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DIAGNOSE THE GAP BETWEEN THE ACTUAL REALITY OF THE COMPANY AND THE REQUIREMENTS OF THE ENERGY MANAGEMENT SYSTEM OF THE STANDARD WITH THE REQUIREMENTS OF STANDARD ISO 50001: 2018

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Abstract

Objective: The research aims to determine the extent of the possibility of applying the provisions of ISO 50001:2018, which are (leadership, planning, support, operation) in the General Company for Electric Power Production in the Central Region.

Methodology: The research starts from the problem of determining the size of the gap between the actual reality and the requirements of the provisions of leadership, planning, support and operation of The Standard ISO 50001:2018, and the high energy consumption and the resulting high costs that fall on the company, in addition to the company's lack of knowledge of the importance of applying Specification 50001. ISO 2018: What benefits the employees and the company and what it gains in terms of competitive advantages and value. The study methodology was based on a case study represented by observation, personal interviews, and the use of a checklist for comprehensive and realistic analysis and access to scientific facts.

Results: In light of the conclusions, a large gap appeared between the actual reality of the General Company for Electric Power Production in the Central Region and the requirements of the energy management system Of The Standard the specification (ISO 50001:2018), as the size of the gap in the leadership item reached (55%), while the size of the gap in the planning item reached (76.5%), as for the support item, the size of the gap is estimated at (59.25%), and finally the size of the gap for the operation item reached (71.75%).

Added value: A number of recommendations were proposed, in addition to formulating work procedures and a guide to help the company implement the energy management system in accordance with ISO 50001:2018

Keywords: Energy Management, Energy Management System, Standard (ISO 50001: 2018).

Introduction

An energy management system in accordance with ISO 50001:2018 provides a strong foundation in companies, as it allows the development and implementation of policies, goals and objectives to identify the main elements of energy consumption and reduce consumption. It also represents the latest and best practices in energy management. This research comes to show the possibility of applying the items leadership, planning, and operating support in accordance with ISO 50001:2018 in the General Company for Electric Power Production in the Central Region, by presenting the sub- and main requirements for the items mentioned above, measuring the extent of application of each item, and determining the size of the gap. With the actual reality of the researched company and by adopting the case study approach and using a checklist, the current study came to reduce this gap in the researched company and help identify and solve problems and thus implement them completely and obtain the ISO 50001:2018 certificate.

2- Research Methodology

2.1 Research problem

Through the researcher's knowledge of the reality of the company's work, it was noted that the General Company for Electrical Power Production in the Central Region suffers from high consumption of energy sources and the resulting costs borne by the company, in addition to poor knowledge of what the ISO 50001:2018 standard is and the advantages that the standard brings. For the company and its employees, the following questions were asked:

2.1.1 What is the level of application of the items (leadership, planning, support and operation) Of The Standard ISO 50001:2018 in the General Company for Electric Power Production in the Central Region?

2.1.2 What is the size of the gap between the actual reality and the requirements of the items (leadership, planning, support and operation) Of The Standard ISO 50001:2018 in the General Company for Electric Power Production in the Central Region?

2.1.3 What are the strengths and weaknesses of the energy management system Of The Standard the items (leadership, planning, support and operation) in the General Company for Electric Power Production in the Central Region?

2.2 Research objectives

Presented Of The Standard the problem and questions of the research , The research seeks to achieve a number of objectives, the most important of which are:

2.2.1 Diagnosing the actual reality of applying the items (leadership, planning, support and operation) in accordance with ISO 50001:2018 in the General Company for Electric Power Production in the Central Region.

2.2.2 Measuring the size of the gap between the actual reality and the requirements of the items (leadership, planning, support and operation) Of The Standard ISO 50001:2018 specification in the General Company for Electric Power Production in the Central Region.

2.2.3 Identifying the strengths and weaknesses of the energy management system Of The Standard the items (leadership, planning, support and operation) in the General Company for Electric Power Production in the Central Region.

2.3 The importance of research

The importance of the research is summarized in the following aspects:

2.3.1 It is a scientific contribution to diagnosing the reality of applying the items (leadership, planning, support and operation) in accordance with ISO 50001:2018 in the General Company for Electric Power Production, as the methodology is one of the continuous improvement tools that the company seeks to apply in its operations.

