OVERVIEW OF ISO 50001:2018

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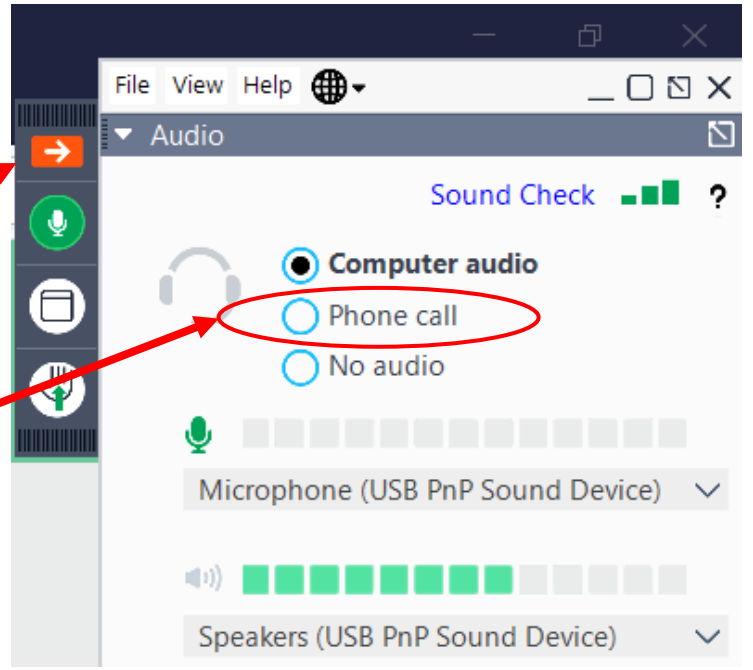

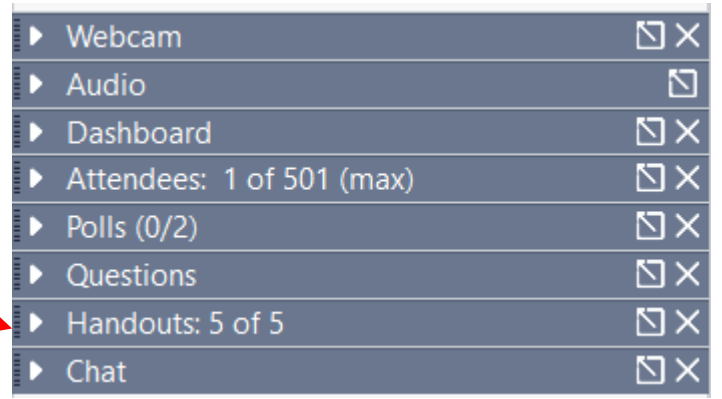

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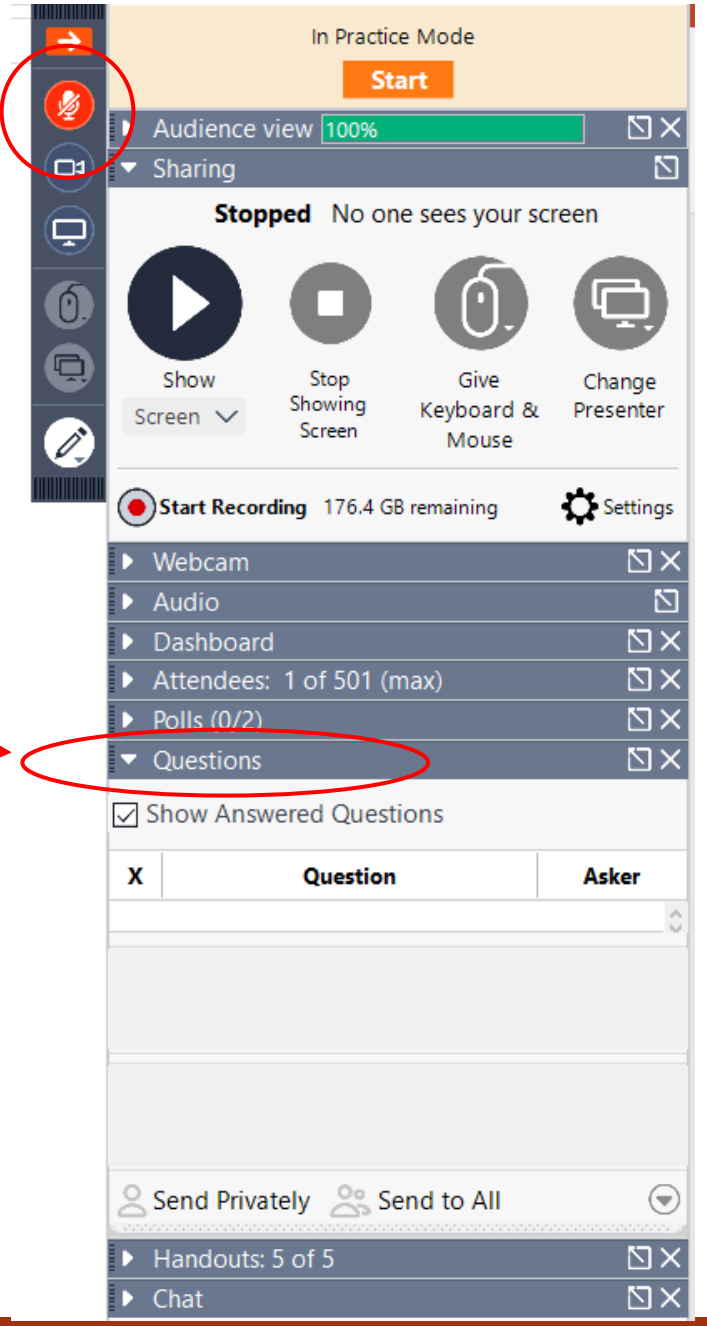

Agenda

- Welcome
- ESI Program
- EnMS and ISO 50001:2018 Overviews
- Q&A

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PEER-TO-PEER PROMOTION OF ENVIRONMENTAL EXCELLENCE

- Free and voluntary recognition and leadership program
- Promotes and supports outstanding environmental performance
- Oversight by DEQ Secretary and External Advisory Board
- Began in 2002
- 96 members at 199 facilities

ESI Membership Levels

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Stewards

- Set aggressive environmental goals
- Integrate EMS into core business functions
- Communicate with local community
- Agree to mentor other ESI members

Rising Stewards

- Demonstrate mature EMS
- Commit to go beyond compliance
- Set long-term environmental goals

Partners

- Establish environmental goals
- Report annually on goals & compliance
- Not be under criminal indictment/conviction

ADVANCEMENT

*Membership requirements are additive as you move up the hierarchy, e.g. Stewards must also meet the member requirements at the Partner and Rising Steward levels

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Staff provide:

- Technical/Compliance Assistance
- Tailor assistance to member needs/goals
  - Energy reduction (75)
  - Water use reduction (44)
  - Solid Waste (28)
- Education
- EMS Assistance
- Provide opportunities to network and share ideas

2019 ESI MEMBERS REPORTED RESULTS			
REDUCTIONS	Air Emissions	247	Tons
	Greenhouse Gas Emissions*	24,190	Metric Tons CO_2e
	Hazardous waste	158	Tons
	Landfilled waste	803	Tons
	Energy	838,230	mmBtu
	Water Use	1,050,057,201	Gallons
	Material Consumption	265	Tons
	Wastewater Pollutants	399,871	Tons
	Wastewater Volume	3,630,628,382	Gallons
REUSE	Biomass Recovery**	77,361	Tons
	Total Recycled Volume	186,998	Tons
TOTAL COST SAVINGS		$ 11,287,397	

*Indirect not reported in energy reductions

**Category created for compost/mulch related goals

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Energy Management System (EnMS)

A proven tool that is specifically designed to help any organization manage its energy related activities and allow successful pursuit of that organization's energy policies and goals.

What does an EnMS do?

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- Provides a systematic way of managing an organization's energy related information and efforts
- Ensures energy strategies are a priority
- Gives order and consistency for organizations to address energy concerns through:
  - allocation of resources,
  - assignment of responsibility
  - ongoing evaluation of practices, procedures and processes
- Focuses on continual improvement

Why Implement an EnMS?

- Helps to focus organization's priorities and avoid "flavor of the month syndrome"
- Helps to prioritize energy related goals and support their need for resources and attention
- Encourages understanding of energy performance and improvement
- Establish a framework to evaluate and reduce energy demand
- Helps to identify the root causes of energy related problems

Why Implement an EnMS?

- Increase energy efficiency thus
  - reducing cost
  - reducing carbon footprint and greenhouse gas contributions
- Other potential benefits:
  - Increased plant productivity
  - Improved product quality
  - Reduced scrap
  - Improved worker comfort
  - Increased available floor space
  - Improved safety

What is ISO 50001?

