

# Strategic Energy Management: Exploring the Benefits of ISO 50001 Implementation through Case Study

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## Abstract

ISO 50001 is a widely acknowledged energy management system that expedites the optimization of energy performance by reducing costs and CO<sub>2</sub> emissions for a sustainable future. Organizations worldwide are increasingly adopting ISO 50001 for sustainable energy practices. The goal of this study is to explore the benefits of implementing ISO 50001 as a strategic energy management framework, with a particular emphasis on case studies conducted with the winners of the Energy Management Leadership Award 2021-2023. This award facilitates global recognition for the leading organizations for their achievements in addressing energy management and climate challenges through ISO 50001 implementation. The result unfolds the benefits of ISO 50001 implementation, including improvements in energy efficiency, cost savings, reduction of CO<sub>2</sub> emissions, and global awareness regarding climate challenge. The insights from this study will support the business community and policymakers in realizing the exemplary impact of ISO 50001 in the pursuit of energy excellence and organizational success. The study will also enhance existing literature and contribute to upcoming research.

## Keywords

ISO 50001, Benefits, Energy, Energy Management and Sustainability.

## 1. Introduction

In the era of evolving globalization and increasing economic growth, effective energy management has become very crucial for sustainable development. More importantly, many countries are committed to attaining the targets of net zero 2050, contributing to the reduction of GHG emissions. To address this situation, countries and organizations across the world are seeking strategic energy management for energy efficiency addressing climate challenges. ISO 50001 has been emerged as a quickly deployable solution that provides a systematic framework to enhance organizations' operational efficiency & energy security while mitigating environmental impacts. In addition, this standard contributes significantly to sustainable development goals (De Sousa Jabbour et al. 2017):



Figure 1. Contribution of ISO 50001 to Sustainable Development Goals

In respect to these circumstances, this study endeavors to illustrate how businesses strategically experienced the benefits of energy excellence through ISO 50001 implementation. Several studies have been conducted to identify the benefits of ISO 50001. However, this study differentiates itself from earlier research by providing an exclusive review of the realistic outcomes associated with ISO 50001-certified organizations, which frequently offer broad insights. Moreover, the study offers a distinct viewpoint that immediately responds to the requirements and concerns of organizations. Furthermore, the study delves into the financial benefits of implementing ISO 50001, such as cost

savings from improved energy efficiency and reduced energy consumption. It also highlights the positive impact on organizational reputation and brand image, as ISO 50001 certification demonstrates a commitment to sustainable practices. The creative integration of practical instances makes this study a valuable resource for businesses and policymakers by providing cutting-edge strategies to maximize the benefits, boosting awareness, and spreading ISO 50001 implementation.

The study initiates with an introduction that reflects the significance of implementing energy management systems-ISO 50001. After that, it offers a brief overview of the procedures to be followed in this study. The findings from the case studies are then offered. Lastly, a summary of both theoretical and practical implications is summarized, along with suggestions for further research.

## **2. Literature Review**

This section presents the overview of the literature regarding energy management systems, ISO 50001, and benefits from their implementation relevant to this study.

### **2.1 ISO 50001 and the need for its implementation**

ISO 50001 is a globally accepted Energy Management System that offers a framework for organizations to manage their energy consumption and reduce their carbon footprint. The standard was first published by the International Organization for Standardization (ISO) in 2011 and has been adopted by many organizations worldwide. The standard provides a systematic approach to energy management that can be integrated into existing management systems, making it easier for organizations to implement and maintain. Several researches have been conducted on the drivers, motivations and benefits of ISO 50001 implementation through questionnaire surveys, review of previous literature, case studies etc. A study conducted by the Lawrence Berkeley National Laboratory found that organizations that implemented ISO 50001 achieved an average energy performance improvement of 10% within the first two years of implementation (Fuchs et al. 2018). The most frequently identified drivers are existing values and goals, environmental sustainability, and government incentives or regulations. The top benefits mentioned are cost savings, productivity, and operational improvements. ISO 50001 helps organizations to comply with regulatory requirements and meet stakeholder expectations regarding environmental performance. Table 1 illustrates the benefits of ISO 50001 implementation from previous literature:

Table 1. Benefits of ISO 50001 implementation:

<b>Benefits</b>	<b>Reference (s)</b>
Energy saving	(Liu et al. 2018) (Prasetya et al. 2021) (Fuchs et al. 2020) (Therkelsen et al. n.d.) (Bonacina et al. 2015) (Marimon and Casadesús 2017)
Energy cost saving	(Fuchs et al. 2020) (Mahmood et al. 2020) (Pelser et al. 2018) (Fuchs et al. 2020) (Fuchs et al. 2018) (Marimon and Casadesús 2017)
Environmental sustainability	(Fuchs et al. 2020) (Mahmood et al. 2020) (Fuchs et al. 2018) (Prasetya et al. 2021)
Increased productivity	(Fuchs et al. 2020) (Mahmood et al. 2020) (Fuchs et al. 2018) (Marimon and Casadesús 2017)
Enhanced organizational culture	(Fuchs et al. 2020) (Mahmood et al. 2020) (Fuchs et al. 2018)