2.3.2 Introducing the management and employees of the researched company to the importance of applying the terms (leadership, planning, support and operation) in providing a set of requirements and benefits that contribute to providing distinguished services.

2.3.3 Discover areas of strength and weakness in order to enhance strengths and address weaknesses.

2.4 Research methodology

The current research relied on the case study approach, which depends on collecting data, analyzing it, and interpreting the results by answering the questions in this research objectively through the use of practical statistical methods to reach scientific facts.

2.5 Research limitations

The limits of the research were as follows:

2.5.1 Time limits: The period was set from 2023-2024

2.5.2 Spatial boundaries: The General Company for Electrical Energy Production in the Central Region

2.5.3 Human limits: It was represented by a sample of workers in the General Company for Electrical Energy Production in the Central Region .

2.6 Data collection methods

The research relied on the following methods of collecting information and data:

2.6.1 The intellectual (conceptual) aspect : The researcher relied on a number of sources, including (Arabic and foreign books available in Arab and foreign universities and libraries, Arab and foreign magazines and periodicals, Arab and foreign university dissertations and dissertations), and the World Wide Web (the Internet) was used to access Some of the sources above that contributed to developing the theoretical side of the current research.

2.6.2 Procedural aspect: Procedural aspect: Information and data in this aspect were collected through (meetings and dialogues with employees of the surveyed company, inspection form: inspection lists were prepared in accordance with ISO 50001:2018, and a Fife-point Likert scale [1]. was determined on the basis of weights from 0- 4) Which appear in the table and preparation, and then analyze the data statistically and interpret the results of that analysis, records, documents, and official books).

Table (1)
The seventh scale to determine the degree of conformity with the standard

4	3	2	1	0
Totally applied Completely documented	Totally applied Partially documented	Partially applied Completely documented	Partially applied Undocumented	Not Applicable Undocumented

After determining the degree of conformity for each axis of the standard (ISO 14001:2015) in light of what is included in the results of the inspection lists, the following equations are adopted to extract the percentage of conformity and the size of the gap [2] , [3]:

$$\textbf{Weighted average (weighted mean)} = \frac{\boldsymbol{Total\ (weight * frequencie)}}{\boldsymbol{Total\ frequencie}}$$

$$\textbf{Percentage of conformity} = \frac{\boldsymbol{Weighted\ average\ (weighted\ mean)}}{\boldsymbol{4\ (highest\ score\ on\ the\ scale)}}$$

$$\textbf{Gap size} = 1 - \textbf{Percentage of conformity}$$

2.7 Some previous studies

2.7.1 Research presented by (Ząbek, 2018) entitled **(A Simplified Concept of Energy Management in Service Organizations Based on the ISO 50001:2011 Standard)** , The research problem was the How to improve business management, achieve sustainability, and reduce uncertainty and vulnerability in businesses while using water and energy , The research objectives were to create an inventory of the main aspects not included in ISO 50001:2018, and to present the model, path, and main planning tools for implementing the system in the company , The Project Management Institute, the Logical Framework School, represents the research population and sample, and the research method and tools are represented by the descriptive analytical study. The most prominent results are the role of energy efficiency in project financial leverage, highlighting the main products of the energy efficiency component, measuring the extent of vulnerability, and reducing energy consumption [4].

2.7.2 Research presented by (Orjuela,2019) entitled **(ISO 50001:2018 and Its Application in a Comprehensive Management System with an Energy-Performance Focus)** , The research problem was supervised energy consumption due to the depletion of the stock of natural energy resources and raw materials as an energy source. The research objectives were to improve energy consumption through simple procedures, such as: identifying energy consumption, analyzing water and electricity bills, or making administrative decisions regarding energy buildings in a manufacturing company. Cars in Poland. The approach followed in this research is a case study using a checklist. The most prominent results of the research indicate that simple operations, such as determining the location of energy consumption and installing switches for automatic devices, will contribute to reducing the company's costs [5].

3. The theoretical aspect

3.1 The Concept Of An Energy Management System Of The Standard ISO 50001:2018

Implementing an energy management system of the standard ISO 50001:2018 has helped organizations use energy better and thus improve productivity. This may include implementing new energy-saving technologies, reducing energy waste, or improving current processes to reduce energy rates [6].

The energy management system can be defined of the standard ISO 50001:2018 as a group of interconnected and interacting elements for building an energy policy, achieving goals, and knowing the necessary procedures and processes [7].

