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Energy Management System (EnMS) –
Requirements with Guidance for Use

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Foreword.....iv	
Introduction...v	
1 Scope.....1	
2 Normative references.....1	
3 Terms and definitions.....1	
4 Energy management system requirements.....1	
4.1 General requirements.....1	
4.2 Management responsibility.....1	
4.2.1 Roles, responsibility and authority.....2	
4.3 Energy policy2	
4.4 Planning.....3	
4.4.1 Energy Review/profile.....3	
4.4.2 Legal and other requirements.....3	
4.4.3 Objectives Targets, and action plans.....3	
4.5 Implementation and operation.....4	
4.5.1 Awareness, Training and Competence.....4	
4.5.2 Design.....4	
4.5.3 Operational control.....4	
4.5.4 Documentation requirements.....5	
4.5.5 Communication.....5	
4.5.6 Purchasing.....6	
4.5.7 Contingency planning.....6	
4.6 Checking performance.....6	
4.6.1 Monitoring and measurement.....6	
4.6.2 Evaluation of legal/other compliance.....7	
4.6.3 Management system audit....7	
4.6.4 Nonconformities, corrective, preventive and improvement actions.....7	
4.6.5 Control of records.....8	
4.7 Review of the energy management system by top management.....8	
4.7.1 Management review inputs.....8	
4.7.2 Management review outputs.....9	
Annex A (informative) Guidance on the use of this International Standard.....10	
A.1 General requirements.....10	
A.1.1 Roles, responsibility and authority10	
A.2 Energy policy	

A3	Planning.....	
A.3.1	Energy Review/profile.....	10
A.3.2	Identification of legal and other requirements.....	11
A.3.3	Implementation and operation	11
A.3.4	Purchasing	11
A.3.5	Contingency planning.....	12
A.3.6	Checking performance	12

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Foreword

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Introduction

(Convener's Note: the following text is offered for consideration as an Introduction)

Increasing energy costs and price volatility combined with growing constraints on energy supplies and distribution networks amplifies the risks associated with energy. Additionally, the importance of energy efficiency and energy performance and renewable energy resources as mechanisms for reducing environmental impacts warrants more sophisticated approaches to energy management. Organizations recognizing the importance of energy to the long-term viability of the business can use this standard to manage and control both energy consumption and cost. Implementation of this management system standard is a reasonable and practical approach to improving energy management and controlling costs. Organizations implementing this standard recognize comprehensive energy management is key to achieving maximum benefit from process improvements, operational and maintenance changes, and advanced energy efficiency technology.

This standard applies on the activities under the control of an organization, within defined site boundaries. The success of the system depends on commitment from all levels and functions of the organization, and especially from top management. A system of this kind enables an organization to develop an energy policy, establish objectives and processes to achieve the policy commitments, take action as needed to improve its performance and demonstrate the conformity of the system to the requirements of this international standard.

By applying this standard, the organization uses the Plan-Do-Check-Act continual improvement framework to manage energy resources, incorporating energy management into everyday business operations. It can be implemented by an organization in many different ways, depending on the organization's activities, needs and size. It can be tailored to fit the requirements of the organization, including complexity of the system, degree of documentation, and resources required.

Implementation of this structured well-defined management system for energy offers and organization both direct and indirect benefits including but not limited to:

Direct benefits:

- Controllable energy costs,
- Improved operational efficiency,
- Decreased energy intensity,
- Reduced environmental impact,
- Continually improved energy performance,
- Improved operations and maintenance.

Indirect benefits:

- Greater organizational involvement
- Improved communication and increased morale
- Increased organizational competency concerning energy issues
- Enhanced communication about energy management outside the organization
- Improved relationships with energy and equipment suppliers
- Improved risk management
- Compatibility with other management system standards

The organization may choose to integrate the Energy Management System (EnMS) into an existing management systems as appropriate.

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WORKING DRAFT
ISO/WD2 50001

Energy Management —

1 Scope

This International Standard specifies requirements for an organization to establish, implement, maintain, and improve an energy management system, which enables an organization to take a systematic approach in order to achieve continual improvement of energy performance, energy efficiency, and energy conservation. An energy management system addresses: energy supply; measurement, documentation, and reporting of energy use; and procurement and design practices for energy-using equipment, systems, and processes. It does not itself state specific performance criteria with respect to energy. The standard applies to all factors affecting energy use that can be monitored and influenced by the organization. This standard for energy management systems has been designed to be used independently but can be aligned or integrated with other management systems. This standard applies to all organizations.