### **2.2 Clean Energy Ministerial**

The Clean Energy Ministerial (CEM) is a global forum promoting clean energy policies and programs. It encourages the transition to a global clean energy economy and shares best practices by bringing together a powerful community of leading countries, companies, and international experts (Tosun and Rinscheid 2021). The CEM serves as a global platform for leadership, gathering, action, and acceleration on an international scale. It serves as a platform for shaping the global clean energy agenda, a government-led community for exchanging knowledge, building networks, and facilitating coordinated actions, and an implementation vehicle for achieving domestic clean energy objectives. The framework for the CEM was reaffirmed in 2021, ensuring its continued role as a vital platform for international collaboration and progress towards a sustainable clean energy future. Through the CEM, countries and stakeholders come together to share best practices, innovative solutions, and lessons learned in clean energy development and deployment. By fostering collaboration and cooperation, the CEM accelerates the transition to a low-carbon economy,

driving global action to tackle climate change and achieve the goals outlined in the Paris Agreement. The current 29 members of this platform account for 90% of the world's clean power and 80% of global clean energy investments. The members are: Australia, Brazil, Canada, Chile, China, Denmark, European Commission, Finland, France, Germany, India, Indonesia, Italy, Japan, Korea, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Russia, Saudi Arabia, South Africa, Spain, Sweden, United Arab Emirates, United Kingdom and United States (*Who We Are | Clean Energy Ministerial*, n.d.). CEM reaffirms its commitment to advancing clean energy technologies, policies, and investments, paving the way for a greener and more sustainable future for all.

### 2.3 The Energy Management Leadership Awards

The Energy Management Leadership Award plays a significant role in global exposure of ISO 50001 certified leading organizations' for their accomplishments in energy management and response to global energy and climate challenges. This award draws attention to the evident business, environmental, and energy benefits derived from the implementation of ISO 50001—an effective solution to sustainable energy management. Beyond recognition, this esteemed honor provides businesses with an opportunity to demonstrate their exemplary energy management strategies for clean energy, environmental responsibility and sustainability. In addition, this award gives businesses the chance to showcase commitment to stakeholders like investors, clients, and staff, which boosts trust and reputation in the ethical business environment. Energetics Incorporated oversees the Energy Management Leadership Awards, having functioned as the awards administrator for the former Energy Management Working Group (EMWG) of the Clean Energy Ministerial (CEM). The CEM, in collaboration with the International Partnership for Energy Efficiency Cooperation (IPEEC), initiated the EMWG in 2010. The group dedicated itself to energy management efforts but officially concluded its activities in September 2020 (*Energy Management Leadership Awards | Clean Energy Ministerial*, n.d.). Figure 2 represents the number of organizations received Energy Management Leadership Awards from 2016 to 2023.

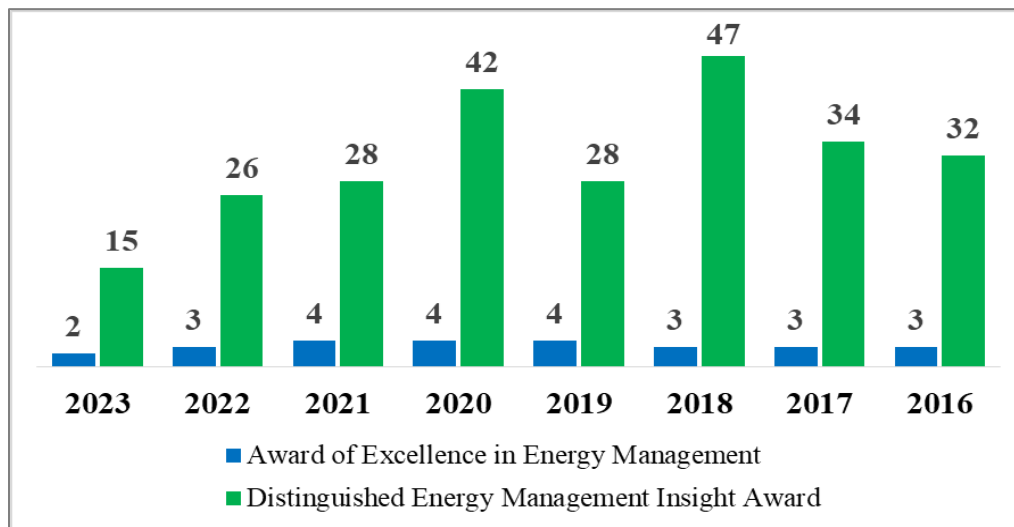


Figure 2. Number of Organizations received Energy Management Leadership Awards

### 3. Methods

This study is carried out by applying the content analysis technique to investigate case studies. The case studies of ISO 50001-certified organizations that received the Energy Management Leadership Awards in last three years are considered the main source of data for the study. The case studies were submitted in the template developed by the Energy Management Working Group (EMWG). This study is a comprehensive document of about 78 case studies from 2021 to 2023 that cover the compilation of benefits obtained by industries and sectors. The organizations vary in size and location, showcasing the applicability and effectiveness of the standard across different contexts. The total procedures of this study has been conducted by the following steps illustrated in Figure 3 (Kahkonen, 2014):