- Developed by an NGO representing over 100 countries – International Organization of Standardization
- ANSI is the US representative (founding member)
- Widely adopted
- Auditable
- Compatible and easily integrated with other ISO standards (ISO 9000, ISO 14001, ISO 45000, etc..)

Energy Performance and an EnMS (Annex A.2)

Interrelated or interacting elements:

- **Policy**
- **Objectives**
- **Energy targets**
- **Energy baseline**
- **Energy performance indicators**
- **Internal audits**
- **Addressing non-conformities**
- **Procurement process**
- **Design**

Promotes, supports and sustains

Energy Performance Improvement

- Improvement in Measurable results of
  - Energy efficiency
  - Energy consumption related to energy use compared to baseline

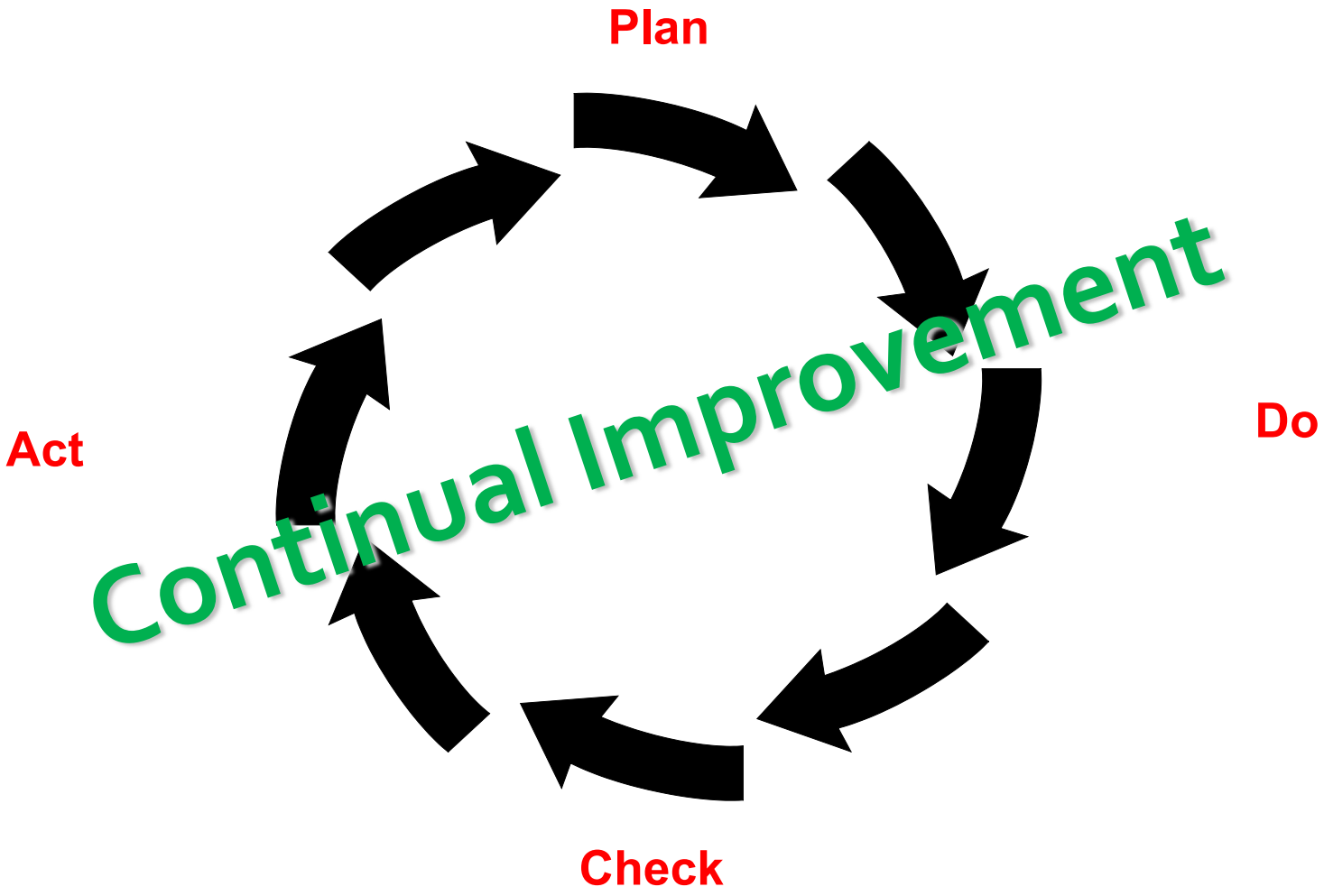
Achievement of other intended outcomes

- Reduced cost of energy
- Meeting overall climate change goals
- Improved reliability
- Increased use of renewables

Continual improvement of EnMS

- Suitability
- Adequacy
- Effectiveness
- Alignment with strategic direction

P-D-C-A Model of Continual Improvement



Elements of ISO 50001:2018

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5 Leadership & commitment
- 5.1 Leadership and commitment
- 5.2 Energy policy
- 5.3 Organization roles, responsibilities and authorities

6 Planning
- 6.1 Actions to address risks and opportunities
- 6.2 Objectives, energy targets and planning to achieve them
- 6.3 Energy Review
- 6.4 Energy performance indicators
- 6.5 Energy baseline
- 6.6 Planning for collection of energy data

Plan

7 Support
- 7.1 Resources
- 7.2 Competence
- 7.3 Awareness
- 7.4 Communication
- 7.5 Documented information

Do

8 Operation
- 8.1 Operational planning and control
- 8.2 Design
- 8.3 Procurement

9 Performance evaluation
- 9.1 Monitoring, measurement, analysis and evaluation
- 9.2 Internal audit
- 9.3 Management review

Check

10 Improvement
- 10.1 Nonconformity and corrective action
- 10.2 Continual improvement

Act

Continual Improvement

4 Context of Organization
- 4.1 Understanding the organization and its context
- 4.2 Understanding the needs & expectations of interested parties
- 4.3 Determining the scope of the EnMS
- 4.4 Energy management system

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50001 Standard

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4.1 Understanding the Organization and its Context

The organization ***shall*** determine external and internal issues that are relevant to its purpose and that affect its ability to achieve the intended outcome(s) of its EnMS and improve its energy performance.

Implementation note:

- Analysis of organizational context provides a high-level conceptual understanding of the **external and internal** issues that can affect, positively or negatively, energy performance and the EnMS

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Context & Leadership of the Organization

Section 4 Context of the Organization

4.1, 4.2, 4.3, 4.4

Section 5 Leadership

5.1, 5.2, 5.3

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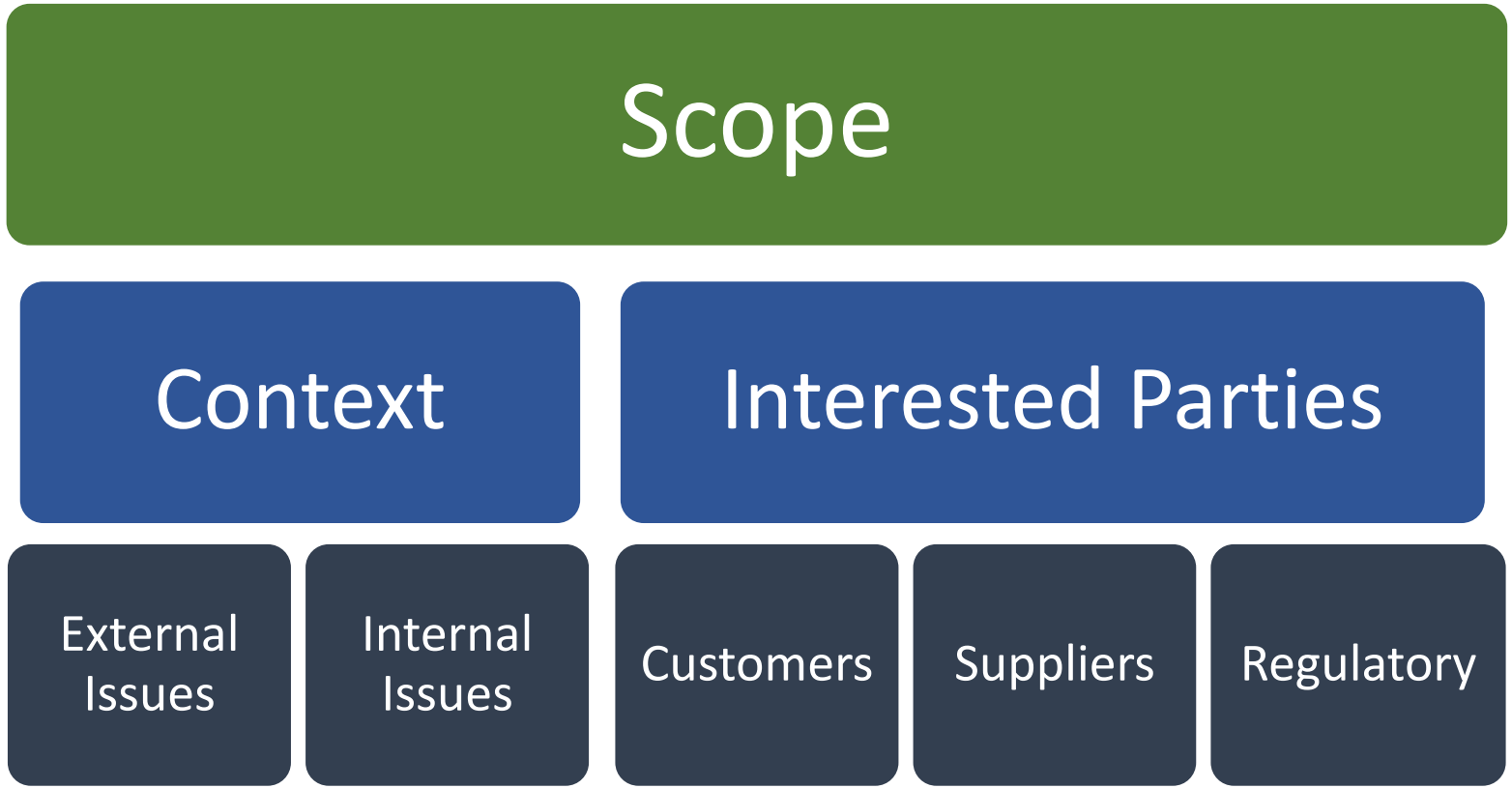
4 Context of the Organization