2 Normative references

To be completed later.

3 Terms and definitions (Convener Note: These definitions were offered but the list is not complete or exhaustive- additional recommendations requested)

To be completed later

- action plan

Includes designation of responsibility and a definite beginning and end, used by the organization to achieve energy management objectives and targets

- boundaries

Describes the physical or site limits within which the standard applies.

- energy

primary energy (raw resources that enter the facility from an internal or external energy supplier) and secondary energy (converted form of primary energy resource, e.g. steam, compressed air)

- energy assessment

information on and evaluation of the current energy performance of equipment, systems, and processes related to energy purchase, use, reliability, storage, and disposal

- energy baseline

initial energy profile used as the starting point for tracking energy performance and continual improvement.

-energy efficiency.....

-energy performance.....

- energy profile

regularly updated overview of the organization's energy status which serves as a means to connect an organization's energy use to its primary business output

- energy management system team

A group representative of the functional areas of the organization empowered by top management to implement the energy management system under the direction of an appointed management representative.

- continual improvement

recurring activity to increase the ability to fulfill requirements

NOTE: The process of establishing goals and finding opportunities for improvement is a continual process. Continual improvement can achieve improvements in overall energy performance, consistent with the organization's energy policy.

[ISO 9000:2005, 3.2.13]

- energy performance indicator (EPI)

index that relates energy use or cost to organizational output which is a measure of energy intensity of organizational operations

- nonconformity

non-fulfillment of a requirement

[ISO 9000:2005, 3.6.2]

- objective

ends toward which effort is directed to achieve the energy policy

- organization

group of people and facilities with an arrangement of responsibilities, authorities, and relationships

NOTE: Examples include company, corporation, firm, enterprise, authority or institution, or part or combination thereof, whether incorporated or not, public or private, that has its own functions and administration, government agency, hotel, transport company, educational institution and utility provider

[ISO 9000:2005, 3.3.1]

- procedure

specified way to carry out an activity or a process

NOTE 1: Procedures can be documented or not.

NOTE 2: When a procedure is documented, the term "written procedure" or "documented procedure" is frequently used. The document that contains a procedure can be called a "procedure document."

- significant energy use

primary or support equipment, processes, applications, or activities identified by the energy profile as a significant component of an organization's energy cost and/or consumption

NOTE: Significance criteria are determined by the organization.

- target

measurable performance requirement to be set and met to achieve part or all of an objective

- top management

person(s) or group of people who directs or controls an organization [ISO 9000:2005, 3.3.1] at the highest level

NOTE: Top management controls the organization defined within the scope of the management system for energy.

[ISO 9000:2005, 3.2.7]

4 Energy management system requirements

4.1 General requirements

The organization shall establish, implement, and maintain an Energy Management System (EnMS) that:

- a) meets the requirements of this International Standard;
- b) demonstrates continual improvements of energy performance, energy efficiency, and the system;
- c) has defined and documented its scope and boundaries; and.
- d) determine and document how it will monitor its energy efficiency and performance improvements.
- e) determining criteria and methods needed to ensure that both the operation and control of these energy efficiency and energy performance *are effective*,

4.2 Management responsibility

Top management shall demonstrate its commitment and support to the Energy Management System (EnMS) and to continually improve its effectiveness by:

- providing the resources needed to establish, implement, maintain and improve the energy management system,
- establishing the energy policy,
- communicating to the organization the importance of energy management,
- ensuring energy objectives are established and met,
- determining criteria and methods needed to ensure that both the operation and control of these processes are effective,
- including energy considerations in long-term planning, if applicable,
- ensuring that results are measured and reported
- conducting management reviews.

4.2.1 Roles, responsibility and authority (Convener Note: there were many suggestions for this section, but many could be put in guidance.)

Top management shall appoint an energy management representative with the appropriate skills and training, and the responsibility and authority to:

- a) ensure the energy management system is established, implemented and maintained in accordance with this International Standard;
- b) report to top management on the performance of the energy management system;
- c) report to top management on improvements in energy performance indicators;
- d) appoint members of the energy management system team with the approval of management
- e) plan and direct energy management activities designed to support the organization's energy policy and goals.
- f) define and communicate responsibilities and authorities in order to facilitate effective energy management.

- i) The energy management system team shall plan and direct energy management activities designed to support the organization's energy policy, objectives, and targets.

Note: the requirement for a team needs further discussion.

4.3 Energy policy (Convener Note: many editorial comments as to ordering and wording. A modified version of the PrEN text is provided.)

