Revisions to ANSI/MSE 2000, The Energy Management System Standard

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ABSTRACT

April 2005 marked the fifth anniversary of the adoption of *ANSI/MSE 2000, the Management System for Energy*. As required by American National Standard Institute (ANSI) procedures, this national standard was revised and again approved by a national review board during the year. To make the standard easier to understand and implement, the format was revised to a process model based on the "plan-do-check-act" process. This change keeps ANSI/MSE 2000:2005 compatible with the current ISO 9001 (quality management) and 14001 (environmental management) standards. This review of revisions includes the reasoning behind each change or addition and the application of changes. An accompanying standard, *The Guide to Implementing ANSI/MSE 2000*, is also presented and discussed.

INTRODUCTION

The ANSI/MSE 2000:2005 Management System for Energy is a standards document that describes the elements necessary for an organization to establish and maintain an effective, sustainable energy management system in a variety of organizations. Based on the complete Deming "plan-do-check-act" cycle, the management system described by this standard can be used to establish an energy management system that not only sustains improvements, but actively promotes continual improvement.

All standards developers are required to review and potentially

revise each standard adopted by ANSI at five-year intervals. The MSE 2000 standard was initially adopted in April 2000. During the programmed review by the standards developer (Georgia Tech Energy and Environmental Management Center), the document format was changed to reflect a process structure. The draft revision was then reviewed by a canvas board of national energy management experts, resulting in a consensus vote and recommended again as a national standard. ANSI formally accepted MSE 2000:2005 in July 2005.

PROCESS FORMAT

During the five-year existence of MSE 2000, the originators of the standard, engineers from the Energy and Environmental Management Center (EEMC), recognized a number of difficulties in understanding and implementation the standard. Many of these difficulties can be attributed to the standard's organization. Although any management system uses the "plan-do-check-act" process, the 2000 version of MSE 2000 was not as clearly organized into these categories. In fact, the standard was organized by activities, such as energy monitoring and measuring. Organized in this way, an element of the standard could contain any or all of the "plan, do, check and act" sub-processes, as shown in Figure 1.

Because elements of the initial standard contained numerous but scattered process activities, standard developers decided that reorganizing the standard along process activities would be preferred by organizations implementing the standard. Table 2 compares elements in the original and revised standards.

STANDARD ELEMENTS

Table 1 describes the primary elements of the revised ANSI/MSE 2000:2005 energy management standard. The standard is now clearly organized into the "plan-do-check-act" cycle, as shown by elements 6.0, 7.0, 8.0 and 9.0. In addition to these critical segments, the standard also contains two elements (4.0 and 5.0), that must be in existence to support these activities. Element 4.0, Management System for Energy, contains requirements necessary to support the general management

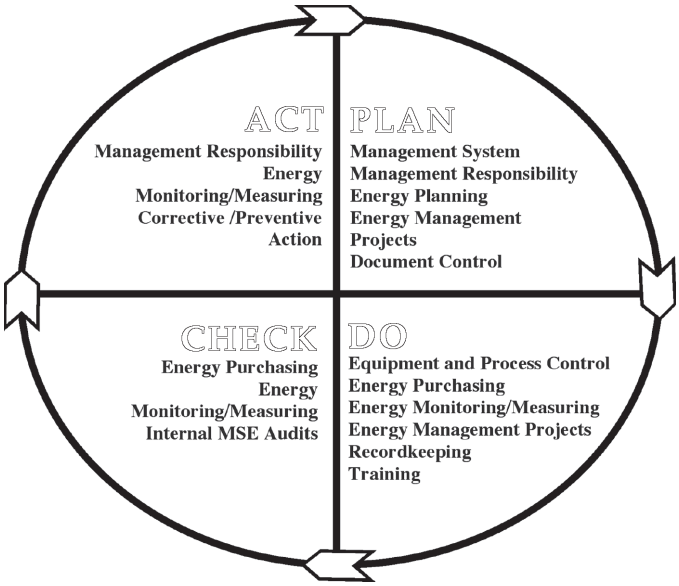

Figure 1. MSE 2000 Original Standard Organized into Plan-Do-Check-Act Process

system, including energy-related documentation, record keeping, and other general activities.