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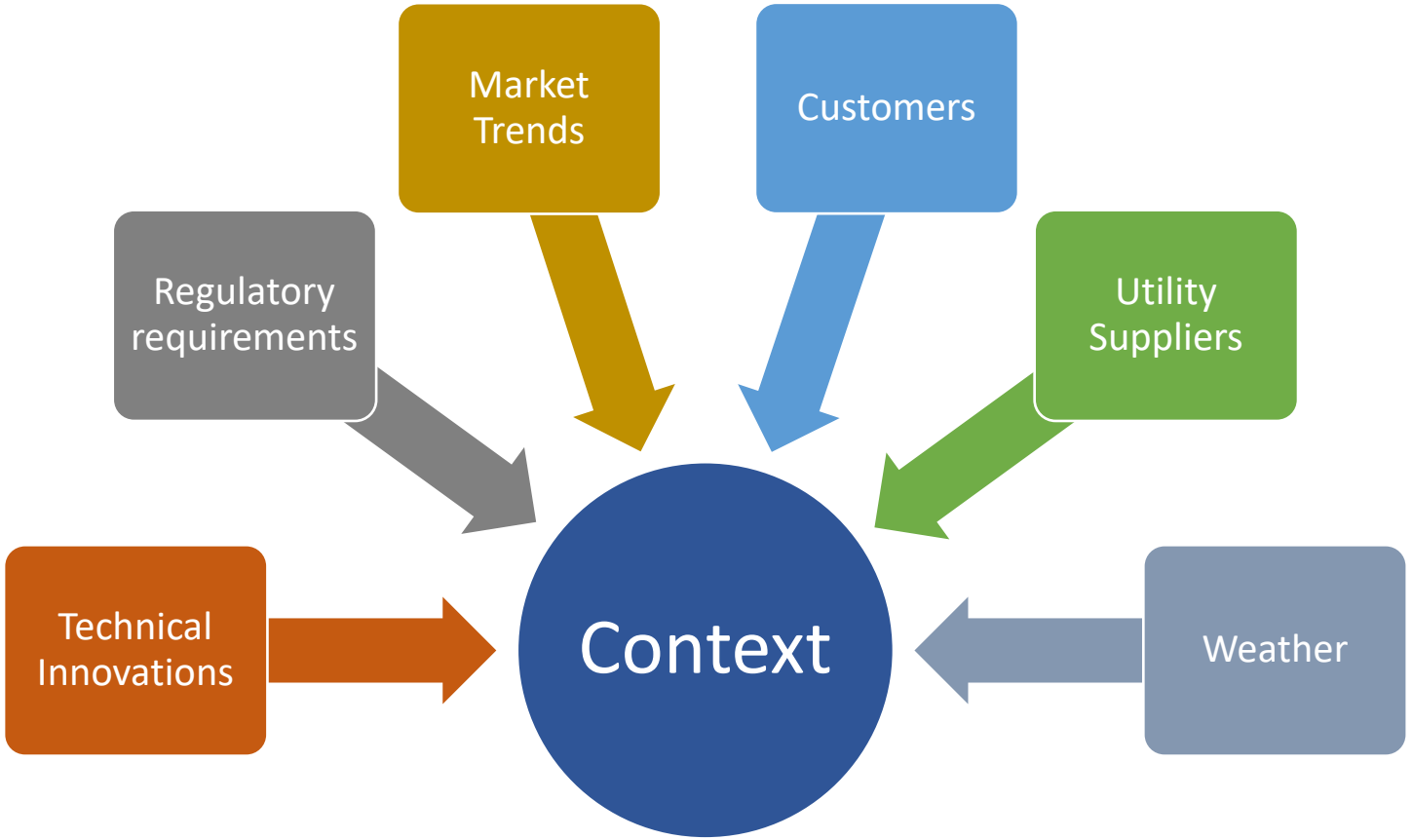

4.1 Understanding the Organization and its Context (cont'd)

Examples of **external** issues can include:

- Issues related to interested parties such as existing national or sector objectives, requirements or standards
- Restrictions or limitations on energy supply, security and energy costs or the availability of types of energy
- Effects of weather
- Effects of climate change
- Policy, legislation or regulations changes

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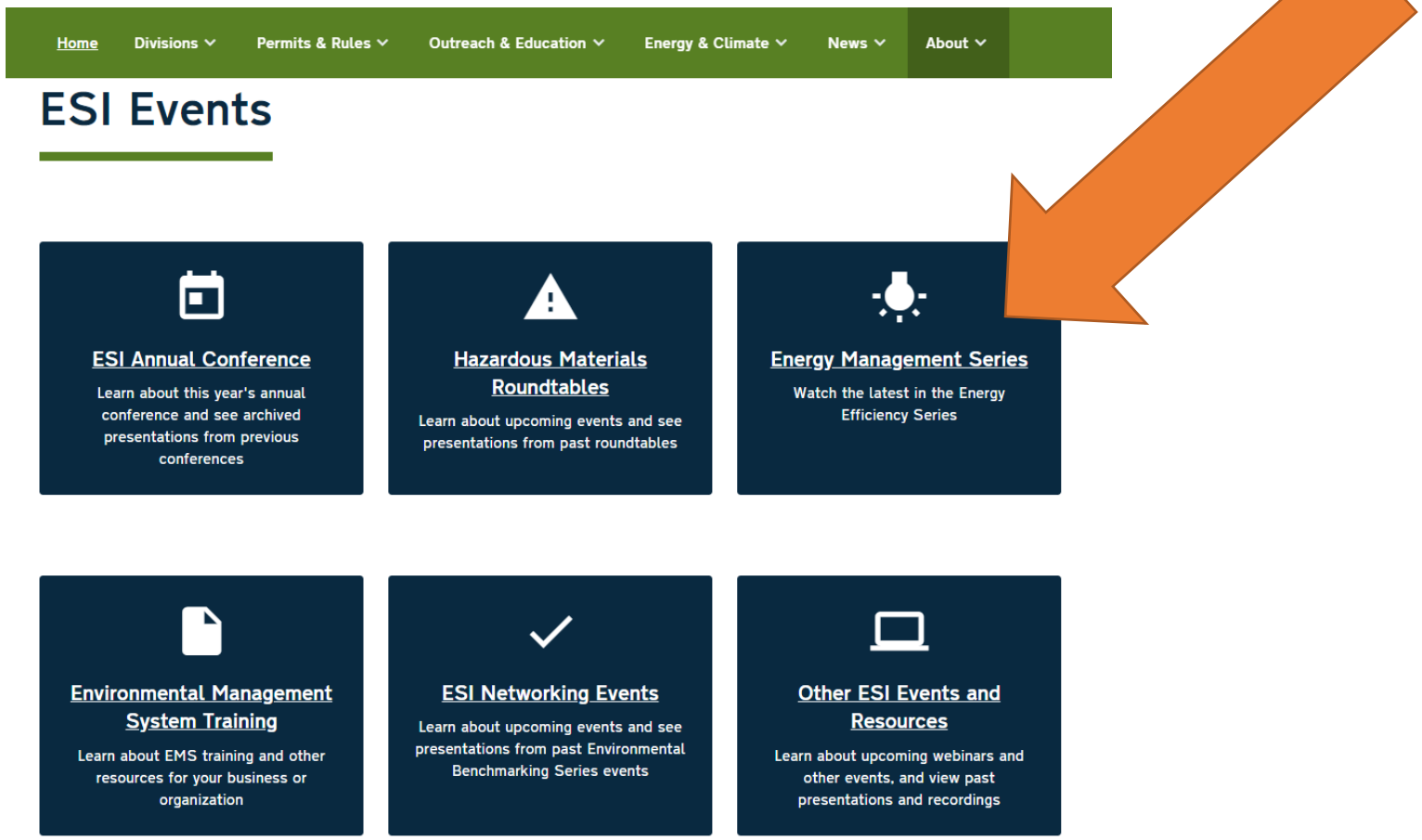
Events Page