It is also known as an international standard that specifies energy management requirements in organizations. It aims to improve energy efficiency and reduce gas emissions. It also provides a systematic approach to achieving energy goals, as well as improving their competitiveness [8].

From the above, the researcher believes that the EMS energy management system is the application of a set of necessary procedures and practices that describe ways to deal with energy, reduce emissions, and improve the organization's image socially, environmentally, and economically, in addition to solving the problems of energy security and global warming.

There are a number of specifications that represent the "ISO 50001:2018" standard family, including [9] [10]:

3.1.1 Energy audit: requirements with ISO 50002 usage guidelines.

3.1.2 Energy management systems: Requirements for bodies that provide auditing and certification of energy management systems ISO 50003.

3.1.3 Energy Management Systems: Guidance for implementing, maintaining and improving the ISO 50004 energy management system.

3.1.4 EnPI general principles and guidelines and EnB energy performance indicators: measuring energy performance using ISO 50006 energy baselines.

3.1.5 Energy Services: Guidelines for Evaluating and Improving Energy Service to Users ISO 50007.

3.1.6 ISO 50015: Measurement and verification of energy performance in organizations, general principles and guidelines.

3.1.7 Energy saving: Defining energy saving in organizations ISO 50047.

3.2 Benefits Of An Energy Management System Of The Standard ISO 50001:2018

There are several benefits for organizations that implement an energy management system in accordance with ISO 50001:2018, which are as follows [11] [12]:

3.2.1 Develop procedures to address risks and opportunities related to energy saving.

3.2.2 Analyzing the results and overall performance in terms of achieving the goals of the energy management system.

3.2.3 Analyzing the factors of the external and internal context and the strengths and opportunities associated with them.

3.2.4 Outputs of other feeding mechanisms, such as audits and reviews of the environmental management system.

3.2.5 Activating procedures related to corrections and responses to incidents, complaints, requirements, violations, and corrective procedures.
3.2.6 Rationalizing energy consumption and preserving renewable energy resources.
3.2.7 Improving productivity and competitiveness by reducing energy efficiency costs.
3.2.8 Promoting clean energy and reducing greenhouse gas emissions.
3.2.9 Transparency and providing adequate information to consumers and decision makers.
3.2.10 Achieving sustainable development .

3.3 Stages of implementing An Energy Management System Of The Standard ISO 50001:2018

There are several steps to implement the energy management system standard, and we will discuss the most important of them below [13] [14] [15]:
3.3.1Energy Policy: The energy policy should be prepared, established and developed, and it should be applicable and consistent with other systems. Senior management must announce the official statement of commitment to energy management, as the energy system is developed from cooperation between senior management, management representatives and work teams authorized to implement the policy as part of Energy management system .
3.3.1 Planning: is to verify that decisions related to the infrastructure of energy supply and demand, and to consider all possible energy supply and demand options, are consistent with the general goals of national sustainable development, and that this stage is crucial, as it involves improving the performance of the energy management system, and includes It includes the following sub-requirements: “Establishing an energy baseline, legal and other requirements, defining energy performance indicators, management review, and energy planning goals and objectives.
3.3.3 Implementation and operation: that is, defining the responsibilities of the energy management system, and training workers on the plan that has been developed, so that they are able to perform the duties required of them in accordance with the policy of the energy management system. The organization should use the completed work plans and other outputs resulting from the planning process in order to implement and operate the energy management system, and include the following requirements (structure and responsibility, training and awareness, communication, documentation, process control, design, procurement of energy services, products and equipment).
3.3.4 Inspection and corrective activities: This is monitoring, measuring and analyzing the main characteristics of the operating process. This also includes internal audit, and the organization must address the actual non-conformity in light of taking corrective and preventive measures.
3.3.5 Management review: Management review takes place over a certain period of time. Once management reviews the inputs, the outcome of changes in energy policy and performance, and the organization's goals for improvement, can be changed. Therefore, top management must at regular and planned intervals review the organization's energy management systems and also maintain audit records.
There are a set of guidelines for successfully implementing the above-mentioned steps, which are as follows [16] :