Top management shall establish, implement and maintain an energy policy for the organization. The energy policy shall state the organization's commitment for achieving improved energy performance. Top management shall ensure that the energy policy:

- a) is appropriate to the nature and scale of, and impact on, the organization's energy use;
- b) includes a commitment to continual improvement in energy performance;
- c) includes a commitment to ensure the availability of information and of all necessary resources to achieve objectives and targets;
- d) provides the framework for setting and reviewing energy objectives and targets;
- e) includes a commitment to comply with all applicable legal and other requirements;
- f) is documented, implemented, maintained and communicated to all persons working for and on behalf of the organization;
- g) is regularly reviewed and updated;
- h) is available to the public.

4.4 Planning

4.4.1 Energy Review/profile

The energy review/profile shall be recorded and shall include, as appropriate:

- a) Utility tracking
- b) Energy assessments
- c) Significant energy uses
- d) Energy performance indicators
- e) Production or service data
- f) Other information deemed necessary by the organization
- g) Comparison to the baseline

The organization shall establish, implement and maintain a documented procedure for developing and maintaining an energy profile. The energy profile shall be consistent with the defined scope of the energy management system. The organization shall plan, identify, collect, record and analyze the data necessary for energy planning. The data shall be used to measure performance against the energy objectives, targets, and a baseline using energy performance indicators. The energy profile shall be updated at defined intervals and made available for use in energy planning.

The method(s) for identification and the criteria used to determine significance for significant energy uses shall be recorded. The significant energy uses shall be controlled by operational controls. The identified significant energy uses shall be reviewed on a regular basis. The review shall include changes in design or modified operational or facility changes.

The organization shall identify indicators needed to demonstrate to top management the success of the management system. These indicators will provide information on the performance of the significant energy uses, objectives and targets as well as planned improvements.

The method(s) for identification and update of the indicators shall be recorded.

The energy performance indicators shall be reviewed and compared to the baseline assessment on a regular basis. The review shall include changes in design or modified operational or facility changes.

4.4.1.1 Identification of past and present energy use (baseline assessment)

The initial energy profile shall establish the energy baseline for an appropriate time period, but not less than 12 months to include significant energy uses and factors affecting such use. The energy baseline shall be recorded. Changes in energy performance shall be measured against the energy baseline. Adjustments to the baseline shall be made only when energy performance indicators no longer reflect organizational energy use or there have been major changes to the processes or energy systems

[Convener's Note: determine what should be in the baseline]

The energy management system team shall:

- identify the facilities, equipment, processes and personnel working for or on behalf of the organization that significantly affect energy consumption and demand, and cost [significant energy uses]
- identify other relevant variables affecting energy consumption
- establish energy performance indicators
- record the method(s) for identifying these significant energy uses
- review the identified significant energy uses on a regular basis
- modify the list of significant energy uses as operational and facility changes occur, and
- Identify and prioritize opportunities for improving energy performance

4.4.1.2 Energy assessments

Information on the current state of equipment, systems, and processes related to energy purchase, use, reliability, storage and disposal shall be collected at defined intervals and used in identifying opportunities for energy management improvements.

4.4.2 Legal and other requirements

The organization shall identify and have access to the applicable legal requirements and other requirements to which the organization subscribes related to its energy uses. The organization shall determine how these requirements apply to its energy aspects and shall ensure that these

legal obligations and other requirements to which the organization subscribes are taken into account in the energy management system..

4.4.3 Objectives Targets, and Action Plans

The organization shall establish, implement and maintain documented energy objectives and targets at the relevant functions and levels within the organization. The energy objectives and target(s) shall be measurable and documented, and a time frame set for achievement.

The objectives and targets shall be consistent with the energy policy, including the commitments to improvement in energy performance and to comply with applicable legal obligations and other requirements to which the organization subscribes.

When establishing objectives and targets, the organization shall consider the significant energy uses identified in the energy review/profile as well as, its financial, operational and business conditions, legal requirements, the views of interested parties and opportunities to improve the energy efficiency or energy performance.

The organization shall establish and maintain energy management action plans for achieving its objectives and targets. The energy management action plans shall include:

- a) designation of responsibility;
- b) the means and time frame by which individual targets are to be achieved; and
- c) the EPIs that will be used to measure progress towards the action plans.

The energy management action plans shall have a suitable level of analysis, including where available:

- a) before project energy usage
- b) projected benefits
- c) identified means of verifying results
- d) implementation costs
- e) maintenance/on-going costs or life-cycle costs
- f) other costs including capital, labor financing, measuring and monitoring etc that are necessary for the organization

The energy management action plans shall be documented and kept up to date.

