

CIBSE Training & Events
Implementing ISO: 50001 – Supporting Documentation

PREFACE

This document presents an overview of the Energy Management System in the perspective of the prevalent EnMS standards viz. ISO 50001. The aim is to provide basic information so as to assist the organisation to evaluate the relevance of EnMS in context of their business and corporate policy. The document is designed and compiled in a systematic manner to achieve twin objectives i.e. to make industry people understand the EnMS and to provide decision makers adequate back ground information regarding ENMS and related aspects.

The logical steps for evolving EnMS by an organisation are also presented. The planned and structured manners by which EnMS can be achieved have been presented as guidelines. It may however be noted that this is not a prescriptive document, rather guide for the beginner.

This is a supporting reference document for use during and after the training course.

KEY ELEMENTS OF ENERGY MANAGEMENT SYSTEM

Below table gives overview of requirements of ISO 50001. It should be noted that this is an extract from the ISO 50001 standard to understand requirements of ISO 50001 and reference to the published standard documentation is recommended

CLAUSE	TITLE	KEY COMMITMENTS
4.3	Energy Policy	<ol style="list-style-type: none"> 1. Continual improvement 2. energy performance 3. Compliance with legal requirements 4. Setting and reviewing energy objectives and targets.
4.4.1	Energy Planning (evaluate products, activities and service; Determine significant energy use areas)	<ol style="list-style-type: none"> 1. Consistent with energy policy 2. Continually improve energy performance 3. Involve for review of energy performance
4.4.2	Legal and other requirements	<ol style="list-style-type: none"> 1. Identify requirements 2. Communicate to personnel 3. Acts applicable <ul style="list-style-type: none"> ➤ Identify, implement, and have access to the applicable legal requirements and other requirements for its energy use, consumption and efficiency. ➤ Determine how these requirements apply to energy use, consumption and efficiency ➤ Ensure that these legal requirements and other requirements are considered in establishing, implementing and maintaining the EnMS. ➤ Legal requirements and other requirements are reviewed
4.4.3	Energy Review	<ol style="list-style-type: none"> 1. Analyse energy use and consumption 2. Identify areas of significant energy use 3. Identify, prioritize and record opportunity for improving energy performance
4.4.4	Energy Baseline	<ol style="list-style-type: none"> 1. Establish energy baseline 2. Maintain and record energy baseline
4.4.5	Energy Performance Indicator	<ol style="list-style-type: none"> 1. Identify EnPIs for monitoring and measuring the energy performance 2. Record methodology to determine and update EnPIs, Record it and regularly review it

CLAUSE	TITLE	KEY COMMITMENTS
4.4.6	Energy Objective, targets and energy management action plans	<ol style="list-style-type: none"> 1. Documented objectives and targets at relevant levels within the organization ... consistent with Energy policy. 2. Establish a process for tracking and reporting progress 3. Prepare management action plan to meet objectives and targets 4. Include responsibilities, means and time frames. Incorporate Energy concerns. Communicate, plan and track progress internally. Establish methodology for verifying results
4.5		
4.5.2	Competence, training and awareness	<ol style="list-style-type: none"> 1. Identified training needs 2. Developed a training plan 3. Provided training at all levels 4. Tracked and documented training 5. Person working in significant energy use areas should be competent 6. Maintain training records 7. Define roles, responsibility and authorities
4.5.3	Communication	<ol style="list-style-type: none"> 1. Responsibility for responding to external communication 2. Communicate for energy performance 3. Identified target audiences 4. Determined proper communication methods for each audience and establish process 5. Document decision to communicate externally.
4.5.4.1	EnMS documentation	<ol style="list-style-type: none"> 1. Documented the Energy policy, organization, key procedures and other EnMS elements. 2. Described where people could find documents. 3. Explained relationship among EnMS elements

1.0 INTRODUCTION: -

ISO: 50001 are a generic document and it does not specify "how" to do, but only states "what" to do. As per the standard, the Energy Management System should be documented and be demonstrable in the manner consistent with the requirements of ISO: 50001 models. The total demonstration in the Energy Management System consists of four tiers of documents.