- Training on the energy management system: The energy management team cooperates with internal and external parties in implementing training on the energy management system, and that the training has proven its effectiveness and its ability to improve the performance of employees so that they can work correctly and optimally.
- Conducting internal and external energy audits: The energy management team conducts internal energy audits, and external operations are conducted with external parties, either the team itself or specialized private parties. This procedure helps to know the size and value of energy consumption obtained from the audit results. Energy waste can be prevented without reducing the value of safety and comfort in using energy. There is also a need for periodic energy audits to improve current and future energy performance.
- Conducting energy efficiency-oriented production activities: The Energy Management Team collaborates with the Operations Team, the Metallurgical Team and the Automation Team to test samples from each stage of the production activity in the Metallurgical Laboratory before applying them to the organization's production process. It also works to improve equipment operation and use energy more efficiently.
- Use of automation and technology systems on equipment: The existing equipment in the organization mostly already uses automation and technology systems, but it needs to be upgraded for some equipment that is outdated or has not been used at all. Therefore, the energy management team cooperates with the maintenance team (electrical/machinery/mechanical) and the automation team to draw a map of equipment that is outdated in technology or that uses an automation operating system.

4. The practical aspect

In this research , the actual reality of the energy management system will be measured and evaluated in the General Electric Power Production Company for the items (leadership, planning, support and operation) in accordance with the ISO 5001:2018 standard using the checklist, as the researcher is accustomed to field visits, personal interviews and observations to verify the appropriate information to fill out the list. With the required data, and using the five-point scale

The fifth item Leadership : The checklist in Table (2) shows the level of application and actual documentation of the requirements of the fifth item, which is represented by (Leadership), by applying and documenting the energy management system in standard with the requirements of the ISO 50001:2018 General Company for Electric Power Production , as the company achieved an arithmetic mean for this axis. The weighted score is (1.8) out of (4) grades, with a matching rate of (45%), which indicates the presence of a gap of (55%).

Table (2) Checklist Item (5) Leadership

Item	Requirements (Leadership)	Totally Applied		Partially Applied		Not applicable Undocumented
		Completely Documented	**Partially documented**	**Completely Documented**	**Undocumented**	
		4	**3**	**2**	**1**	**0**
	5.1 Leadership & Commitment					
1-	Top management shall demonstrate leadership and commitment with respect to continual improvement of its energy performance and the effectiveness of the EMS, by:					
A)	ensuring that the EMS scope and boundaries are established.		√			
B)	ensuring that the energy policy (see 5.2), objectives and energy targets (see 6.2) are established and are compatible with the strategic direction of the organization.		√			
C)	Ensuring the integration of the EMS requirements into the organization's business processes; NOTE 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 EMS are available.		√			
F)	Communicating the importance of effective energy management and of conforming to the EMS requirements.		√			
G)	Ensuring that the EMS achieves its intended outcome(s);					√
H)	promoting continual improvement of energy performance and the EMS.		√			
I)	Ensuring the formation of an energy management team.					√
J)	Directing and supporting persons to contribute to the effectiveness of the EMS and to 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(s) energy performance.					√
M)	ensuring that processes are established and implemented to identify and address changes affecting the EMS and energy performance within the scope and boundary of the EMS.				√	
	5.2 Energy Policy					
1-	Top management shall establish an energy policy that:					
A)	Is appropriate to the purpose of the organization;				√	
B)	Provides a framework for setting and reviewing objectives and energy targets (see 6.2) .				√	
C)	Includes a commitment to ensure the availability of information and necessary resources to achieve objectives and energy targets.					√
D)	includes a commitment to satisfy applicable legal requirements and other requirements (see 4.2) related to energy efficiency, energy use and energy consumption .		√			
E)	includes a commitment to continual improvement (see 10.2) of energy performance and the EMS		√			
F)	supports the procurement (see 8.3) of energy efficient products and services that impact energy performance.				√	
g)	supports design (see 8.2) activities that consider energy performance improvement.	√				
2-	The energy policy shall:					
-	be available as documented information (see 7.5);		√			
-	be communicated within the organization;		√			

-	be available to interested parties, as appropriate;					√
-	be periodically reviewed and updated as necessary					√
5.3 Organization Roles, Responsibilities And Authorities						
1-	Top management shall ensure that the responsibilities and authorities for relevant roles are assigned and communicated within the organization .	√				
2-	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 this document;					√
C)	implementing action plans (see 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.				√	
Frequencies		**4**	**7**	**6**	**6**	**7**
Output (Weight × Number Of Iteration)		**16**	**21**	**12**	**6**	**0**
Weighted Average (Weighted Mean)		**1.8**				
Percentage Of Conformity		**45%**				
The Gap Size Of The Requirements		**55%**				

