Section: Performance Evaluation

Task 20: We monitor trends in energy management system (EnMS) performance and evaluate the effectiveness of the EnMS in achieving intended outcomes and planned results. The methods used, the frequency of the monitoring, and when the results are analyzed and evaluated are defined.

Getting It Done

1. Determine what data or information is needed to establish trends in energy management system (EnMS) performance, including trends in nonconformities, corrective actions, and results in monitoring and measurement, internal and external audits, and evaluations of compliance with applicable energy-related legal and other requirements.
2. Determine what data or information is needed to monitor, measure, analyze, and evaluate the results of the EnMS and its effectiveness as related to the intended outcomes of your EnMS and the strategic goals and priorities of your organization.
3. Determine the methods to be used, when the monitoring and measurement will be done, and when the results will be analyzed and evaluated.
4. Implement the monitoring and measurement analysis of EnMS performance and the evaluation of EnMS effectiveness.

Task Overview

Monitoring, measurement, analysis, and evaluation in the energy management system (EnMS) are not limited to energy performance and energy performance improvement (see Task 21 Monitoring and Measurement of Energy Performance Improvement). You also must monitor, measure, and analyze the performance of the EnMS and evaluate its effectiveness. We evaluate the effectiveness of the EnMS to ensure that it continues to promote, support, and sustain not just energy performance improvements, but the achievement of other intended outcomes and planned results. It also is intended to ensure that the resources allocated by top management for the EnMS are used effectively.

First, you determine what needs to be monitored and measured, and then you determine the methods you will use to ensure valid results. These methods are those needed for monitoring, measurement, analysis, and evaluation. Next, you determine when the monitoring and measurement will be done and when the results will be analyzed and evaluated.

This guidance is relevant to Section 9.1.1 of the ISO 50001:2018 standard.

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Associated Resources Short Description

no resources for this questions

Full Description

Develop a plan to establish trends in EnMS performance

The energy management system (EnMS) promotes, supports, and sustains not just energy performance improvement but the achievement of other intended outcomes of the EnMS. You need information to enable your organization to know whether the processes of the EnMS are effective in achieving other expected outcomes. These can be outcomes, in addition to energy performance improvement, that are expected by top management and that may have been identified in Task 1 An EnMS and Your Organization. It is in this task that you start to establish the processes needed to determine the results of the management system and to connect them back to top management's expectations and the strategic direction and priorities of your organization. Examples of expectations and priorities could be related to cost savings, reduced risks to security of energy supply, improved community relations, and other factors.

To evaluate the effectiveness of the EnMS, use the performance evaluation and improvement processes of the EnMS as outlined below:

- Monitoring, measurement, and analysis (discussed in this task)
- Evaluating compliance with the applicable energy-related legal and other requirements (see Task 2 People and Legal Requirements Affecting the EnMS)
- Performing internal audits to provide information on whether the EnMS is effectively implemented and maintained (see Task 22 Internal Audit)
- Management review of the EnMS's ongoing suitability, adequacy, effectiveness, and alignment with the strategic direction of the organization (see Task 23 Management Review)
- Finding and fixing nonconformities and problems in the management system (see Task 24 Corrective Actions)

It is possible that your organization may not have implemented the activities mentioned above from Tasks 20–24 yet. Building an EnMS requires a lateral approach because many of these processes are interrelated. Consequently, completion of each task or even each step within a given task, will not necessarily be sequential.

To ensure that the processes for performance evaluation and improvement accurately inform the effectiveness of the energy management system, consider what elements will be monitored, measured, analyzed, and evaluated, in addition to how energy performance improvement will be achieved. The effectiveness of the EnMS is based on the extent to which it achieves planned results and outcomes. Management system results indicate whether the resources allocated to the EnMS by top management are being used effectively.

The basic information on EnMS performance that must be developed for review by top management and evaluation of EnMS effectiveness consists of the following *trend* information on:

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- Nonconformities
- Corrective actions
- Monitoring and measuring results
- Results of EnMS internal audits
- Results of EnMS external audits (if applicable)
- Results of evaluations of compliance with applicable energy-related legal and other requirements

In Task 2 People and Legal Requirements Affecting the EnMS, you already determined what information would be developed to monitor trends in the results of compliance evaluations. These trends provide information on the performance of the EnMS. Like the other items listed above, they are required inputs to management review (see Task 23 Management Review).

The optional Worksheet can be used to identify the compliance evaluation trend information, along with other data and metrics related to trends in EnMS performance that will be monitored, measured, and analyzed for management review and the evaluation of the EnMS effectiveness. In the optional Worksheet an example planning worksheet for monitoring, measurement, analysis, and evaluation of EnMS performance illustrates how this worksheet can be used.