4.1 Understanding the Organization and its Context (cont'd)

Examples of **internal** issues can include:

- Core business objectives and strategy
- Asset management plans
- Internal Resources (labor, financial, etc..) affecting the organization
- Energy management maturity and culture
- Sustainability considerations
- Contingency plans for interruptions in energy supply
- Maturity of existing technology
- Operational risks and liability considerations

4.1 Understanding the Organization and its Context (cont'd)

How do you implement it?

- Need to identify how you'll develop organization's context and how or if you'll document this process
  - Manual
  - SOP
  - Reference planning documents (strategic plan, business continuity, etc.)
  - Discussions documented through meeting minutes

Big picture – taking into account strategic direction (where we're going) and operational purpose (what we make/do).

4.2 Understanding the Needs and Expectations of Interested Parties

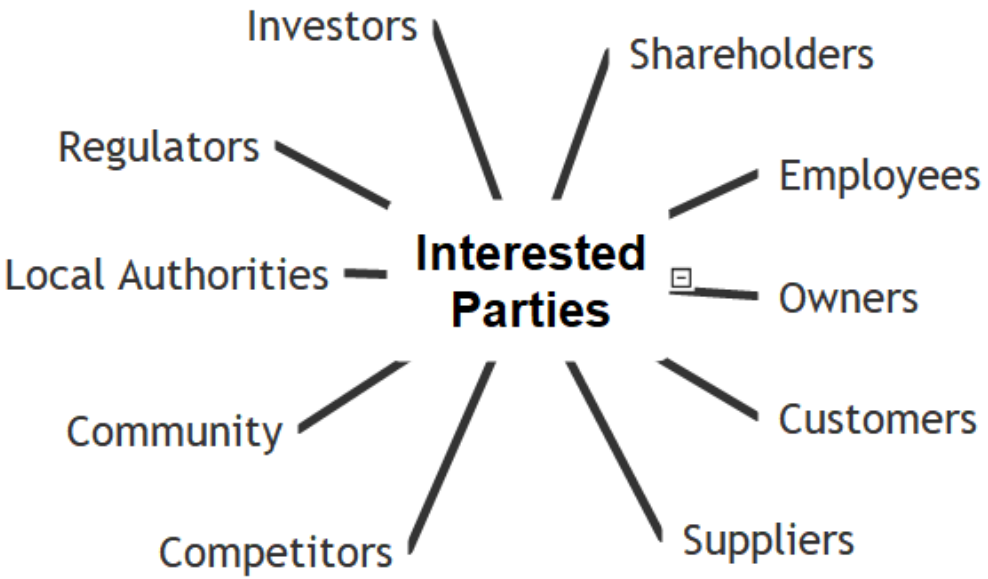
The organization ***shall*** determine:

a) Interested parties that are relevant to energy performance and the EnMS

b) The relevant requirements of these interested parties

c) Which of the identified needs and expectations the organization addresses through its EnMS

4.2 Understanding the Needs and Expectations of Interested Parties



4.2 Understanding the Needs and Expectations of Interested Parties (cont'd)

The organization ***shall***:

- Ensure that it has access to the applicable legal and other requirements related to its energy efficiency, energy use and energy consumption
- Determine how these requirements apply to its energy efficiency, energy use and energy consumption
- Ensure that these requirements are taken into account
- Review at defined intervals its legal and other requirements

4.2 Needs and Expectations of Interested Parties (cont'd)

How do you implement it?

- Need to identify how you'll identify interest parties and their needs and if they get addressed in the EnMS
- How you'll ensure access to the requirements
- How you'll review and at what internal Manual
  - SOP
  - List of requirements – does not specify
  - Discussions documented through meeting minutes

4.3 Determining the Scope of the Energy Management System

The organization ***shall*** determine boundaries and applicability of the EnMS to establish its scope.

When determining the EnMS scope, the organization ***shall*** consider:

a) External and Internal issues referred to in 4.1

b) The requirements referred to in 4.2

The organization ***shall*** ensure that it has the authority to control its energy efficiency, energy use and energy consumption within the scope and boundaries. The organization ***shall not*** exclude an energy type within the scope and boundaries.

The EnMS scope and boundaries ***shall*** be maintained as ***documented information***.

4.3 Determining the Scope of the Energy Management System

Consideration of the boundaries and applicability of the EnMS can include:

- The range of products and services;
- Different sites and activities;
- External provision of processes, products and services;
- Common support provided by centralized functions;
- Processes, procedures, instructions, or site-specific requirements.

4.3 Determining the Scope of the Energy Management System

Scope can include:

- Whole of the organization
- Specific and identified functions within the organization
- Specific sections of the organization
- One or more functions across a group of organizations.

Auditors could challenge your organization if any activities, products and services that would likely have a significant impact on the energy use. Your organization's scope determinations should be reasonable and consistently applied.

4.4 Energy Management System (EnMS)

The organization ***shall*** establish, implement, maintain and continually improve an EnMS, including the processes needed and their interactions, and continually improve energy performance, in accordance with the requirements of the ISO 50001 standard.

The processes needed can differ from one organization to another due to:

- The size of organization and its type of activities, processes, products and services
- The complexity of processes and their interactions
- The competence of personnel

4.4 Energy Mgt. System - cont'd

ISO 50001 requires an organization to demonstrate continual energy performance improvement

- Defined as – improvement in measurable results of energy efficiency or energy consumption related to energy use compared to your energy baseline
- No quantitative targets specified within the standard
- Organization defines its own - creates an action plan to reach the targets

4.4 Energy Management System cont'd

To help lock-in energy improvements longer-term, continual improvement here means periodically reinforcing gains and behaviors as well as being alert for new (cost-effective) opportunities as they arise.

- Energy reviews are used to understand reality, consider where to focus efforts and prioritize opportunities feeding into objectives, targets and action plans.
- Operational controls, design standards and procurement processes help ensure target behaviors are achieved by reducing the opportunity for other behaviors.
- Monitoring and targeting, internal audits and management reviews provide the preventive maintenance processes to help reinforce practices as well as identify opportunities and problems quickly enough to maintain the right momentum.

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Context & Leadership of the Organization

Section 4 Context of the Organization

4.1, 4.2, 4.3, 4.4

Section 5 Leadership

5.1, 5.2, 5.3

5.1 Leadership and Commitment

Top Management ***shall*** demonstrate leadership and commitment with respect to continual improvement of its energy performance and the effectiveness of the EnMS, by:

a) Ensuring that the EnMS scope and boundaries are established

b) Ensuring that the energy policy (5.2), objectives and energy targets (6.2) are established and are compatible with the strategic direction of the organization

c) Ensuring the integration of the EnMS requirements into the organization's business processes (Reference to "business" in this document can be interpreted broadly to mean those activities that are core to the purposes of the organization's existence)

d) Ensuring that action plans are approved and implemented

e) Ensuring that the resources needed for the EnMS are available

f) Communicating the importance of effective energy management and of conforming to the EnMS requirements

5.1 Leadership and Commitment (cont'd)

Top Management ***shall*** demonstrate leadership and commitment with respect to continual improvement of its energy performance and the effectiveness of the EnMS, by:

g) Ensuring that the EnMS achieves its intended outcome(s)

h) Promoting continual improvement of energy performance and the EnMS

i) Ensuring the formation of an energy management team

j) Directing and supporting persons to contribute to the effectiveness of the EnMS and to the energy performance improvement

k) Supporting other relevant management roles to demonstrate their leadership as it applies to their areas of responsibility

l) Ensuring that the EnPI(s) appropriately represent energy performance

m) Ensuring that processes are established and implemented to identify and address changes affecting the EnMS and energy performance within the scope and boundary of the EnMS

5.1 Leadership and Commitment (cont'd)

If employees observe top management asserting responsibility for energy management this will greatly assist in the establishment of a positive energy culture throughout the organization.