Source : Prepared by the researcher in light of the requirements ISO 50001:2018

From the results shown in Table (2), the following is clear:
Strengths: The company has its own quality policy, strategic goals and objectives that are published and understood by employees in the company, and it documents the resources necessary to achieve the goals.
Weak points: An administrative order was not issued that includes the names of the energy team in a clear and public manner, since the company does not take into consideration energy performance indicators to ensure that they represent energy performance appropriately.
The Sixth item Planning : The checklist in Table (3) shows the level of application and actual documentation of the requirements of the sixth item, which is represented by (Planning), by applying and documenting the energy management system in standard with the requirements of the ISO 50001:2018 General Company for Electric Power Production, as the company achieved an arithmetic mean for this axis. The weighted score is (0.94) out of (4) grades, with a matching rate of (23.5%), which indicates the presence of a gap of (76.5%).

Table (3) Checklist Item (6) Planning

Item	**Requirements (Planning)**	Totally Applied		Partially Applied		Not applicable Undocumented
		Completely Documented	**Partially documented**	**Completely Documented**	**Undocumented**	
		4	**3**	**2**	**1**	**0**
6.1 Actions to address risks and opportunities 6.1.1 General						
1-	When planning for the EMS, the organization shall consider :					
A)	Issues referred to in 4.1.					√

B)	requirements referred to in 4.2					√
C)	review the organization's activities and processes that can affect energy performance.					√
D)	Planning shall be consistent with the energy policy and shall lead to actions that result in continual improvement in energy performance.				√	
2-	The organization shall determine the risks and opportunities that need to be addressed to:					
-	give assurance that the EnMS can achieve its intended outcome, including energy performance improvement.					√
-	prevent or reduce undesired effects.					√
-	achieve continual improvement of the EnMS and energy performance.					√
6.1.2 The organization shall plan:						
A)	actions to address these risks and opportunities.				√	
B)	how to:					
-	integrate and implement the actions into its EnMS and energy performance processes .					√
-	evaluate the effectiveness of these actions .					√
6.2 Objectives, energy targets and planning to achieve them						
1-	6.2.1 The organization shall establish objectives at relevant functions and levels. The organization shall establish energy targets.				√	
2-	6.2.2 The objectives and energy targets shall:					
A)	be consistent with the energy policy (see 5.2)		√			
B)	be measurable (if practicable)					√
C)	take into account applicable requirements					√
D)	take into account opportunities (see 6.3) to improve energy performance;				√	
E)	be monitored					√
F)	be communicated		√			
H)	be updated as appropriate.		√			
3-	The organization shall retain documented information .	√				
4-	6.2.3 When planning how to achieve its objectives and energy targets, the organization shall :					
-	what will be done					√
-	what resources will be required					√
-	who will be responsible					√
-	when it will be completed					√
-	how the results will be evaluated					√
5-	The organization shall retain documented information on action plans .					√
6.3 Energy review						
1-	The organization shall develop and conduct an energy review.					
A)	To develop the energy review, the organization shall: analyses energy use and consumption based on measurement and other data, i.e.:					
-	identify current types of energy .	√				
-	evaluate past and current energy use and consumption		√			
-	evaluate energy use in future					√
B)	based on the analysis, identify SEUs .					√
C)	for each SEU:					
-	determine relevant variables;				√	
-	identify the person 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.	√				
2-	The energy review shall be updated at defined intervals					√
3-	shall retain documented information of its results.					√
6.4 Energy performance indicators						
1-	The company identifies energy performance indicators that are appropriate to measure and monitor its performance.					√
2-	The company works to maintain the method of determining and updating energy performance indicators as documented information.					√