1. Energy Manual
2. Procedure Manual
3. Work Instruction/Operating Procedure Manual/Action plans and objective target sheets
4. Forms, Records

The amount of documentation should support and efficient Energy assurance system without creating a paper bureaucracy. The detail for documenting above four tiers of documents is described in this paper.

2.0 NEED FOR DOCUMENT CONTROL: -

The Energy System consists of a number of documents. Some system should be provided for safe keeping of complex records. It is important to clearly define as to where they should be kept and for how long, and who is responsible for them. Each written procedure should be checked and signed by an authorized person, with issue number and issue date. The management representative should have a list of all completed procedures, applicable to the individual departmental activities. Against each listed document the number should be shown together with the date of the latest change. It is also called a "Master Copy". It is a yardstick against which any other controlled copy can be judged.

From time to time the Committee for Management Review and Corrective Action may put forward recommendations for change in the procedure. The Management Representative should be responsible for implementing the change. For making a change, the new page should be circulated to the keeper of the controlled copy of the document with an instruction to insert the new page in order and return the replaced page to the Management Representative. Thus outdated documents will be removed from circulation. The change, which has been made, should be known to the staff and everyone should implement the new procedure. When a number of major changes have been made, a complete new manual has to be issued. The retention period for these records can be predefined either contractually or by the policy and it is to be mentioned in the Energy Manual.

3.0 ENERGY MANUAL (1st tier of documentation)

3.1 WHAT IS ENERGY MANUAL: -

Energy Manual states the Energy Policy, objectives and targets. It describes the Energy System of an organisation. It may relate to an organization's total activities or to a selected part of it, e.g. specified requirements depending upon the nature of products or services, processes, contractual requirements, governing regulations etc. It is expected to provide an adequate description of the Management intention to fulfil system requirement while serving as a permanent reference for implementation and maintenance of the system.

3.2 WHAT TO INCLUDE IN ENERGY MANUAL: -

❖ **Energy manual should normally contain, or refer to: -**

- (A) The title, scope and the field of application, Also scope and boundaries of EnMS
- (B) The table of contents of the manual,
- (C) The introductory pages about the organisation concerned and the manual itself,
- (D) The Energy policy of the organisation, Objectives and Targets
- (E) The organisation,
- (F) Elements of the Energy Management system,

- (G) A definitions section, if appropriate,
- (H) Guide to the Energy manual, if appropriate.
- (I) List of procedures

Note: - The order of Energy manual structure is optional to user needs.

3.3 WHAT IS AN ENERGY PROCEDURE MANUAL? : -

It is a manual comprising of a number of Energy procedures, each procedure being independent in it. Procedure manual should be made department wise / element wise. It is also called a "Middle Management Book". Generally these Energy procedures are prepared by the M.R. in consultation with functional heads. Energy procedures are also called operational procedure, as they are a snapshot of the actual activities taking place in a company at a particular point of time. They are considered to be the core of the system documentation for Energy attainment and assurance. An important distinction confidential document. They are intended for internal use and should be protected from misuse. These procedures are meant to instruct in broad terms, how the policies and objectives expressed in the Energy manual are to be addressed and achieved. They describe how the tasks and functions of the various departments should be performed to meet the requirements of the ISO: 50001 standards and the Energy Policy of the company. In general it describes 6 major questions for the activity. (WHO, HOW, WHERE, WHEN, WHAT, SHOW ME)

4.0 DOCUMENTED PROCEDURES (LIST OF SUGGESTED PROCEDURES): -

4.1 We suggest the documented procedures as below to establish the system:

- Σ Document control (clause 4.5.4.2)
- Σ Scope and boundaries of EnMS(4.1b)
- Σ Energy planning process and review(4.4.1 and 4.4.3)
- Σ Legal and other requirements(clause 4.4.2)
- Σ Energy objectives, energy targets and energy management action plans (clause 4.4.6)
- Σ Control records (clause 4.5.3)
- Σ EMS audit (clause 4.5.4)
- Σ Operational controls(clause 4.5.5)
- Σ The methodology for determining and updating the EnPIs (4.4.5)
- Σ Competence, training and awareness (4.5.2)
- Σ Non conformance, corrective action, Preventive action (clause 4.6.4)
- Σ Control records (clause 4.6.5)
- Σ EMS audit (clause 4.6.3)

This is a general requirement for documented procedures. Most organizations in the organized sector would need many more procedures depending upon the nature of business processes and scale of operations. They can integrate it with other system procedures like ISO 9001, ISO 14001 etc.