A “trend” generally refers to a direction in which something is developing or changing. In order to determine a direction, data or information is typically collected, monitored, measured, analyzed, and evaluated across time. Data that can be useful for monitoring, measuring, analyzing, and evaluating trends in nonconformities, corrective actions, internal and external audit results, and evaluations of compliance include:

- Number or percentage identified by areas, departments, or functions where they occurred
- Number or percentage identified by task of the 50001 Ready Navigator guidance

Data for measuring and monitoring EnMS performance

The types of trend information to be analyzed will be dictated by what aspects of the EnMS your organization decides is important to monitor and measure as related to expected outcomes, strategic goals, and priorities. If necessary, review the outcomes, strategic goals, and issues developed in Task 1 An EnMS and Your Organization. Develop metrics for the EnMS that align with and support those outcomes, goals, and priorities. This task is an important opportunity to further integrate the EnMS with your organization’s strategic direction. Obtain input from top management as appropriate.

Learn More: **Examples of data useful in evaluating EnMS effectiveness**

Other examples of the types of data often helpful in developing trend information to evaluate EnMS effectiveness include, but are not limited to the following:

- Nonconformities
  - number or percentage of nonconformities by source of identification (e.g., internal audit, external audit, management review, corrective action, data analysis, employee observation, compliance evaluation)

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    - number of nonconformities that recurred
- Corrective actions
    - number or percentage of corrective actions categorized by types of causes (preferably, root causes)
    - number or percentage of corrective actions requiring capital planning or capital expenditures
    - average cost of the solutions to corrective actions
    - number or percentage of corrective actions completed on time
    - average number of days between assignment and close-out
    - number or percentage of corrective actions failing the evaluation of effectiveness
    - monitoring and measuring results (depends on the specific intended outcomes of the EnMS and the organization's strategic goals and priorities)
    - energy costs by type
    - number of planned actions to address risks
    - number of planned actions that have resulted in the elimination of identified risks
    - status of planned actions to address risks and opportunities
    - number of investigations of significant deviations in energy performance
    - number of comments and suggestions received versus implemented
    - status of the external communication plan implementation
    - percentage of personnel completing annual energy awareness refresher training
    - number of design specifications incorporating energy requirements
- Internal and external audit results
    - number or percentage of nonconformities per audit categorized by significance (major/minor)
    - total number of concerns written up per audit
    - number or percentage of concerns categorized by task of the 50001 Ready Navigator or section of the ISO 50001 standard
    - total number of positive findings per audit
    - positive findings categorized by area, department, or function
    - percentage of internal audits conducted on schedule (i.e., not delayed or rescheduled)
    - frequency of changes made to annual internal audit schedule
- Results of compliance evaluations
    - findings categorized by applicable energy-related legal requirement
    - findings categorized by applicable other (i.e., voluntary, corporate mandated) energy-related requirement
    - actions taken categorized by type of action
    - actions taken categorized by cost of action

Determine methods to evaluate EnMS performance

You will want to establish what will be monitored and measured for EnMS performance, the methods to be used, when the monitoring and measuring will be done, and when the results will be analyzed and evaluated. Although there is no explicit requirement to maintain this as documented information, it can be helpful to capture it using the optional Worksheet or some other approach that suits your

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organization. In determining when monitoring and measurement will be done and when results will be analyzed and evaluated, give consideration to the timing of internal audits, compliance evaluations, strategic planning, and management reviews.

Implement the monitoring, measurement, analysis, and evaluation

The next step is to actually implement what you determined was needed for monitoring, measurement, analysis, and evaluation.

(see Task 2 People and Legal Requirements Affecting the EnMS). Information that will be used to develop trends in the results of evaluations of compliance with legal and other requirements should have already been collected. If these compliance evaluations have not already been performed, they should be completed now. Once done, you can initiate the collection, monitoring, measurement, and analysis of the information needed to develop trend in the results. This should be implemented as an integral part of the compliance evaluation process.

As part of this task, you also should be able to implement the monitoring and measurement activities needed to analyze the results related to specific strategic goals and priorities and the achievement of specific intended outcomes. The monitoring, measurement, and analysis of data and other information for development and evaluation of trends in internal audit results can be implemented once internal audits are conducted as part of Task 22 Internal Audit. Monitoring, measurement, and analysis of information needed to develop and evaluate trends in nonconformities and corrective actions can be implemented once nonconformities are identified and corrective actions are undertaken and completed as part of Task 24 Corrective Actions. Again, the monitoring, measurement, analysis, and evaluation should be implemented as integral elements of these processes. And, the results of all monitoring and measurement activities must be retained as documented information.