(Convener Note: Need further discussion on “Action Plans” vs Projects and Programmes)

4.5 Implementation and operation

4.5.1 Competence, awareness and training

The organization shall identify training needs associated with the control of its significant energy uses and the operation of its energy management system. It shall provide training or take other action to meet these needs, and shall retain associated records.

The organization shall provide resources and ensure that any person(s) performing tasks for it or on its behalf that are related to significant energy uses identified by the organization is (are) competent on the basis of appropriate education, training or experience, and shall maintain and retain training records.

The organization shall ensure that its employees and all relevant persons working on its behalf are and remain aware of:

- a) the importance of conformity with the energy policy, procedures and with the relevant requirements of the Energy Management System (EnMS),
- b) the significant energy uses associated with their work, and the potential consequences of departure from specified procedures.
- c) their roles and responsibilities in achieving the requirements of the Energy Management System (EnMS), and
- d) the benefits of improved energy performance.

4.5.2 Design

The goal of all such projects shall be either an improvement in energy efficiency or energy neutrality compared to the previous process. The organization shall assess and record the significant energy uses when specifying, designing, modifying or renovating energy consuming systems, equipment and/or buildings. The evaluation of the possibilities for improving energy efficiency or energy performance shall be incorporated into the specification, design and procurement activities of the project. Energy efficiency shall be considered in the design for major upgrades or expansions. Decisions affecting energy design of major upgrades or expansions shall be recorded. The energy profile shall be updated following major upgrades or expansions.

4.5.3 Operational control

The organization shall ensure control of operations associated with the identified significant energy uses. The controls shall be consistent with the energy policy, energy objectives and energy targets.

This includes:

- a) setting criteria for the energy efficient operation and maintenance of significant energy uses,
- b) operating and maintaining in accordance with documented operational criteria, to avoid situations that could lead to deviation from the documented operating criteria,
- e) appropriate communication of the operational controls to personnel, contractors, suppliers, and others acting on behalf of the organization and other relevant parties.

4.5.4 Documentation requirements

4.5.4.1 General requirements

The organization shall establish, implement and maintain information, in paper or electronic form, to describe the core elements of the energy management system and their interaction and to identify the location of related documentation including technical documentation.

(Convener's Note: This list is helpful but not necessary)

The documentation shall include:

- a) the energy policy statement;
- b) energy objectives and targets;
- c) plans for achieving the energy goals and targets;
- d) documented procedures required by this International Standard, and;
- e) documents needed by the organization to ensure the effective planning, operation, and control of its significant energy-related processes and equipment.

NOTE The degree of documentation can vary for different organizations for the following reasons:

- a) Scale of the organization and type of activities
- b) Complexity of the processes and their interactions
- c) Competence of personnel

4.5.4.2 Control of documents

Documents required by the Energy Management System (EnMS) shall be controlled.

Documented procedure(s) shall be established to define the controls needed to:

- a) periodically review and update as necessary;
- b) ensure that changes and current revision status of documents are identified;
- c) ensure that current versions of applicable documents are accessible in locations where operations important to the efficient implementation of the Energy Management System (EnMS) are ongoing;
- d) ensure that documents remain legible and readily identifiable;
- e) ensure documents of external origin determined by the organization to be necessary for the planning and operation of the Energy Management System (EnMS) are identified and their distribution controlled;
- f) prevent the unintended use of obsolete documents, and apply suitable identification to them if they are retained for any purpose.

4.5.5 Communication **(Convener's Note: why not "establish and maintain procedure for...")**

The organization shall communicate internally with regard to its energy performance and the energy management system.

The organization should ensure that personnel at all levels within the organization are encouraged to and have a process to make proposals for improvements, and submit relevant comments on the Energy Management System (EnMS)

The organization shall decide whether to communicate externally about its energy management system and energy performance, and shall document its decision. If the decision is to communicate externally, the organization shall establish and implement a method for this external communication.

4.5.6 Purchasing

4.5.6.1 Purchasing of energy efficient services and equipment

The organization shall establish and maintain procedures for assessing the energy use of energy using equipment and services prior to purchase.

When purchasing energy using equipment and services, the organization shall inform suppliers that energy efficiency and energy performance is a factor in purchasing decisions.

4.5.6.2 Purchasing of energy

The organization shall define or agree to specifications in the following areas, as applicable:

- a) energy quality,
- b) availability,
- c) capacity,
- d) variation over specified time,
- e) billing parameters, and
- f) environmental impact.