How do you implement it?
How do you ensure responsibilities are met?
How do you show conformance during an audit?

5.1 Leadership and Commitment (cont'd)

Leadership and commitment can be shown by:

- Aligning the energy management system with the organization's business objectives;
- Ensuring the necessary resources are available;
- Encouraging employees and other relevant interested parties to become actively involved in improving energy performance;
- Involving everyone in energy decisions that affect them;
- Promoting open discussion about energy performance

The organization can improve the energy culture, by:

- Providing clear and consistent leadership;
- Promoting formal and informal involvement of employees.

5.2 Energy Policy

Top Management ***shall*** establish an energy policy that:

- Is appropriate to the purpose of the organization;
- Provides a framework for setting and reviewing objectives and energy targets (6.2);
- Includes a **commitment to ensure the availability of information and necessary resources to achieve objectives and energy targets**;
- Includes a **commitment to satisfy applicable legal requirements and other requirements** (4.2) related to energy efficiency, energy use and energy consumption;
- Includes a **commitment to continual improvement** (10.2) of energy performance and the EnMS;
- *Supports the procurement* (8.3) *of energy efficient products and services* that impact energy performance;
- *Supports design* (8.2) *activities that consider energy performance improvement*.

5.2 Energy Policy (cont'd)

The energy policy ***shall***:

- Be available as **documented information** (7.5);
- Be communicated within the organization;
- Be available to interested parties (4.2), as appropriate;
- Be periodically reviewed and updated as necessary.

5.3 Organizational Roles, Responsibilities, & Authorities

Top Management ***shall*** ensure that the responsibilities and authorities for relevant roles are assigned and communicated within the organization

Top Management ***shall*** assign the responsibility and authority to the energy management team for:

a) Ensuring that the EnMS is established, implemented, maintained and continually improved
b) Ensuring that the EnMS conforms to the requirements of the ISO 50001 standard
c) Implementing action plans (6.2) to continually improve energy performance
d) Reporting on the performance of the EnMS and improvement of energy performance to top management at determined intervals
e) Establishing criteria and methods needed to ensure that the operation and control of the EnMS are effective

5.3 Organizational Roles, Responsibilities, & Authorities (cont'd)

Energy Management Team will be essential to success of the EnMS

Who should participate?

- Top Management
- Environmental staff
- Facilities management
- Procurement
- Staff related to major power users

Planning

Section 6 Planning

6.1, 6.2, 6.3, 6.4, 6.5, 6.6

6.1 Actions to Address Risks & Opportunities

6.1.1

When planning for the EnMS, the organization ***shall*** consider the issues referred to in the organization's context (4.1) and the requirements referred to in the interested parties (4.2) and review the organization's activities and processes that can affect energy performance.

Planning ***shall*** be consistent with the energy policy (5.2) and ***shall*** lead to actions that result in continual improvement in energy performance.

6.1 Actions to Address Risks & Opportunities (cont'd)

6.1.1 cont'd

The organization ***shall*** determine the risks and opportunities that need to be addressed to:

- Give assurance that the EnMS can achieve its intended outcome(s), including energy performance improvement;
- Prevent or reduce undesired effects;
- Achieve continual improvement of the EnMS and energy performance

6.1 Actions to Address Risks & Opportunities (cont'd)

6.1.2

The organization ***shall*** plan:

a) Actions to address these risks and opportunities;

b) How to:

   1) Integrate and implement the actions into the EnMS and energy performance processes;
   2) Evaluate the effectiveness of these actions

6.2 Objectives, energy targets and planning to achieve them

6.2.1

The organization ***shall*** establish objectives at relevant functions and levels.

The organization ***shall*** establish energy targets.

6.2 Objectives, energy targets and planning to achieve them (cont'd)

6.2.2

The objectives and energy targets ***shall***:

a) Be consistent with the energy policy

b) Be measurable (if practicable) – aka if at all possible

c) Take into account applicable requirements

d) Consider SEUs (6.3)

e) Take into account opportunities to improve energy performance

f) Be monitored

g) Be communicated

h) Be updated as appropriate

The organization ***shall*** retain **documented information** on the objectives and energy targets.

6.2 Objectives, energy targets and planning to achieve them (cont'd)

6.2.3

When planning how to achieve its objectives and energy targets, the organization ***shall*** establish and maintain action plans that include:

- What will be done
- What resources will be required
- Who will be responsible
- When it will be completed
- How the results will be evaluated, including the method(s) used to verify energy performance improvement

The organization ***shall*** consider how the actions to achieve its objectives and energy targets can be integrated into the organization's business processes. The organization ***shall*** retain **documented information** on action plans.

6.3 Energy review

The organization ***shall*** develop and conduct an energy review:

To develop an energy review, the organization ***shall***:

a) Analyze energy use and consumption based on measurement and other data, i.e.:
   1) Identify current types of energy
   2) Evaluate past and current energy use(s) and consumption

b) Based on the analysis, identify SEUs

c) For each SEU:
   1) Determine relevant variables;
   2) Determine current energy performance;
   3) Identify the person(s) doing work under its control that influence or affect the SEUs;

d) Determine and prioritize opportunities for improving energy performance;

e) Estimate future energy use(s) and energy consumption

6.3 Energy review (cont'd)

The energy review ***shall*** be updated at defined intervals, as well as in response to major changes in facilities, equipment, systems or energy-using processes.

The organization ***shall*** maintain as **documented information** the methods and criteria used to develop the energy review and ***shall*** retain **documented information** of its results.

6.4 Energy performance indicators

The organization ***shall*** determine EnPIs that:

a) Are appropriate for measuring and monitoring its energy performance;

b) Enable the organization to demonstrate energy performance improvement.

The method for determining and updating the EnPI(s) ***shall*** be maintained as **documented information**. Where the organization has data indicating that relevant variables significantly affect energy performance, the organization ***shall*** consider such data to establish appropriate EnPI(s).

EnPI value(s) ***shall*** be reviewed and compared to their respective EnB(s), as appropriate. The organization ***shall*** retain **documented information** of EnPI value(s).

6.5 Energy baseline

The organization ***shall*** establish (an) EnB(s) using the information from the energy review(s) taking into account at suitable period of time.

Where the organization has data indicating that relevant variables significantly affect energy performance, the organization ***shall*** carry out normalization of the EnPI value(s) and corresponding EnB(s).

6.5 Energy baseline (cont'd)

EnB(s) ***shall*** be revised in the case of one or more of the following:

a) EnPI(s) no longer reflect the organization's energy performance;

b) There have been major changes to the static factors;

c) According to a pre-determined method.

The organization ***shall*** retain information of EnB(s), relevant variable data and modifications to EnB(s) as **documented information**.

6.6 Planning for collection of energy data

The organization ***shall*** ensure that key characteristics of its operations affecting energy performance are identified, measured, monitored and analyzed at planned intervals.

The organization ***shall*** define and implement an energy data collection plan appropriate to its size, its complexity, its resources and its measurement and monitoring equipment.

The plan ***shall*** specify the data necessary to monitor the key characteristics and state how and at what frequency the data ***shall*** be collected and retained.

6.6 Planning for collection of energy data (cont'd)

Data to be collected (or acquired by measurement as applicable) and retained documented information ***shall*** include:

a) The relevant variables for SEUs;

b) Energy consumption related to SEUs and to the organization;

c) Operational criteria related to SEUs;

d) Static factors, if applicable;

e) Data specified in action plans.

The energy data collection plan ***shall*** be reviewed at defined intervals and updated as appropriate.

6.6 Planning for collection of energy data (cont'd)

The energy data collection plan ***shall*** be reviewed at defined intervals and updated as appropriate.

The organization ***shall*** ensure that the equipment used for measurement of key characteristics provides data which are accurate and repeatable.

The organization ***shall*** retain documented information on measurement, monitoring and other means of establishing accuracy and repeatability.