Active involvement of executive/top management of the organization is critical if an effective management system is to be created and sustained over the long term. Management must demonstrate its commitment through providing adequate manpower, physical resources, and funding. Management sets the tone of the management system through the creation of an appropriate energy policy and strategic plan, selecting the cross-functional personnel responsible for developing and operating the management system and giving the chosen personnel the authority to make the system work.

COMPARISON TO ORIGINAL STANDARD

Table 2, also included in the 2005 standard, compares the original MSE 2000 standard to the 2005 revision, section by section. In the far left column are the elements from the original 2000 version, followed

Table 1. Elements of the Revised MSE 2000 Standard

4.0 Management System for Energy
4.1 General Requirements
4.2 Documentation Requirements
4.3 Recordkeeping Requirements
5.0 Management Responsibility
5.1 Management Commitment
5.2 Energy Policy
5.3 Strategic Planning
5.4 Authority and Responsibility
6.0 Energy Management Planning (PLAN)
6.1 Energy Profile
6.2 External Information
6.3 Energy Assessment
6.4 Goals and Targets
7.0 Implementation and Operation (DO)
7.1 Purchasing
7.2 Facility, Equipment and Process Control
7.3 Energy Management Projects
7.4 Control of Outsourced Energy Services
7.5 Commissioning
7.6 Training, Competence and Awareness
8.0 Checking and Evaluation (CHECK)
8.1 Energy Monitoring and Measuring
8.2 Internal MSE Audits
8.3 Corrective and Preventive Action
9.0 Management Review (ACT)

by their element number. In the far right column are the elements of the 2005 standard revision, preceded by their reference number.

Because some sub-elements have been added, there is no strict correspondence between every item. Sections added to the standard appear at the bottom of the table. These additions include requirements for strategic planning, utility tracking, selection of significant energy uses and key performance indicators, energy purchasing, equipment or building commissioning, energy management project selection, and control of outsourced energy services. Some elements were added to make the standard more complete, and others were

Table 2. Comparison Between the Original and the Revised ANSI/MSE 2000.

ANSI/MSE 2000:2000			ANSI/MSE 2000:2005
Requirements for a Management System for Energy	4.0 4.1	4.0	Management System for Energy (title only) General Requirements
Management System (title only)	4.1	4.0	Management System for Energy (title only)
General	4.1.1 4.2.2	4.1	General Requirements Energy Manual
MSE Procedures	4.1.2	4.2.1	General Requirements
Management Responsibility (title only)	4.2	5.0	Management Responsibility (title only)
Energy Policy and Goals	4.2.1 6.4	5.2	Energy Policy Goals and Targets
Responsibility and Authority for Energy	4.2.2	5.4	Responsibility and Authority
Energy Coordinator	4.2.3		
Resources	4.2.4	5.1(f)	Management Commitment
MSE Team	4.2.5	5.4	Responsibility and Authority
Communication	4.2.6	7.5	Communication
Management Review	4.2.7	9.0	Management Review
Energy Planning	4.3 6.0	5.4	Responsibility and Authority Energy Management Planning (title only)
Energy Profile	4.3.1	6.1	Energy Profile
External Information	4.3.2	6.2	External Information
Planning Sequence	4.3.3	6.4	Goals and Targets
Energy Assessment	4.3.4	6.3	Energy Assessment
Equipment and Process Control	4.4 7.2.2	7.1.2	Energy Equipment and Systems Control of Equipment and Processes
Energy Management Projects (title only)	4.5	7.3	Energy Management Projects (title only)
Continual Improvement	4.5.1 7.3.1 7.3.3	4.1	General Requirements Purpose Project Implementation

Table 2 (*Continued*)