3-	The company collects data that indicates that relevant variables significantly affect energy performance. The company considers this data to create appropriate energy performance indicators.				√	
4-	The company reviews the value of energy performance indicators and compares them with the energy baseline.					√
5-	The company maintains documented information on the value of energy performance indicators.	√				
6.5 Energy baseline						
1-	The organization shall establish (an) EnB(s) using the information from the energy review , taking into account a suitable period of time.					√
2-	Energy baseline shall be revised in the case of one or more of the following:					
A-	Energy performance indicators no longer reflect the organization's energy performance;					√
B-	there have been major changes to the static factors;					√
3-	The organization shall retain information of Energy baseline, relevant variable data and modifications to Energy baseline as documented information .					√
6.6 Planning for collection of energy data						
1-	The organization shall ensure that key characteristics of its operations affecting energy performance are identified, measured, monitored and analysed at planned intervals .	√				
2-	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.		√			
3-	The company obtains the data that will be collected or obtained by measurement and the documented information kept includes the following:					
A-	The relevant variables for Significant energy use.					√
B-	Energy consumption related to Significant energy use and to the organization.					√
C-	Operational criteria related to Significant energy use.					√
D-	Data specified in action plans.					√
4-	The energy data collection plan shall be reviewed at defined intervals and updated as appropriate.				√	
5-	The organization shall ensure that the equipment used for measurement of key characteristics provides data which are accurate and repeatable.				√	
6-	The organization shall retain documented information on measurement, monitoring and other means of establishing accuracy and repeatability.				√	
Frequencies		**6**	**5**	**0**	**10**	**31**
Output (Weight × Number Of Iteration)		**24**	**15**	**0**	**10**	**0**
Weighted Average (Weighted Mean)		**0.94**				
Percentage Of Conformity		**23.5%**				
The Gap Size Of The Requirements		**76.5%**				

Source : Prepared by the researcher in light of the requirements ISO 50001:2018

From the results shown in Table (3), the following is clear:

Strengths: The company's senior management was directed to identify energy types, analyze energy use and consumption, and maintain the value of energy performance indicators.

Weak points: The company does not have any progress on the energy baseline with regard to reviewing, updating or changing it. The company did not develop a plan to address the risks of the ISO 50001:2018 energy management system.

The seventh item Support : The checklist in Table (4) shows the level of application and actual documentation of the requirements of the seventh item, which is represented by (Support), by applying and documenting the energy management system in standard with

the requirements of the ISO 50001:2018 General Company for Electric Power Production, as the company achieved an arithmetic mean for this axis. The weighted score is (1.8) out of (4) grades, with a matching rate of (45%), which indicates the presence of a gap of (55%).

Table (4) Checklist Item (7) Support

Item	Requirements (Support)	Totally Applied		Partially Applied		Not applicable Undocumented
		Completely Documented	Partially documented	Completely Documented	Undocumented	
		4	3	2	1	0
	7.1 Resources					
1-	The organization shall determine and provide the resources needed for the establishment, implementation, maintenance and continual improvement of energy performance and the EMS.	√				
	7.2 Competence					
1-	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 as evidence of competence.					√
	7.3 Awareness					
1-	Persons doing work under the organization's control shall be aware of :					
A-	the energy policy.			√		
B-	their contribution to the effectiveness of the EnMS, including achievement of objectives and energy targets and the benefits of improved energy performance.			√		
C-	the impact of their activities or behaviour with respect to energy performance					√
D-	the implications of not conforming with the EnMS requirements.					√
	7.4 Communication					
1-	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.		√			
2-	When establishing its communication process , the organization shall ensure that information communicated is consistent with information generated within the EnMS and is dependable.			√		
3-	The organization shall establish and implement a process by which any person doing work under the organization's control can make comments or suggest improvements to the EnMS and to energy performance.					√
4-	The organization shall consider retaining documented information of the suggested improvements.					√

7.5 Documented information **7.5.1 General**						
1-	The organization's EnMS shall include:					
A-	documented information required by this document .					√
B-	documented information determined by the organization as being necessary for the effectiveness of the EnMS and to demonstrate energy performance improvement.					√
7.5.2 Creating and updating						
1-	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 .					√
7.5.3 Control of documented information						
1-	Documented information required by the EnMS and by this document 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).					√
2-	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.					√
3-	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.	√				
Frequencies		**7**	**5**	**3**	**0**	**15**
Output (Weight × Number Of Iteration)		**28**	**15**	**6**	**0**	**0**
Weighted Average (Weighted Mean)		**1.63**				
Percentage Of Conformity		**40.75%**				
The Gap Size Of The Requirements		**59.25%**				

Source : Prepared by the researcher in light of the requirements ISO 50001:2018

From the results shown in Table (4), the following is clear:

Strengths: The company has qualified people with appropriate training, education and skills who have the appropriate experience to support the energy management system.