The organization shall review and approve energy purchasing specifications (such as requests for proposals, quotes or qualifications) for adequacy prior to release.

NOTE The applicability of this section may vary from market to market.

4.6 Checking performance

4.6.1 Monitoring and measurement

The organization shall plan and implement the monitoring, measurement, analysis and improvement processes needed to:

- a) To demonstrate the performance of the energy management system
- b) To demonstrate progress on energy performance objectives and targets

At planned intervals or continuously, the organization shall measure, monitor and record significant uses that affect the Energy performance indicators (EPIs) and evaluate the results. The organization shall identify and describe the measuring and monitoring requirements of its energy management action plans.

The organization shall ensure that the equipment used in monitoring and measuring provides data which is accurate and repeatable. The results from monitoring and measuring the fundamental characteristics shall be recorded.

Records of monitoring and measurement shall be maintained.

4.6.2 Evaluation of legal/other compliance

At planned intervals, the organization shall evaluate compliance with legal and other requirements to which the organization subscribes that are relevant to the scope of the Energy Management System (EnMS) . Records of the evaluation shall be maintained.

4.6.3 Management system audit

At planned intervals, the organization shall carry out management system audits to ensure that the Energy Management System (EnMS):

- conforms to the energy policy, objectives, action plans, and all other requirement of the standard
- is effectively, implemented and maintained.

An audit plan and schedule shall be developed, taking into consideration the status and importance of the processes and areas to be audited, as well as the results of previous audits.

The selection of auditors and conduct of audits shall ensure objectivity and the impartiality of the audit process.

(Convener's Note: are next two paragraphs necessary?)

The management responsible for the area being audited shall ensure that actions are taken without undue delay to eliminate detected nonconformities and their causes. Follow-up activities shall include the verification of the actions taken and the reporting of verification results.

Management system audits of the Energy Management System (EnMS) are carried out by, or at the request of, the organization itself, for internal purposes and may be the basis for a self declaration of adherence to the Energy Management System (EnMS).

4.6.4 Nonconformities, corrective, preventive and improvement actions

4.6.4.1 Nonconformities

Where Energy Management System (EnMS) nonconformities are identified, they shall be corrected and action taken to mitigate their impact.

4.6.4.2 Corrective and preventive action

A process shall be established to define requirements for the corrective and preventive action of the Energy Management System (EnMS):

- a) Reviewing nonconformities or potential nonconformities
- b) Determining the causes of nonconformities or potential nonconformities
- c) Evaluating the need for action to ensure that nonconformities do not occur or reoccur
- d) Determining and implementing the appropriate action needed
- e) Recording the results of actions taken
- f) Reviewing the effectiveness of the action taken

Preventive and corrective actions shall be appropriate to the nature and scale of the nonconformity. Records of corrective and preventive actions shall be maintained.

4.6.4.3 Improvement **(Convener's Note: Why is this not in Management Review?)**

At planned intervals the organization shall evaluate the opportunities for improvement of:

- 1) the effectiveness of the Energy Management System (EnMS) and
- 2) the energy efficiency and energy performance.

The organization shall identify the responsibility and authority and allocate resources for improvement.

4.6.5 Control of records

The organization shall maintain records as necessary to demonstrate conformity to the requirements of the Energy Management System (EnMS) and of this International Standard.

The organization shall establish, implement and maintain procedures to define the necessary controls needed for record management.

Records shall be and remain legible, identifiable and traceable to the relevant activity, product or service for the established retention period.

4.7 Review of the energy management system by top management

At planned intervals top management shall review the organization's energy management system performance to ensure continuing suitability, adequacy and effectiveness.

Top management shall consider its commitment to continual improvement in decisions related to actions taken or to be taken.

Records of management review shall be maintained.

4.7.1 Management review inputs

Inputs to the management review shall include:

- a) energy management action plan reviews, energy diagnoses/review results, energy management system audits results; (this includes changes to EPIs)
- b) evaluation of compliance with legal and other requirements and any changes to legal requirements
- c) the energy performance of the organization (performance relative to EPIs);
- d) the status of corrective and preventive actions
- e) the performance of the Energy Management System (EnMS)
- f) the extent to which energy objectives and targets have been met;
- g) recommendations for improvement (Convener's Note: how is this different that 4.6.4.3?)
- h) follow up actions from previous management reviews

4.7.2 Management review outputs

Outputs from the management review shall include any decision or actions related to:

- a) changes to the energy policy
- b) improvement including but not limited to:
 - 1. improvements since the last management review,
 - 2. Energy performance indicators
 - 3. Energy management system performance
- c) changes in other key elements of the management system such as objectives, targets, consistent with the commitment to continual improvement
- d) Allocation of resources

Annex A

(informative)

Guidance on the use of this International Standard

A.1 General requirements

What is the intention of the standard? How to start in case of no previous system. Some details on what should be included throughout the entire standard. Some further discussion on scope and boundaries of energy management systems. (ISO 14001 – A.1, KS A 4000 – A.1, prEN 16001 – A.1)

A.2 Roles, responsibility and authority

The energy management system team shall include, as appropriate, representatives from functional areas dealing with the selection, procurement, consumption, reliability, disposal and environmental impacts of fuels, water and energy systems. Representative areas may include but are not limited to: purchasing, accounting, engineering, design, production, maintenance, facilities management, environmental, and external service providers, as appropriate.

A.3 Energy policy

Include some detail on what should be included in an energy policy (ex. Commitment, long term goals, awareness, approach to applying policy, and review.) How it should be communicated. Linkages to other policies.

A.4 Planning

In the process of selecting goals, targets and action plans, the organization should consider:

- a) finances,
- b) alternative energy resources,
- c) maintenance and infrastructure needs,
- d) operational requirements and constraints,
- e) quality and appropriateness of energy resources,
- f) environmental impacts,
- g) safety and health issues,
- h) available human and technical resources, and
- i) ability to measure improvement in energy performance.

The action plans should have a suitable level of analysis, including:

- before-action plan energy use,
- action planned energy and non-energy benefits,
- identified means of verifying results, using standard measurement and verification protocols where available,

- implementation and maintenance costs, which includes the cost of capital equipment, labor, operation, financing, risk, measurement and verification, and
- life-cycle costs.

A.5 Energy Review/profile

Discuss linking energy goals with organizational strategy. Ensure business and energy objectives are aligned.

Identify simple methods vs more sophisticated energy strategy planning. (MSE 2000 A.5.4, A6.4; KS A 4000 – A.2.3)

A.5.1.1 Identification of past and present energy use (baseline assessment)

Identify specific areas of significant energy use, how to evaluate, where to look for energy consumption. How to include impacts and risks.

Need to address identifying significant energy use; energy-related water use; best practices for selecting data interval for establishing a baseline; information on in-depth analysis, including financial analysis, before making implementation decision

A.5.2 Identification of legal and other requirements

Internal benchmarks should be encouraged. External benchmarks are encouraged where available.

Planned intervals for measuring and monitoring may not be the same as those for legal and other. Planned intervals are determined by the organization.

A.5.3 Implementation and operation

A.5.3.1 Competence, awareness and training

These objectives shall be consistent in the line of management and between teams, as applicable, to encourage team work and a comprehensive approach.

The organization shall clearly define quantified objectives to its employees related to the energy management system application and the energy performance and/or its improvement. These objectives shall be consistent in the line of management and between teams, as applicable, to encourage team work and a comprehensive approach.

Discuss who should be competent in terms of energy management. If a procedure is required, more about what should be included. Add details on how to assess competency and what should be included in any records.

A.5.3.2 Design

Discuss what is meant by systems integration and optimization (consumption against requirements, minimizing losses in distribution, conversion efficiency.) Expand on systems design including new facilities or modification. Discuss how to include energy consumption/efficiency considerations when selecting or changing equipment and processes (matching of equipment to design requirements, connect to energy policy).

A.5.3.3 Operational control

Discuss how operations can be conducted in support of control and reduction of energy consumption.

A.5.4 Purchasing

Discuss links to Design. Include the importance of consideration of life cycle in equipment and outsourced services purchasing decisions.

4.5.5 Communication

This should ensure that all persons working for and on behalf of the organization can take an active part in the energy management and the improvement of the energy performance.

A.5.5 Contingency planning

Discuss some detail as to what should be included in a contingency plan

4.5.7 Contingency planning

The organization shall establish, document and maintain a procedure for identifying and responding to any energy supply or other potential disasters. This procedure shall seek to prevent or mitigate the consequences of any such occurrence and consider the continuity of the business operations.

A.5.6 Checking performance

A.5.6.1 Monitoring and measurement

Include guidance on frequency of measurement and reporting (how to ensure delivery of information to appropriate person/place).

A.5.6.2 Management system audit

Auditor objectivity and impartiality can be demonstrated by the freedom from responsibility for the activity being audited.