Section: Operation

Task 18: We consider energy performance improvement opportunities and operational controls when designing new, modified, or renovated sites, equipment, systems, and processes.

Getting It Done

1. Identify the sites, equipment, systems, and processes that can have significant impact on energy performance.
2. Incorporate consideration of energy opportunities and operational controls in design projects.
3. Include results of energy performance considerations in specification, design, and procurement activities, where applicable.
4. Retain records of the results of design activities related to energy performance.

Task Overview

In ISO 50001, the design requirements are not associated with the design of products or services to be sold or offered as a service; they are applicable to the development of new, modified, and renovated sites, equipment, systems, and processes that can have a major impact on energy performance within the scope of the energy management system (EnMS). These requirements incorporate consideration of energy performance improvement opportunities and operational controls into design activities. This can provide the basis for more innovative and energy-efficient designs.

This guidance is relevant to Section 8.2 of the ISO 50001:2018 standard.

Associated Resources Short Description
no resources for this questions

Full Description

Identify energy uses that have significant impact on energy performance

Any sites, equipment, systems, or processes that are within the scope of the EnMS that can or will significantly impact energy performance fall under the design requirements of ISO 50001. This means that energy performance improvement opportunities and operational controls must be considered when you design, renovate, or modify any sites, equipment, systems, and processes that can significantly impact your energy efficiency, energy use, and energy consumption.

Depending on project specifics, items that can significantly affect energy performance include sites,

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equipment, systems, or processes associated with:

- Management and operation of significant energy uses
- Achievement of energy objectives, targets, and action plans
- Energy performance indicators (EnPIs)

Incorporate consideration of energy opportunities and operational control in design projects

When designing new sites, equipment, systems, and processes, or renovating or modifying existing ones, think about how they can or will affect your organization's energy performance. Identify:

- Potential energy performance improvements that can be considered for the design
- Any operational controls that may be needed, including controls necessary to achieve energy performance improvement and minimize or appropriately manage the impacts of the design on your organization's energy performance

Examples of design for energy performance improvement include the following:

- Design lighting to automatically adjust according to the amount of daylight present. (equipment)
- Design air conditioning systems to use a water-cooled central chiller instead of an air-cooled split system for cooling. (system)
- Design the molding process such that hydraulic pumps only pump the volume needed instead of operating at full speed and pumping full volume. (processes)

Some questions to ask when designing new, modified, or renovated sites, equipment, systems, and processes include:

- What characteristics of this item impact energy consumption (past, current, or future)?
- Where and how can energy consumption be reduced?

When evaluating the opportunities for improving energy performance, consider the following:

- How will the existing sites, equipment, systems, and processes be modified?
- What specific items can be changed to optimize energy use and reduce energy consumption over time?
- What is the right energy source for this application?
- What are the technological options?
- What operational controls are needed to achieve and sustain design intended energy performance?

For energy-optimized designs to achieve their full potential, the design process should be coupled with proper operational controls. Since equipment controls can be bypassed or disabled, an operational control strategy should be combined with optimized design to ensure anticipated energy savings are achieved.

The optional Playbook worksheet can be useful in identifying and evaluating energy performance improvement opportunities and operational controls in design activities.

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Learn More: **Example Misapplications of Energy-Efficient Technologies**

When designing or upgrading sites, equipment, systems, or processes that can significantly impact energy performance, it is important that close attention be paid to how new energy-efficient technology is specified, applied, and used to avoid misapplications. Installation of “energy-efficient” equipment does not ensure improved efficiency if the retrofit is not properly specified. And, no energy efficient technology will capture savings when installed or programmed incorrectly.

As an example, consider energy efficient air conditioner induction motors. Premium efficiency motors are manufactured using high quality materials to reduce losses, and they consistently demonstrate energy improvements of 2 to 5 percent over standard motors. A downside of improved efficiency is that in most cases energy-efficient motors operate at higher speeds than standard motors. This presents a problem in centrifugal device applications such as pumps and fans because higher speed corresponds to higher energy consumption. When replacing standard motors with energy-efficient motors in centrifugal applications, ensure that the replacement motor has the same rated speed as the original, or increased energy consumption will result.

Another example related to improper installation of energy-efficient technology concerns air-side economizers. Air-side economizers are a common approach to energy savings in new or retrofit sites. The economizer is a set of outside air dampers that is controlled to bring in outside air when its temperature is below that of the return air. While this technology is a proven method to reduce cooling costs in buildings, a recent survey by the California Energy Commission found that almost 70 percent of the installed airside economizers were not functioning correctly and, consequently, not saving energy. Misapplications discovered included dampers not connected to actuators so they would not open, and improperly programmed controls that fail to open the dampers when the outside conditions are cool enough. These installation errors should be identified and corrected during construction.

Include energy performance considerations in specification, design, and procurement

Once the questions above have been answered, take action to improve energy performance. The results of the energy performance considerations must be incorporated, where applicable, into the specification, design, and procurement activities related to the project. This should ensure that the decisions on energy efficiency related to the design are carried out. Incorporating results into procurement specifications and activities keeps the purchasing department involved, ensures their awareness of procurement requirements to support energy performance improvements, and provides the justification for any additional costs.

When designing or upgrading sites, equipment, systems, or processes that can significantly impact energy performance, pay close attention to how new energy-efficient technology is specified, applied, and used in order to avoid misapplications. Installation of “energy-efficient” equipment does not ensure improved operation or energy savings if the retrofit is not properly specified. Moreover, no energy-efficient technology will capture savings when installed or programmed incorrectly.

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Record results of design activities

Retain documented information on the results of design activities to show energy considerations were properly addressed. This can take a variety of forms, such as completed checklists, meeting minutes, design drawings, purchasing specifications, and project records.

Learn More: **Energy Considerations in Design**

Recommendations for Energy Considerations in Design

- Energy Consideration in Design is not intended to apply to products and services, but rather sites, equipment, and systems.
- Sites, equipment, and systems to be improved through design should be associated with SEUs, EnPIs, and energy objectives and targets.
- Proper implementation of design projects for energy performance improvement should include proper operational control.

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