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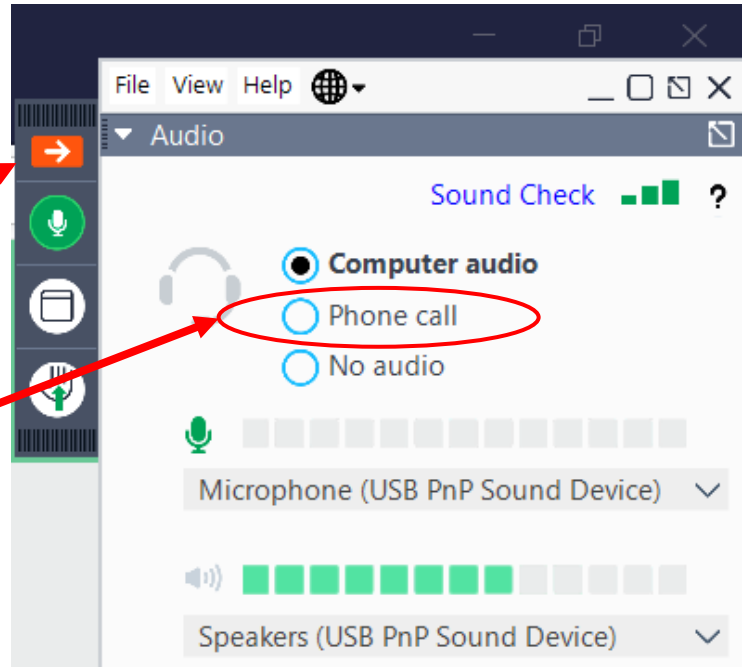

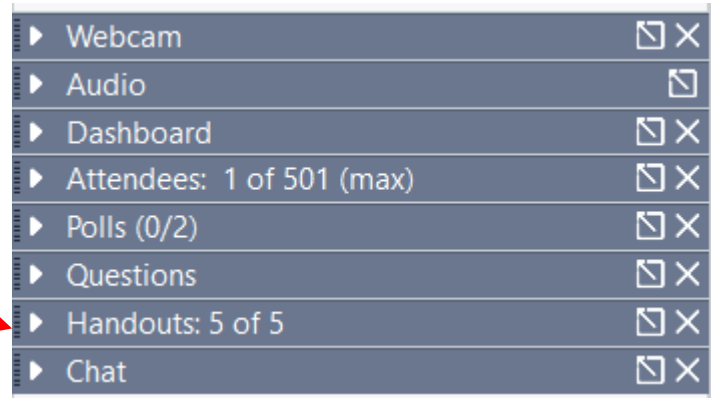

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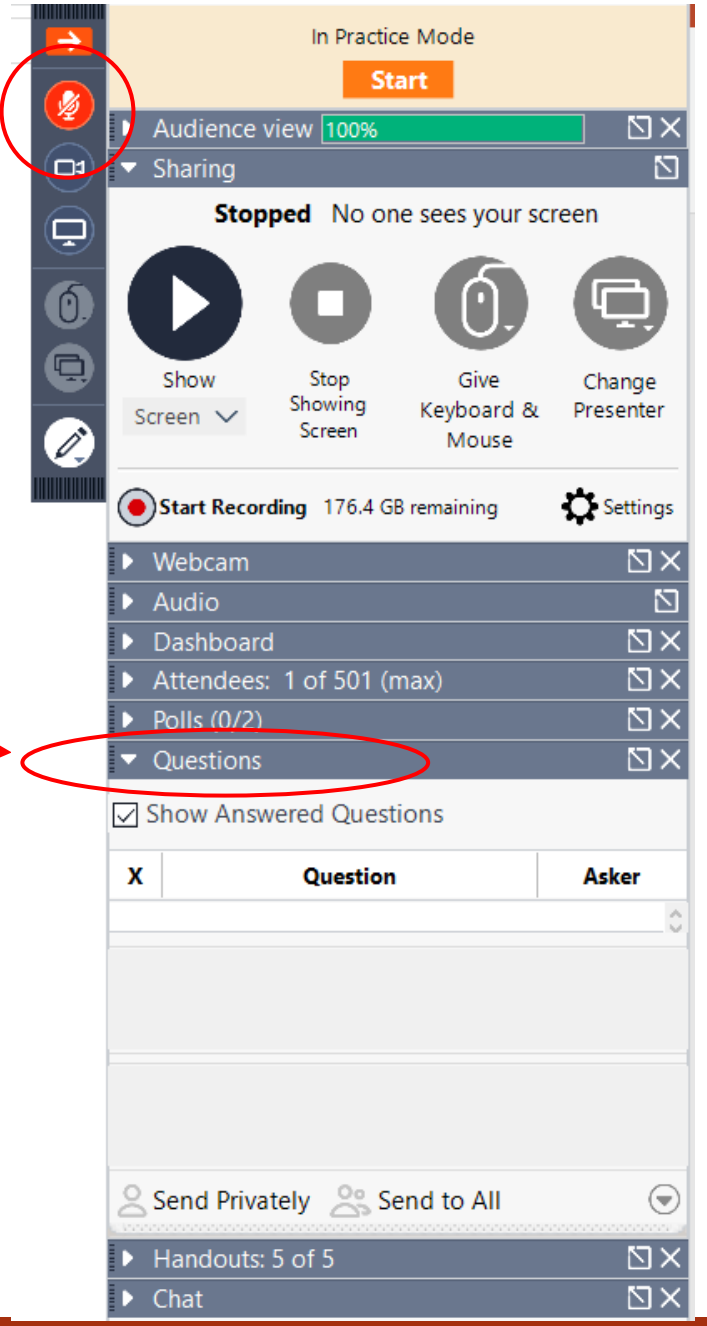


Support & Operation

Section 7 Support

7.1, 7.2, 7.3, 7.4.1, 7.4.2, 7.4.3, 7.5.1, 7.5.2, 7.5.3

Section 8 Operation

8.1, 8.2

7.1 Resources

The organization ***shall*** determine and provide the resources needed for establishment, implementations, maintenance, and continual improvement of energy performance and the EnMS.

Resources include human resources, specialized skills, technology, data collection, infrastructure and financial resources.

7.1 Resources (cont'd)

- Ensure that your organization has determined and provided the resources needed for the establishment, implementation, maintenance and continual improvement of your management system.
- Check that your organization has identified which resources it needs to make available in order to ensure the effective operation of your EnMS.
- Resources will often include raw materials, infrastructure, finance, personnel and IT, all of which can be either internally or externally provided.

7.2 Competence

The organization ***shall***:

a) Determine the necessary competence of person(s) doing work under its control that affects its energy performance and EnMS

b) Ensure that these persons are competent on the basis of appropriate education, training, skills or experience

c) Where applicable, take actions to acquire the necessary competence, and evaluate the effectiveness of the actions taken

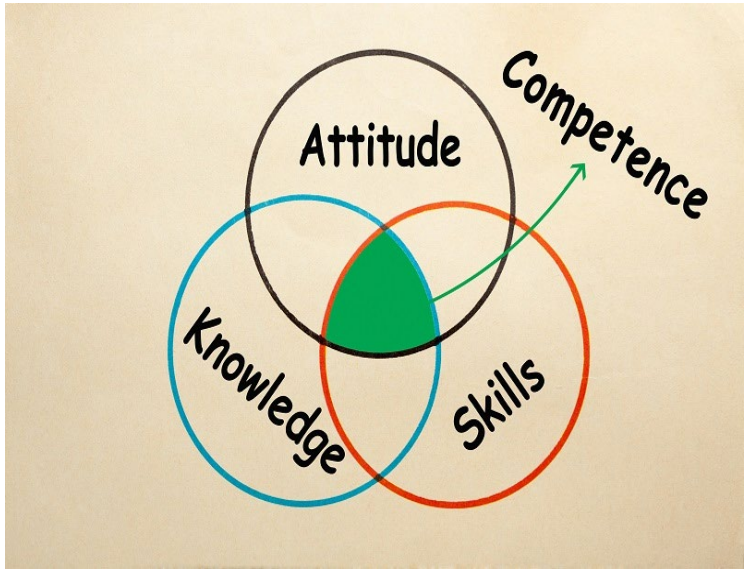
d) Retain appropriate ***documented information*** (7.5) as evidence of competence

Applicable actions can include, for example, the provision of training to, the mentoring of, or the reassignment of currently employed persons; or the hiring or contracting of competent persons.

7.2 Competence (cont'd)

Training alone may not be sufficient to demonstrate competence; this must be demonstrated through tests, observations, results, etc.. Auditors need to find objective evidence in order to determine that the competency requirements have been met.

If the people are found not to be competent, your organization is required to take action. The actions taken need to be evaluated for effectiveness in raising competence to the required level. Examples of action may include remedial training, recruitment or the use of external people in order to acquire the necessary competence.



7.3 Awareness

Persons doing work under the organization's control ***shall*** be aware of:

a) The energy policy (5.2)
b) Their contribution to the effectiveness of the EnMS, including achievement of objectives and energy targets (6.2), and the benefits of improved energy
c) The impact of their activities or behavior with respect to energy performance
d) The implications of not conforming with the EnMS requirements

7.3 Awareness (cont'd)

You should seek evidence to confirm that this requirement has been applied by your organization to ensure that the people who need to be made aware now include all the people who work on your organization's behalf that affect the conformity of your organization's EnMS or products. You ensure that these people are aware of:

- The quality, **energy**, environmental, and/or health and safety policies;
- Their contribution to the effectiveness of the EnMS;
- Benefits of improved performance;
- The implications of not conforming to energy management system requirements.

