNDERWAY AND TIME FRAMES

The previous section described the theory, application and common elements of world class management systems. The 26th ISO General Assembly in 2003 requested that the ISO Technical Management Board (ISO/TMB) see if they could improve the alignment between the various ISO management system standards. In response to this request, Annex SL Appendices 2, 3 and 4, were developed by the ISO Technical Management Board's Technical Advisory Group 13 "Joint Technical Coordination Group on Management system standards" (or JTTCG).

All ISO's Technical Committees (TCs), Project Committees (PCs) and Sub-committees (SCs) involved in the development of management system standards were requested to participate in the JTTCG. Other ISO bodies involved in the development of management standards (as opposed to management system standards) were also invited to participate. Following its formation with representation from all relevant groups, the JTTCG established a number of task forces to develop Annex SL, Appendices 2, 3 and 4. These were populated by experts from the

JTCG's participating TCs/PCs/SCs.

The output from the JTCG was circulated by the ISO Technical Management Board (ISO/TMB) as Draft ISO Guide 83, for a ballot amongst ISO's member national standards bodies. Following consultation amongst their management systems constituencies, the national standards bodies returned their votes, and the draft was approved.

ISO/TMB incorporated the text of Draft ISO Guide 83 into the ISO/IEC Directives, Procedures specific to ISO; 2012 as part of a new annex, now Annex SL. The intent was to allow diverse standards to be more effectively harmonized, by providing them with a starting point that has the same structure and core text. The committees provide additions based on the technical needs of the area such as quality or energy or modifications based on an agreed set of rules. Annex SL is a document that sets out a common high level structure and core definitions to be used in all ISO management system standards. The new (high level) structure to be incorporated into each management system moving forward is:

- | | |
|--------------------------------|---------------------------|
| 1. Scope | 6. Planning |
| 2. Normative reference | 7. Support |
| 3. Terms and definitions | 8. Operation |
| 4. Context of the organization | 9. Performance evaluation |
| 5. Leadership | 10. Improvement |

The revised standards will include a requirement to establish the context of the organization. This is accomplished by determining the following information relevant to the organization:

- Internal and external issues
- Interested parties
- Specific organizational requirements
- Scope of the management system and processes to establish, implement, maintain and improve it

Previous versions of management system standards required that top management of the organization be committed to and engaged with the management system. The revised standards will substitute leadership of the system for top management. This expanded definition of system management is broader and more in-tune with how modern organizations actually operate. Persons in top management as well as

other relevant parties must demonstrate leadership that is committed to a strategic direction for the management system.

The concept of preventive action will be replaced with risk planning and management. During management system planning, the organization will use issues determined from the organizational context to establish risks and mitigation opportunities that need to be included. The purpose of risk management planning is to prevent undesired effects (risks) and realize opportunities for improvement (mitigation).

Earlier versions of the standard included a competence, training and awareness element. In future versions of the standard, this section will be retitled Competence and Awareness. This revision is being made because training is just one of many methods to achieve competence, and thus it need not be included as a separate topic.

Similarly, the concept of documents and records are being collapsed into simply documentation. This simpler language is anticipated to be not so intimidating and less "ISO like." In all of the standards, documentation will not be emphasized. Instead of excessive amounts, documentation should only be sufficient to render the management system effective and efficient.

With the increased emphasis on risk management, the need for preventive action will no longer be needed, so this part of the standard will be removed. Effective application of risk management is anticipated to replace preventive action by identifying and correcting failure modes prior to failure.

Previous versions of the standards included continual improvement as part of the management philosophy and required it to be included as part of the policy. Revisions of the standard will have a separate continual improvement element. Inclusion of a free standing continual improvement element in the standard will raise its importance and make it an essential part of the management philosophy.

While implementation of a structured management system is expected to improve performance in the area being managed, earlier standards had no explicit requirement for improvement. The revised standards will contain an element stipulating that management system performance be evaluated, and there must be a quantified improvement after the system is operating. Furthermore, if the expected performance is not achieved, the organization must take action to address the risk of failure. The concept of evaluating performance is new to ISO management systems and will promote measurement and verification of man-

agement progress.

The completed revision of ISO 14001 is expected in January of 2015, and the revised ISO 9001 standard is expected to be completed by September, 2015. ISO 50001 will begin the process of revision to the new structure at the next systematic review scheduled to occur in 2016.

HOW WILL CHANGES TO THE STANDARD AFFECT OUR ORGANIZATION?

Although changes to the ISO 50001 Energy Management System Standard are significant, the net effect is expected to make the standard more robust and easier to integrate with other management system standards. Expanding top management to leadership should help organizations add responsible individuals to the management team without diminishing the impact of top management participation. Increasing the size of the leader group will allow top management to concentrate on the essential aspects of the management system and permit specialists in various critical areas to make a more significant contribution rendering the system more effective.

The inclusion of risk management techniques in managing energy offers the prospect of improving the standard because results achieved from both energy management system upgrades and organizational energy performance projects should be greater. Use of risk management can assist small and mid-size organizations by providing a broader array of tools to achieve their intended results in energy performance. Addressing energy management issues effectively, ensuring the competency of personnel, providing the availability of documented information and clearly defining operation and maintenance practices for significant energy uses will also offer measureable benefits to an organization using ISO 50001.

The removal of preventive action as a standard element is not expected to have any effect on implementation and operation of the standard because preventive actions will be addressed by the risk management element of the system. Effective identification and handling of risks can improve the preventive aspects of the management system and help avoid catastrophic failures.

The inclusion of performance is expected to have a beneficial effect on management system implementation and operation. While

this revision will add requirements to measure, track, and address adverse trends, measurement is an essential component of any effective management. Providing executive management with objective data on system performance will increase the acceptance of the system and help to recognize and locate problems as well as identify and reward positive results. Including performance as a consideration in management should be a welcome addition to organizational stakeholders in these times of increased competition and reduced cash for investment.

Adding continual improvement as a stand-alone element in the standard should have no profound effects on the management system because it is already included to a lesser extent. Increasing the visibility of continual improvement in the standards will have no significant effect on implementation, but it may affect the way a management system operates. Essentially, the change will be in the focus of the management system since the commitment to continual improvement must increase. Because performance has also been added, there will be a readily available measure which can be used to gauge the degree of improvement achieved by the management system.

CONCLUSION

ISO management systems are somewhat new to the energy community, but the adoption of the ISO 50001 standard in 2011 has created new interest and commitment to the plan-do-check-act theory of management. With the requirement to be ISO 50001 certified as part of the DOE Superior Energy Performance program, ISO-based energy management is expected to grow significantly in the coming decade.

ISO management systems are currently undergoing revision to a uniform high level structure with the intent to make them easier to integrate and even more effective. Philosophical changes to the standard include incorporating risk management, expanding the concept of leadership, adding organizational context, expanding the role of continual improvement, updating the concept of competency and adding the evaluation of performance. While some added complexity may result from this revision, the increased effectiveness and ease of integrating multiple management systems are anticipated to make the changes both welcome and worthwhile.

References

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