This is a suggested minimum requirement for documented procedures. Most organizations in the organized sector would need many more procedures depending upon the nature of business processes and scale of operations.

4.2 Contents of Procedures: -

One or more procedures relevant to each of the statements made in the Energy systems manual defining how groups of people in the same or different departments will work together to meet management's stated objectives for Energy.

The procedures must address each requirement of the relevant clause of the appropriate standard and collectively they will define the organization's operation from receiving and enquiry to delivering a completed product or service.

It should be noted that the procedures do not have to be assembled into a manual, but it is quite likely that one master set will be in the form of a manual, to facilitate control.

Wherever required, Energy management system procedures must detail those activities for which records are to be maintained. This is best achieved by cross-reference to an individual procedure, set-up for the purpose, which details all records kept.

The writing style should be simple. Short sentences should be used and long words, which might be difficult to understand, must be

Avoided colloquial terms or jargons, which may not be understood in the context and hence cause confusion, should not be used. Avoid words, which can have variety of meanings. In short procedure should be written in such a manner so as to make them easy to understand even to a layman.

A procedure is extremely important. It will determine the standard, which is being set for the manual. It should be in detail and should answer, what has to be done, by whom, how, where and when. Similarly a numbering system should be established. For example a numbering system can be like.

PRO/XX, where

PRO = It is Energy Procedure,

XX = Serial No. of the procedure in a particular clause.

The format includes a number of features, which all documented procedures should contain. However, there is nothing sacrosanct about this particular format: other styles can be adopted to encompass the required features just as well, and it is for each organisation to develop its own format. For ready reference the format for writing procedure is given in Annexure-1

It should be noted that the procedures related to the individual activity should be kept with that department and reference of this procedure must be given in Energy manual, under an appropriate clause. In general, a big composite company would require many procedures for ISO: 50001.

5.0 WORK INSTRUCTIONS /OPERATING PROCEDURE (3RD TIER OF DOCUMENTATION): -

This is the third tier of the documentation. The standard requires work instructions to be available, where the absence of such instruction would adversely affect Energy use and efficiency as well as effectiveness of EnMS. In the practical sense, work instruction may be written, drawings, photographs, computer menu options, machine care / operation, work production documentation etc. These are practical documents. Hence the authority for the initiation of work instructions should be given to the working committee, i.e. to the supervisor of the particular area in which he / she is working. The final draft of the work instruction should be checked and approved by the Head of the department.

Work instructions deals with shop-floor level of activities. Their purpose is to clearly direct the operator as to what has to be done, and what standard of workmanship is required to control significant aspects. The instructions must therefore clearly identify:

- * What has to be done?
- * The correct sequence of activities.
- * Any special, Energy conditions, e.g. temperature, humidity cleanliness etc.
- * Reference to standards / codes of practice which must be complied with

In case of special processes, work instructions are a mandatory element and for this, detailed instructions are needed. These work instructions should be written in the

local language, so that the operators easily understand them. For the laboratory or Q.C. activity and calibration of instruments the operating procedure is documented describing how particular activity shall be done.

6.0 ENERGY MANAGEMENT SYSTEM RECORDS, FORMS AND OTHER DOCUMENTS: -

Forms, records etc. are supporting documents used by the company to record information for different procedures followed. They belong to the last and fourth tier of documentation. They link the activities written in the procedure to the records kept in the department. Energy Records can be represented as QR. This documentation serves to demonstrate that the Energy System is operating efficiently to produce the product in accordance with specified requirements of the Energy System. Records should be e legible, easily retrievable and available when asked for by the auditor.

6.1 Suggested List of Records under ISO: 50001

- Record for Energy review
- Register of opportunities for improving energy performance
- Register of Legal & regulations(Legislation and compliance) related to energy management system
- Energy Baseline
- Records of Energy performance indicators
- Energy Objectives & energy targets and energy management action plan
- Competence, training and skill records
- Energy Management program reviews
- Plant/Machinery design records
- Actual and potential non conformity investigations
- Records of the results of the evaluations of compliance
- Monitoring / measurement and checking records
- Calibration & maintenance
- Corrective and preventive action records
- Process control data (critical tasks)
- Trends in EnMS performance and significant energy tracking
- Training and effectiveness records
- Equipment design records
- Records related to procurement of energy services/products/equipment/energy
- Audit plans & results
- Management reviews
- External/ internal communication
- Document control records

The details for Objectives and targets and action plans related records are described in more details as below.