7.3 Awareness (cont'd)

The awareness training does not need to follow the format of long classroom sessions.

- Training techniques can include short training segments supplemented with videos and hands-on demonstrations that address key elements of the EnMS.
- Other methods to promote and reinforce the health and safety awareness training sessions include communication via electronic bulletin boards, posters, newsletters and informational meetings.

7.4 Communication

The organization ***shall*** determine the internal and external communications relevant to the EnMS, including:

a) On what it will communicate
b) When to communicate
c) With whom to communicate
d) How to communicate
e) Who communicates

7.4 Communication (cont'd)

When establishing its communication process(es), the organization ***shall*** ensure that information communicated is consistent with information generated within the EnMS and is dependable.

The organization ***shall*** establish and implement a process by which any person(s) doing work under the organization's control can make comments or suggest improvements to the EnMS and to energy performance.

The organization ***shall consider*** retaining ***documented information*** (7.5) of the suggested improvements.

7.4 Communication (cont'd)

Examples of **internal** communications include:

- Communicating energy objectives and targets to employees.
- Raising awareness of energy issues to employees.
- Communicating the energy policy to employees.
- Advising of nonconformance to relevant departmental heads.
- Reporting incidents arising from abnormal or emergency operations to senior management.

7.4 Communication (cont'd)

Examples of **external** communications include:

- Dealing with energy/environmental complaints or proactively inviting such stakeholders, or 'green' pressure groups to the site.
- Responding to media inquiries, especially in the event of an incident.

7.4 Communication (cont'd)

An inability to communicate effectively within the first few hours of an incident could seriously reduce the company's ability to control the situation. This will undermine the company's reputation in the minds of staff, customers, the media, and the public. Effective energy management requires effective communications. Communications will help you:

- motivate the workforce;
- explain the energy management policy both internally and externally and how it relates to the overall business vision/strategy;
- ensure understanding of roles and expectations;
- demonstrate management commitment;
- monitor performance; and,
- identify potential system improvements.

7.5 Documented information

Definition:

Information required to be controlled and maintained by an organization and the medium on which it is contained

Can refer to :

- The management system including related processes
- Information created in order for the organization to operate (documentation)
- Evidence of results achieved (records)

7.5 Documented information

Annex clarification:

- “Documented information” replaces the nouns “documentation”, “documents”, and “records” used in previous versions
- “Retain documented information…” means records
- “Maintain documented information” means documentation other than records that is kept up to date

- For those with 14001 standard “as evidence of” referred to records

7.5 Documented information

7.5.1 - General

The organization's EnMS ***shall*** include:

a) Documented information required by ISO 50001;

b) Documented information determined by the organization as being necessary for the effectiveness of the EnMS and to demonstrate energy performance improvement.

7.5 Documented information (cont'd)

7.5.2 – Creating and updating

When creating and updating documented information, the organization ***shall*** ensure appropriate:

a) Identification and description (e.g. a title, date, author or reference number);

b) Format (e.g. language, software version, graphics) and media (e.g. paper, electronic);

c) Review and approval for suitability and adequacy.

7.5 Documented information (cont'd)

7.5.3 – Control of documented information

Documented information required by the EnMS and by ISO 50001 ***shall*** be controlled to ensure:

a) It is available and suitable for use, where and when it is needed;

b) It is adequately protected (e.g. from loss of confidentiality, improper use, loss of integrity).

7.5 Documented information (cont'd)

7.5.3 – Control of documented information (cont'd)

For the control of documented information, the organization ***shall*** address the following activities, as applicable:

- Distribution, access, retrieval and use;
- Storage and preservation, including preservation of legibility;
- Control of changes (e.g. version control);
- Retention and disposition.

Documented information of external origin determined by the organization to be necessary for the planning and operation of the EnMS ***shall*** be identified, as appropriate, and controlled.

8.1 Operational Planning & Control

The organization ***shall*** plan, implement and control the processes, related to its SEUs, needed to meet requirements and to implement the actions determined in 6.2 by:

a) establishing criteria for the processes, including the effective operation and maintenance of facilities, equipment, systems and energy-using processes, where their absence can lead to a significant deviation from intended energy performance

b) communicating the criteria to relevant person(s) doing work under the control of the organization

c) implementing control of the processes in accordance with the criteria, including operating and maintaining facilities, equipment, systems and energy-using processes in accordance with established criteria

d) keeping **documented information** to the extent necessary to have confidence that the processes have been carried out as planned

8.1 Operational Planning & Control (cont'd)

The organization ***shall*** control planned changes and review the consequences of unintended changes taking actions to mitigate any adverse effects, as necessary.

The organization ***shall*** ensure the outsourced SEUs or processes related to its SEUs are controlled.

8.2 Design

The organization ***shall*** consider energy performance improvement opportunities and operational control in the design of new, modified and renovated facilities, equipment, systems and energy-using processes that can have a significant impact on its energy performance over the planned or expected operating lifetime.

Where applicable, the results of the energy performance consideration ***shall*** be incorporated into specification, design and procurement activities.

The organization ***shall*** retain ***documented information*** of the design activities related to energy performance.

8.3 Procurement

The organization ***shall*** establish and implement criteria for evaluating energy performance over the planned or expected operating lifetime, when procuring energy using products, equipment and services which are expected to have a significant impact on the organization's energy performance.

When procuring energy using products, equipment and services that have, or can have, an impact on SEUs, the organization ***shall*** inform suppliers that energy performance is one of the evaluation criteria for procurement.

Where applicable, the organization ***shall*** define and communicate specifications for:

a) ensuring the energy performance of procured equipment and services;

b) the purchase of energy

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Performance Evaluation

Section 9.1 Monitoring, measurement, analysis and evaluation

9.1.1, 9.1.2

Section 9.2 Internal Audit

9.2.1, 9.2.2

Section 9.3 Management Review

9.1 Monitoring, Measurement, Analysis, & Evaluation of Energy Performance and the EnMS

ISO 50001 9.1 focuses on elements of the EnMS that need to be monitored, measured, analyzed and evaluated, and when these procedures should be carried out.

Any significant deviations in energy performance should be investigated and responded to. Compliance with legal and other requirements should also be evaluated.

9.1.1 Monitoring, Measurement, Analysis, & Evaluation of Energy Performance and the EnMS

The organization **shall** determine for energy performance and the EnMS:

a) What needs to be monitored and measured, including at a minimum the following key characteristics:
   1) The effectiveness of the action plans in achieving objectives and energy targets
   2) Energy Performance Indicators (EnPIs)
   3) Operation of significant energy uses (SEUs)
   4) Actual versus expected energy consumption

b) the methods for monitoring, measurement, analysis and evaluation, to ensure we get valid repeatable and reliable results

9.1.1 Monitoring, Measurement, Analysis, & Evaluation of Energy Performance and the EnMS (cont'd)

- This will now allow you to determine when monitoring and measurement ***shall*** be performed and when the results from monitoring and measurement ***shall*** be analyzed and evaluated.

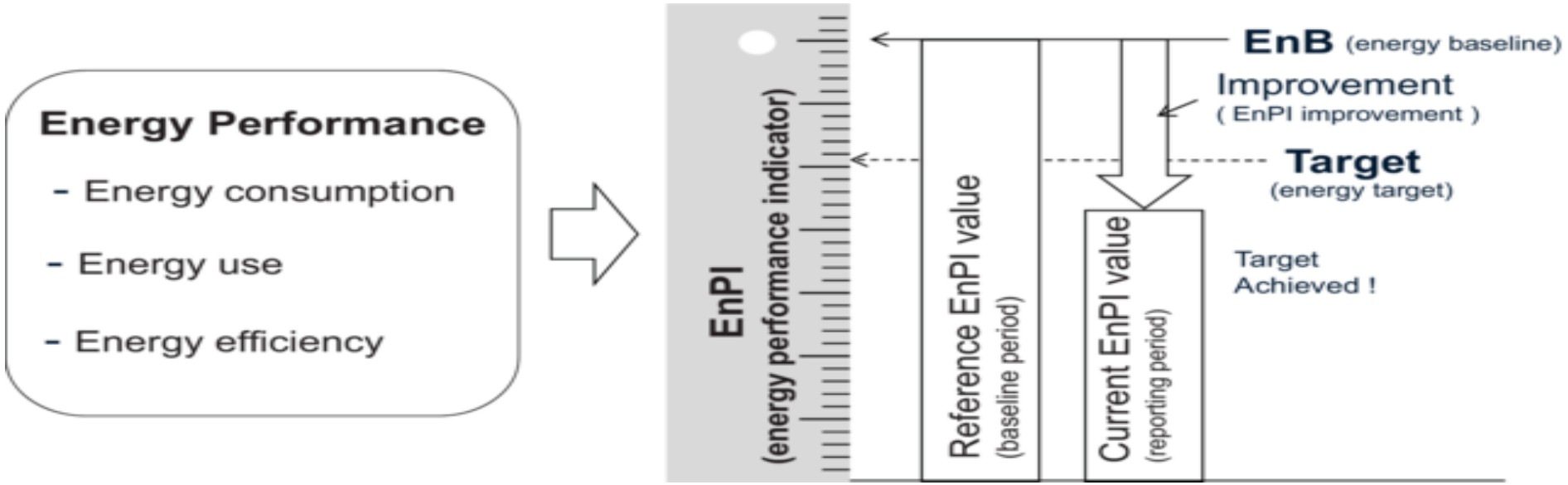
- The final step is to evaluate data created from the implementation of the energy data collection plan with a view to drawing conclusion on energy performance and the effectiveness of the EnMS (see 6.6).