Weak points: The company does not have any documented information required within the ISO 50001:2018 standard, as it has not been worked on nor has the appropriate description, form, or review been determined for it, or the duration of its preservation or disposal.

The eight item Operation: The checklist in Table (5) shows the level of application and actual documentation of the requirements of the sixth item, which is represented by (Operation), by applying and documenting the energy management system in standard with the requirements of the ISO 50001:2018 General Company for Electric Power Production, as the company achieved an arithmetic mean for this axis. The weighted score is (1.8) out of (4) grades, with a matching rate of (45%), which indicates the presence of a gap of (55%).

Table (5) Checklist Item (8) Operation

Item	Requirements (Operation)	Totally Applied		Partially Applied		Not applicable Undocumented
		Completely Documented	Partially documented	Completely Documented	Undocumented	
		4	3	2	1	0
	8.1 Operational planning and control					
1-	The company's management works to plan, implement and control the processes related to its use of significant energy, necessary to meet the requirements and implement the procedures specified in 6-2.				√	
2-	**The company's management takes into consideration the planning, implementation and control of the following operations:**					
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 (see 7.4) 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 (see 7.5) to the extent necessary to have confidence that the processes have been carried out as planned.				√	
3-	The organization shall control planned changes and review the consequences of unintended changes, taking actions to mitigate any adverse effects, as necessary.					√
4-	The organization shall ensure that outsourced SEUs or processes related to its SEUs (see 6.3) are controlled (see 8.3).					√
	8.2 Design					
1-	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.			√		
2-	The results of the energy performance consideration shall be incorporated specification, design and procurement activities.			√		
3-	into The organization shall retain documented information of the design activities related to energy performance.					√
	8.3 Procurement					
1-	The organization shall establish and implement criteria for evaluating energy performance over the planned or expected operating lifetime,					√
2-	when procuring energy using products, equipment and services which are expected to have a significant impact on the organization's energy performance.					√
3-	The company informs its suppliers that evaluation of purchases is based in part on energy performance.					√
4-	The company is working to determine the purchase specifications as follows:					
A-	ensuring the energy performance of procured equipment and services .	√				
B-	the purchase of energy.		√			
Frequencies		**2**	**1**	**2**	**2**	**8**
Output (Weight × Number Of Iteration)		**8**	**3**	**4**	**2**	**0**
Weighted Average (Weighted Mean)		**1.13**				
Percentage Of Conformity		**28.25%**				
The Gap Size Of The Requirements		**71.75%**				

Source : Prepared by the researcher in light of the requirements ISO 50001:2018

From the results shown in Table (5), the following is clear:

Strengths: The company installs solar energy systems in all its branches, and it also has projects to support renewable energy.

Weak points: The company has procedures that comply with the specifications of the energy management system, but when using external energy, the amount of energy is not controlled and thus deviates from the specification specified in the Energy management system ISO 50001:2018.

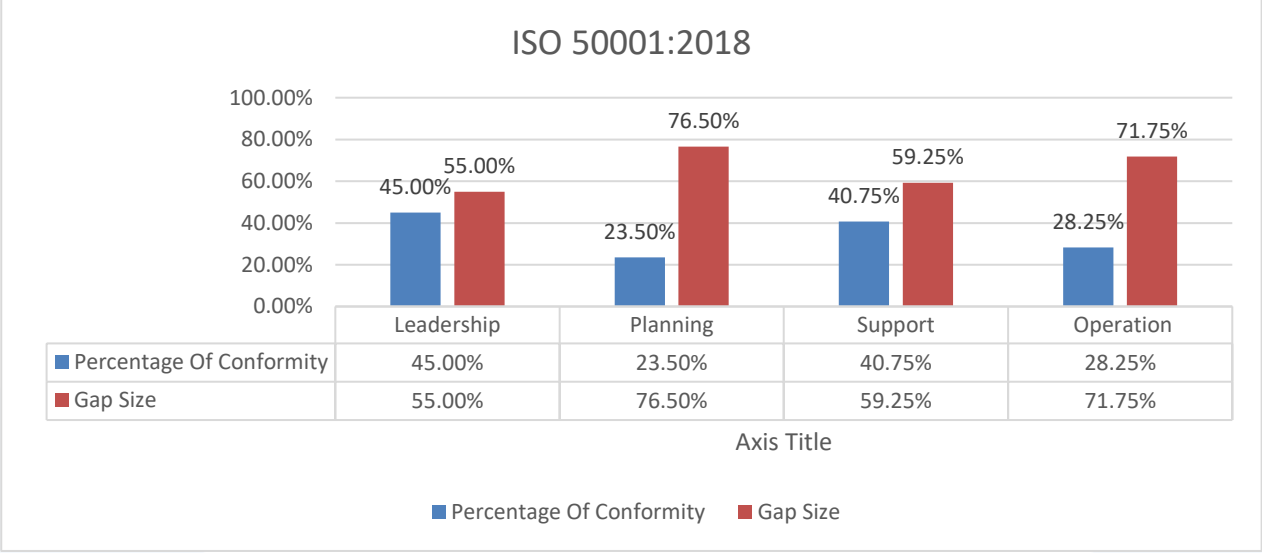
The final results of measuring the gap between the reality of implementing the energy management system ISO 50001:2018 in the Company , Table (6) shows the final results of implementing and documenting the Energy management system in Company with the terms of the ISO 50001:2018 standard.