6.2 Energy Objective and Targets

Objective and target are the evidence and measure of the company's commitment to continual improvement. Energy management system audits address not only compliance of the documented system with ISO 50001, the implementation of the documented system but also the effectiveness of the system in achieving the company's objective and targets. Objectives and targets must be quantified wherever possible. Take care as below in framing the objectives and targets for EnMS

- Set of objectives and targets for Organization / Department /Function
- Quantified where practicable
- Input and output oriented
- S.M.A.R.T.
(Specific, Measurable, Attainable, Realistic, Track able / time bound)
- In line with Long term Energy action t plan
- Linked to functional performance criteria

It is up to the company to determine how it will implement its policy of continual improvement and in which areas it is able to achieve improvement particular times. Because for most companies these systems are new there is uncertainty as to which objectives are appropriate and attainable. The methods for measuring performance also vary a great deal between companies. The most common means are in terms of either a percentage reduction/improvement such as in energy consumption or waste production or tasks to be completed such as installation of bunds or planting of trees.

6.3 Inputs of Objectives:

- Energy Policy
- Continual improvement commitment
- Energy baseline results
- Energy performance indicators
- Energy action plans
- Opportunities to improve energy performance
- Initial review results (Significant energy usage)
- Legal and other requirements
- Technology options
- Technology options available
- Financial, operational and business conditions
- Views of interested parties
- Results of Management review

6.4 Progress Towards Objectives Can Be Measured By:

- Quantity of energy used.
- Energy consumption per kg of products produced
- Awareness for energy saving with employees and contractors
- Quantity of green house gases consumed
- Waste produced per quantity of finished product.
- Plant Efficiency of energy and material use.

- Number of environmental incidents (e.g. excursions above limits).
- Number of environmental accidents (e.g. unplanned releases).
- Percentage Green house gases used.
- Number of vehicle kilometers per unit of production.
- Return on Investment in energy saving equipments,
- Improvement in theoretical energy consumption and practical energy consumed

An integrated objective can be:

Energy base line: Quantity of energy consumed in year 2011 for production of 1000 tones.(Per unit of production)

OBJECTIVE: Reduce energy required in manufacturing operations.

TARGET: Achieve 5 % reduction of energy consumption compared to the previous year.

INDICATOR: Quantity of fuels and electricity consumed in 2012 per unit of production.

6.5 Examples of Objectives and Targets:

OBJECTIVES	TARGETS
Reduce energy use	<ul style="list-style-type: none"> * Reduce electricity use by 5% in 2012 * Reduce natural gas use by 3% in 2012 * Reduce use of diesel oil by 4% in 2012
Process/product/service design changes	<ul style="list-style-type: none"> * Improve consumption pattern of significant energy use areas by 2 % * Change electrical appliance and use of 100 % 5 star rating equipments by 2012
Improve employee awareness of environmental	<ul style="list-style-type: none"> * Hold monthly awareness training courses * Train 100% of employees by end of 2012 for energy saving
Reduce Energy loss	<ul style="list-style-type: none"> * Improve ration of theoretical energy use vs. actual energy usage * Improve plant efficiency by 3 %

ENSURE:

1. Documented objectives and targets for applicable activities/ product/ services.
2. Are these consistent with your energy policy?
3. Are established processes for monitoring and reporting progress?
4. Objectives and targets are APPROPRIATE for your organization?
5. Considered legal requirements?
6. Are they simple and flexible?
7. Have you considered supplier/ vendors who provide you services/ products and have significant energy usage?

6.5 Energy Management Action Plans

The pilot study conducted with BS7750 before the second edition was published revealed that although most companies were strong on drawing up Energy policy statements they were generally weak in committing the resources necessary to put these into practice.