9.1.1 Monitoring, Measurement, Analysis, & Evaluation of Energy Performance and the EnMS (cont'd)

Most importantly and critical to ensuring the ability to demonstrate continual improvement is the need to confirm that improvement in energy performance has been evaluated by comparing energy performance indicator (EnPI) value(s) (see 6.4) against the corresponding baselines (EnB's) (see 6.5).

9.1.1 Monitoring, Measurement, Analysis, & Evaluation of Energy Performance and the EnMS (cont'd)

Relationship between energy performance, EnPIs, EnBs and energy targets



9.1.2 Evaluation of Compliance with Legal Requirements and Other Requirements

- At planned intervals, the organization ***shall*** evaluate compliance with legal and other requirements (4.2) related to its energy efficiency, energy use, energy consumption and the EnMS.

- The organization ***shall*** retain ***documented information*** (7.5) on the results of the evaluation of compliance and any actions taken.

9.1.2 Evaluation of Compliance with Legal Requirements and Other Requirements (cont'd)

Once you have determined your Compliance Obligation, now you must evaluate your Compliance. Here you must plan and implement a process to evaluate if you meet the legal requirements that are applicable to you as determined above. This process needs to include:

- **Frequency of compliance evaluation:** How often you are going to check to see if you meet the requirements of particular legislation will vary from law to law, but your process needs to determine how often you will check each level of compliance. For example, you may need to continually check the concentration of chemicals you are emitting into the wastewater system, but you may only need to periodically check on how well you are diverting recycling from your landfill waste.

9.1.2 Evaluation of Compliance with Legal Requirements and Other Requirements (cont'd)

- **Evaluate compliance and take action:** This is the step that everyone thinks about when it comes to the requirements of legal compliance, and this requirement has not changed. As an organization, you need to make an assessment against the applicable laws to see if you meet the requirements and take any actions necessary to become compliant if you are not.

9.1.2 Evaluation of Compliance with Legal Requirements and Other Requirements (cont'd)

- **Maintain the status of your compliance:** In other words, always know if you actually comply with your legal requirements. If a law changes, you need to know about it and know if the change affects your compliance with the law. If you make a change in your facility, you may need to evaluate whether you still obey all the laws, both during and after the change, even if you are not yet set to evaluate this according to your regular schedule.

9.2 Internal Audit

9.2.1

The organization ***shall*** conduct internal audits of the EnMS at planned intervals to provide information on whether the EnMS:

a) Improves energy performance;

b) Conforms to:

- the organization's own requirements for its EnMS; the energy policy (5.2), objectives and energy targets (6.2) established by the organization;
- the requirements of the ISO 50001 standard.

c) Is effectively implemented and maintained.

9.2 Internal Audit (cont'd)

9.2.2

The organization ***shall***:

a) Plan, establish, implement and maintain (an) audit program(s) including the frequency, methods, responsibilities, planning requirements and reporting, which ***shall*** take into consideration the importance of the processes concerned and the results of previous audits;

b) Define the audit criteria and scope for each audit;

c) Select auditors and conduct audits to ensure objectivity and the impartiality of the audit process;

d) Ensure that the results of the audits are reported to relevant management;

e) Take appropriate actions in accordance with 10.1 and 10.2;

f) Retain **documented information** as evidence of the implementation of the audit program(s) and the audit results

9.3 Management Review

A Management Review is a formal, structured meeting which involves top management and takes place at regular intervals throughout the year. They are a critical and required part of running an ISO certified Management System.

The purpose of a Management Review meeting is to review and evaluate the effectiveness of the EnMS, helping you to determine its continued suitability and adequacy. The Management Review does this by encouraging top management to consider the degree by which the EnMS:

- Achieves the expected results
- Meets the organization's requirements
- Functions in accordance with the established operating procedures and processes
- Is capable of identifying non-conformities and monitoring subsequent corrective and preventive actions

A Management Review also ensures that all levels of management are made aware of any changes, updates, revisions, etc.. to the day-to-day workings of the Management System itself.

9.3 Management Review (cont'd)

9.3.1

Top Management ***shall*** review the organization's EnMS, at planned intervals, to ensure its continuing suitability, adequacy, effectiveness and alignment with the strategic direction of the organization.

The management review covers the entire scope of the EnMS, although not all elements of the EnMS need to be reviewed at once. The review process can take place over a period of time.

9.3 Management Review (cont'd)

9.3.2

Management review ***shall*** include consideration of:

- The status of actions from previous management reviews
- Changes in external and internal issues and associated risks and opportunities that are relevant to the EnMS
- Information on the EnMS performance, including trends in:
  - Nonconformities and corrective actions
  - Monitoring and measurement results
  - Audit results
  - Results of the evaluation of compliance with legal requirements and other requirements
- Opportunities for continual improvement, including those for competence
- Energy policy

9.3 Management Review (cont'd)

9.3.3

The energy performance inputs to management review ***shall*** include:

- The extent to which objectives and energy targets have been met
- Energy performance and energy performance improvement based on monitoring and measurement results including the Energy Performance Indicators (EnPIs)
- Status of the action plans

9.3 Management Review (cont'd)

9.3.4

The outputs of the management review ***shall*** include decisions related to continual improvement opportunities and any need for changes to the EnMS, including:

a) Opportunities to improve energy performance
b) The energy policy
c) The energy performance indicators (EnPI(s)) or energy baselines (EnB(s))
d) Objectives, energy targets, action plans or other elements of the EnMS and actions to be taken if they are not achieved
e) Opportunities to improve integration with business processes
f) The allocation of resources
g) The improvement of competence, awareness and communication

The organization ***shall*** retain ***documented information*** as evidence of the results of management reviews.

9.3 Management Review (cont'd)

Note that there is a difference between Management Meetings and Management Reviews. A Management Meeting may address the day-to-day working practices, sales, production, resources and staffing matters, but the Management Review focuses solely on the requirements of the Management System, as described within your Manual or documented information.

Improvement

10.1 Nonconformity & Corrective Action

When a nonconformity is identified, the organization ***shall***:

a) React to the nonconformity and, as applicable:

   1) Take action to control and correct it;

   2) Deal with the consequences

b) Evaluate the need for action to eliminate the cause(s) of the nonconformity, in order that it does not recur or occur elsewhere, by:

   1) Reviewing the nonconformity

   2) Determining the causes of the nonconformity

   3) Determining if similar nonconformities exist, or can potentially occur

c) Implement any action needed

d) Review the effectiveness of any corrective action taken

e) Make changes to the EnMS, if necessary

10.1 Nonconformity & Corrective Action (cont'd)

Corrective actions ***shall*** be appropriate to the effects of the encountered nonconformities.

The organization ***shall*** retain ***documented information*** of:

- The nature of the nonconformities and subsequent actions taken;
- The results of any corrective action

10.2 Continual Improvement

The organization ***shall*** continually improve the suitability, adequacy and effectiveness of the EnMS.

The organization ***shall*** demonstrate continual energy performance improvement.

Resources

- ISO 50001 Gap Analysis Tool
  - In handouts
- Waste Reduction Partners
  - https://wastereductionpartners.org/
- DOE 50001 Ready Navigator Tool!
  - https://www.energy.gov/eere/amo/50001-ready-program
- Advanced Energy
  - https://www.advancedenergy.org/commercialandindustrial/
- UNC Charlotte
  - Director: Dr. Robert Cox
    Phone: 704-687-8249
    E-Mail: Robert.Cox@uncc.edu

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