Table (10) measuring the final gap of the Energy management system according to the requirements of ISO 50001:2018

No.	Item name	Weighted Average (Weighted Mean)	Percentage Of Conformity (%)	size of the gap (%)
5	Leadership	1.8	45%	55%
6	Planning	0.94	23.5%	76.5%
7	Support	1.63	40.75%	59.25%
8	Operation	1.13	28.25%	71.75%
	the total	5.5	138	207.50
	the average	1.375	34.5%	51.875%

The source was prepared by the researcher based on the results of the checklists for ISO50001:2018

We can explain the results obtained using a chart to show the total compliance rates and the size of the gaps for the items of the energy management system in with the international standard (ISO50001:2018) in the company, as shown in Figure (1).



The total compliance rates and the size of the gaps for the environmental management system according to the international standard (ISO14001:2015) in the company.

5. Conclusions and recommendations

5.1 Conclusions: The current research will address a set of conclusions in light of the results that appeared in the checklists for the environmental management system in the directorate, which are as follows:

•There is a large gap between the actual reality of the General Company for Electric Power Production and the requirements of the specification (ISO 50001:2018) with regard to documentation and application. This is due to reasons mentioned in the weak points of each item.

• The investigated company did not adopt a declared energy policy even though it has a declared and documented quality policy in accordance with the standard (ISO 90001:2015), but it does not take into consideration the energy policy.

• The surveyed company lacks procedures for seizing opportunities and treating risks, as it addresses risks as soon as they occur to avoid stopping work only, and the lack of laws and procedures related to risks and opportunities and the lack of focus on preventing risks from their origins, due to the lack of rational and inefficient use of energy and improving energy performance.

• Although the investigated company began the procedures for implementing the standard (ISO 50001:2018), it did not take into account the new issues related to the context and the extent of compatibility of the energy strategy with the company's strategy, directive planning, energy policy, risk-based thinking and other issues specific to the company.

• There is no importance in determining the energy baseline, as it is not possible to know the company's current status and the progress made by employees, departments, or equipment in the energy management system (ISO 50001:2018).

5.2 Recommendations: In light of the conclusions reached in the first section, the second section will present a number of recommendations, as follows:

• Senior management should formulate a policy for the energy management system that is understood and published inside and outside the company and on its website, and this policy should be integrated into other policies related to the environment. This is due to the overlap between the two specifications, and the participation of specialists with experience and relationship in preparing the energy policy for the energy management system. Energy according to ISO 50001:2018 is essential.

• To help the researched company, it is necessary to rely on bills from previous years in order to know the amount of energy used in the current period and the amount of energy that will be used in the coming period.

• Identify risks and develop a mechanism and methodology to reduce the risks that the surveyed company may face, reduce their effects or address them permanently from the main source, and educate employees on risk-based thinking and seizing opportunities.

• We enhance workers' awareness of energy activities to contribute to achieving energy goals and improving energy performance, as well as enhancing awareness about energy consumption and how to reduce consumption.

• The communication process is very important in reducing time and speed in decision-making, so all technologies, information and human resources must be available in order to ensure an effective communication process within the company.

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