Top management is responsible for ensuring the ongoing effectiveness of the EnMS. This is accomplished through the process of management review as part of Task 23 Management Review. It is very important that the trends in EnMS performance and the analysis of EnMS results related to intended outcomes be presented to management in a format and at a level that facilitates their review and understanding of the information and enables them to make informed decisions on its effectiveness and on the effective use of resources.

In Task 21 Monitoring and Measurement of Energy Performance Improvement, the monitoring and measurement needed to evaluate energy performance is addressed.

Decarbonization

Your organization should evaluate the effectiveness of the EnMS to ensure that it continues to promote, support, and sustain energy and energy-related GHG emissions performance improvements, as well as the achievement of any other intended outcomes and planned results.

As you determine how to include the management of energy-related GHG emissions throughout your

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EnMS, you'll want to make sure energy-related GHG emissions are captured in the performance evaluation and improvement processes of the EnMS.

Establishing a new EnMS prioritizing decarbonization

If you do not have an existing 50001 Ready-based EnMS and want to build one that also helps your organization manage energy-related GHG emissions, you should follow the guidance in the "Full Description" tab keeping the following in mind:

1. **Develop a plan to establish trends**. Ensure the performance evaluation and improvement processes of the EnMS include the necessary elements to manage energy-related GHG emissions. These processes include:
    a. Task 2 People and Legal Requirements Affecting the EnMS
    b. Task 22 Internal Audit
    c. Task 23 Management Review
    d. Task 24 Corrective Actions
2. **Establish data for measuring and monitoring EnMS performance**. Ensure the data collected for measuring and monitoring EnMS performance includes the relevant energy-related GHG emissions data.
3. **Determine methods to evaluate EnMS performance**. Ensure the methods used to monitor and measure EnMS performance consider energy-related GHG emissions.
4. **Implement the monitoring, measurement, analysis, and evaluation methods.** Ensure that energy-related GHG emissions monitoring, measurement, analysis and evaluation are included in the appropriate parts of the EnMS, including:
    a. Task 2 People and Legal Requirements Affecting the EnMS
    b. Task 21 Monitoring and Measurement of Energy Performance Improvement
    c. Task 22 Internal Audit
    d. Task 23 Management Review
    e. Task 24 Corrective Actions

Adapting an existing EnMS to prioritize decarbonization

If you have an existing 50001 Ready-based EnMS and want to adapt it to manage energy-related GHG emissions, you should:

1. **Review your plan to establish trends**. Review the performance evaluation and improvement processes of the EnMS to determine if they need to be updated to include the necessary elements to manage energy-related GHG emissions. These processes include:
    a. Task 2 People and Legal Requirements Affecting the EnMS
    b. Task 22 Internal Audit
    c. Task 23 Management Review
    d. Task 24 Corrective Actions

Communicate any changes to these processes to the appropriate personnel.

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1. **Review your data for measuring and monitoring EnMS performance**. Review the data collected for measuring and monitoring EnMS performance to ensure energy-related GHG emissions data is considered.
2. **Review methods to evaluate EnMS performance**. Review the methods used to monitor and measure EnMS performance to ensure they are still applicable given the inclusion of energy-related GHG emissions in the EnMS.
3. **Implement the monitoring, measurement, analysis, and evaluation methods.** Ensure that energy-related GHG emissions monitoring, measurement, analysis and evaluation are included in the appropriate parts of the EnMS, including:
    a. Task 2 People and Legal Requirements Affecting the EnMS
    b. Task 21 Monitoring and Measurement of Energy Performance Improvement
    c. Task 22 Internal Audit
    d. Task 23 Management Review
    e. Task 24 Corrective Actions

Commercial ERP

The guidance for this task is from the following sections from the ERP Framework: Implement the Plan.

At this point in the process, considerable time will have been invested in creating an actionable Emissions Reduction Plan. A wise way to protect that investment is to install an energy management and information system (EMIS).

Industrial ERP

The ERP Industrial Framework is not a management system such as the EnMS, however, the following planning and evaluation components of the framework complement the planning and evaluation related to measuring the performance of the EnMS.

Ongoing Implementation:

Develop work plan – Develop a work plan for the ERP that outlines actions, sets timelines, and assigns personnel and capital. This provides accountability for the projects being implemented. Quantify risks and constraints for ERMs to predict potential delays in implementation. Build in time and resources for analysis, design, implementation, testing, and training for new projects.

Continuous evaluation of circumstances and revision or ERP – The ERP should be updated every 3-5 years to account for changing factors like the constant development of technologies, new policies and incentives, changes in fuel costs, changes to the grid mix, updated portfolio growth models, or new business models and strategies. Periodic revision ensures that ERPs continue to meet organizational needs and goals; however, constant (e.g., annual), complete revision is likely unnecessary and can waste organizational resources (personnel, capital) on excessive planning rather than actual implementation.

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