ANSI/MSE 2000:2000			ANSI/MSE 2000:2005
Upgrade or Expansion of Energy Systems	4.5.2	6.4	Goals and Targets
Document Control (title only)	4.6	4.2.3	Control of Documents
General	4.6.1		
Document Approval and Issue	4.6.2		
Changes to Controlled Documents	4.6.3		
Energy Purchasing (title only)	4.7		
General	4.7.1	7.1.1	Energy Supply
Evaluation of Energy Suppliers	4.7.2	7.1.1(b)	Evaluation of Energy Suppliers
Energy Purchasing Specifications	4.7.3	7.1.1(a)	Energy Purchasing Specifications
Energy Purchasing Bids and Contracts	4.7.4	7.1.1(c) 7.1.1(d)	Energy Purchasing Bids Energy Purchasing Contracts
Energy Monitoring and Measuring (title only)	4.8	8.1	Energy Monitoring and Measuring (title only)
General	4.8.1 7.3.3	6.4	Goals and Targets Project Implementation
Energy Accounting	4.8.2	8.1.1	Energy Monitoring
Energy Measurement	4.8.3	8.1.2	Energy Measurement and Verification
Calibration	4.8.4	8.1.3	Calibration
Corrective and Preventive Action (title only)	4.9	8.3	Corrective and Preventive Action
General	4.9.1		
Corrective Action	4.9.2	8.3.1	Corrective Action
Preventive Action	4.9.3	8.3.2	Preventive Action
Record Keeping	4.10	4.3	Recordkeeping Requirements
Internal MSE Audits	4.11	8.2	Internal MSE Audits
Training	4.12	7.6	Training, Competence, and Awareness
	5.3		Strategic Planning
	6.1.1		Utility Tracking
	6.1.2		Significant Energy Uses

Table 2 (*Concluded*)

ANSI/MSE 2000:2000	ANSI/MSE 2000:2005	
	6.1.3	Key Performance Indicators
	7.1	Purchasing
	7.2.1	Commissioning, Recommissioning, and Continuous Commissioning[SM]
	7.3.2	Project Selection
	7.4	Control of Outsourced Energy Services
	9.0	Management Review (inputs and outputs)

added to make the standard better fit the plan-do-check-act model.

Strategic planning and key performance indicators (KPI) were added to the standard to ensure complete alignment with the needs of executive management. Top managers look at the organization's key performance indictors as metrics to gauge performance. Thus, including KPIs as a highly visible part of the energy management process makes the MSE 2000 system more meaningful to these decision makers. By including a strategic planning element in the energy management system, executives become active members of the energy management system, identifying upper management policies related to energy and the environment, as well as maintaining a full cycle of communication within the system, resulting in a process to meet the organization's energy, operational, and financial needs.

Because energy monitoring and purchasing must be considered in both the planning and doing phases of management, requirements were split between two elements. Energy monitoring and measuring is included in this standard under Element 7.0, Implementation and Operation (DO), while utility tracking was moved to Section 6.0, Energy Management Planning (PLAN).

During review of the standard, developers recognized two areas that had been overlooked—commissioning and outsourced services. Growth of interest in these areas demanded their explicit inclusion in the standard. Section 7.2.1, Commissioning, Re-Commissioning and Continuous Commissioning, addresses commissioning in new, old, and maintenance situations. Section 7.4, Control of Outsourced Energy

Services, requires that outside organizations participating in energy management be held to the same quality and evaluation standards as internal staff.

CONCLUSION

The ANSI MSE 2000 standard adopted in April 2000 was the first national standard to provide a comprehensive guide for organizational energy management. The 2005 revision to the standard describes the requirements of the standard in a clearer "plan-do-check-act" format, making it easier to understand and implement. An accompanying implementation guide is in draft form and will be available in the near future.

References

ANSI MSE-2000:2005, A Management System for Energy, American National Standards Institute, New York, 2005.

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ABOUT THE AUTHORS

Michael Brown, P.E., is a primary developer of the Management System for Energy (MSE) 2000 standard and a senior research engineer with Georgia Tech's Energy and Environmental Management Center. He has more than 25 years of experience providing energy conservation and efficiency improvement assistance to industrial, commercial, and institutional facilities. Mr. Brown has completed more than 300 energy audits at industrial facilities and is a lead instructor and coach for the MSE 2000 Implementation Program. He also has experience in optimizing processes to reduce waste and instructs numerous technical courses related to industrial energy systems. Mr. Brown holds a Bachelor's in engineering and an MS in management from Georgia Tech, as well as an MS in mechanical engineering from Texas A&M. He is registered Professional Engineer, a Certified Energy Manager, and a Certified Measurement & Verification Professional.

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A co-developer of the MSE 2000 standard, she serves as a classroom and online instructional designer, a coach in MSE 2000 implementation efforts, and instructor for MSE 2000 courses. Ms. Key has extensive experience developing management system training, including ISO 9000 and ISO 14000, and serves as the ANSI Standards Coordinator for GTEEMC. She holds a BA in experimental psychology from California State University at Los Angeles, an MS in technology and science policy from Georgia Tech, and is a certified online learning designer and facilitator.