Establish, document and maintain EnMP for achieving its energy objectives –

- Responsibility defined for achieving at relevant level
- Means & time scale for each target to be achieved (Plan)
- Method for verifying energy performance improvement
- Method for verifying the results
- Review at regular & planned interval
- Updated

AUDITING THE ENERGY MANAGEMENT SYSTEM

1.0 INTRODUCTION: -

EnMS audit is one of the key management tools for achieving the objectives set out in order to verify that the individual elements within a management system are implemented effectively and suitable in achieving stated EnMS objectives. The management system audit also provides objective evidence concerning the need for the reduction, elimination and most importantly, prevention of non-conformities. The results of these audits can be used by management for improving the performance of the organisation.

2.0 EnMS AUDIT: -

“A systematic and independent examination to determine whether EnMS activities and related results comply with planned arrangements and whether these arrangements are implemented effectively and are suitable to achieve the objectives”.

The EnMS audit can be carried out by: -

- (A) Companies own staff or outside consultants called by the company, to give confidence to the management that the system is properly implemented. (Called internal or first party audit)
- (B) Independent accredited body, for certification (called third party audit)

3.0 OBJECTIVES OF ENMS AUDIT & TYPES OF AUDIT: -

Audits are normally designed for one or more of the following purposes -

- (A) To determine the conformity or non-conformity of the management system elements with specified requirements.
- (B) To determine the effectiveness of the implemented management system in meeting specified EnMS objectives.
- (C) To verify that the management system is working as planned.
- (D) To afford an opportunity to improve the Management Systems.
- (E) To meet regulatory requirements.
- (F) To afford and opportunity to improve the Management Systems.

TYPES OF AUDIT: -

System Audits are divided into three categories:

(1) FIRST PARTY AUDIT: -

This is an audit, which is undertaken by an organisation on its own management system in order to assess if personnel are complying with the company procedures and maintaining the appropriate records.

(2) SECOND PARTY AUDIT: -

A second party audit is one, which is conducted on a company by the customer. This is usually against the criteria of the contract and any supporting management system standards. These could be customer derived standards or international standards such as the ISO series.

(3) **THIRD PARTY AUDIT: -**

A third party audit is one that is carried out by an independent organisation i.e. they are not involved within the company or a representative of the customer.

Third party audits are carried out by accredited certification bodies such as CIBSE etc as part of the assessment of the management system of an organisation prior to registration.

4.0 INTERNAL EnMS AUDIT PROCESS: -

This is an audit carried out by a company on its own Management Systems for the purpose of giving assurance to the management that its Management Systems are effectively achieving the planned EnMS objectives.

The internal EnMS audit also known as self-audit is a major component of the Management System. These audits can increase the confidence of management in its production system & demonstrate to its personnel that the company is committed to EnMS management.

Internal EnMS audit can be carried out by the organisations own staff, provided they are independent of the systems being audited or by outside consultants.

The steps involved in internal EnMS audit are: -

- (A) Audit Initiation.
- (B) Audit Preparation.
- (C) Audit Execution & Audit Report.

4.1 AUDIT INITIATION: -

4.1.1 SCOPE OF AUDIT: -

One should determine the scope of audit based on one's own needs & make the final decision as to which management system elements, departments & organisational activities are to be audited & within what time frame. The particular department /section /activity to be audited should be functional & not shutdown/discontinued during the period the audit is to be carried out.

To decide whether or not an audit of any activity, department etc. is required following points should be considered: -

- (A) Audits should preferably be carried out when they are most effective, such as, in the early or late stages of implementing the contract rather than in the mid stream.

- (B) Internal audits should be carried out also when there is a possibility of an external audit such as by a certifying body, or by a customer or his representative.
- (C) Audit of a particular area becomes necessary also when there is legal issues for energy management system

4.1.2 FREQUENCY OF AUDIT: -

Factors to be considered for deciding audit frequency are: -

- (A) Implementation phases of the Management System.
- (B) The schedules as specified in the EnMS manual of the company.
- (C) Significant changes in management, organisation, policy, techniques or technologies that could affect the operating of the Management System.
- (D) Changes to the system itself.
- (E) Results of recent previous audits.
- (F) Status and importance of the activity / department. And changes in design of facility, equipment, building

In the interest, of efficiency & effectiveness of the audit & in the optimum use of available resources, all these factors should be integrated into an audit schedule.