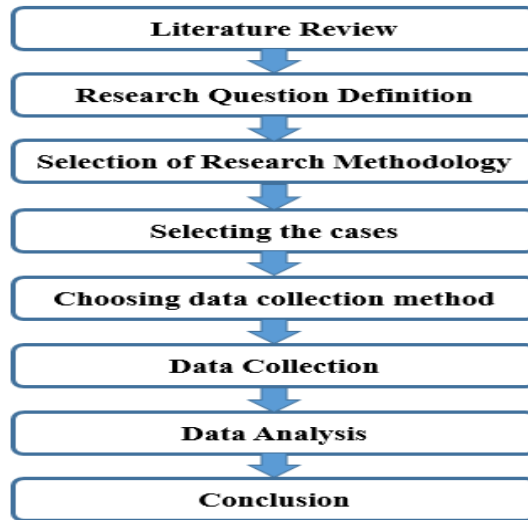


Figure 3. Process followed in the study

#### 4. Results and Discussion

Energy Management Leadership Award has been hosted since 2016 by Energy Management Working Group (EMWG) of Clean Energy Ministerial. In this study, case studies from 2021-2023 have been considered among them the share of case studies from different Regions are represented below:

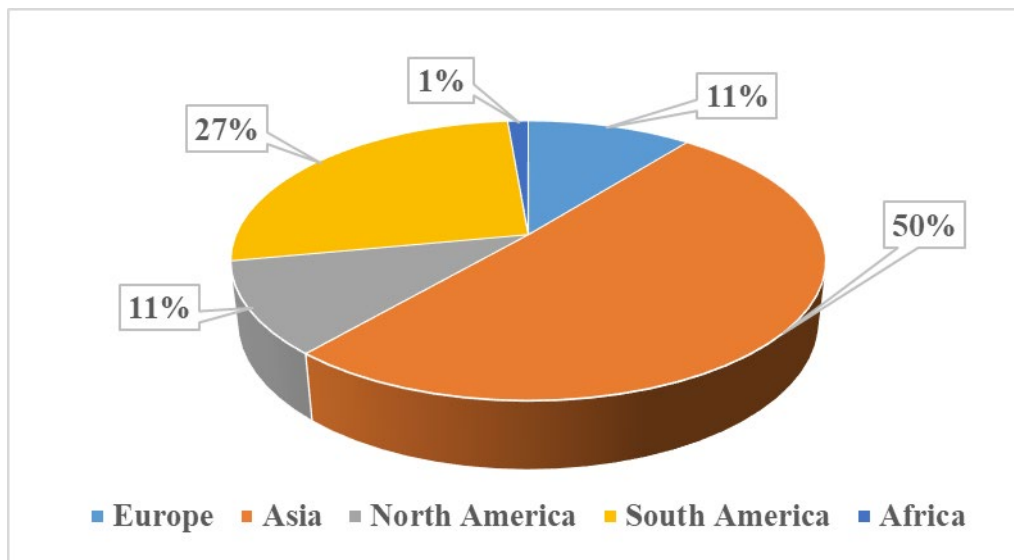


Figure 4. Share of case studies from different Regions

From the figure it is evident that, about 50% awardees of energy management leadership awards during the last three years are from Asian countries including UAE, Indonesia, India, Saudi Arabia, Philippines and Malaysia. European countries includes Austria, Denmark, France, Germany, Ireland, Spain, and Russia. Moreover, North America, South America and North Africa consist of countries- Canada, USA, Argentina, Brazil, Chile, Latin America, Mexico and Egypt.

Among them 9 organizations received the Award of Excellence in Energy Management –the program’s top honor and 69 organizations were awarded the Energy Management Insight Award. The benefits achieved by these 9 organizations through the implementation of ISO 50001 is listed in Table 2.

Table 2. Benefits achieved by the Award of Excellence in Energy Management Winners (2021-223)

Year	Company	Country	Benefits (over the improvement period)			
			Total energy cost savings (USD)	Total energy savings (GJ)	Total CO <sub>2</sub> -e emission reduction (MT)	Improvement of energy performance (%)
2023	Coop Danmark A/S	Denmark	29000000	493200	42000	24% (over 6 years)
	PT Semen Tonasa	Indonesia	16164305	4370972	435864	18.52% (over 4 years)
2022	Grupo Libertad	Argentina	3671800	210690	27520	16.6% (over 3 years)
	PT. ISM Bogasari Flour Mills Tbk	Indonesia	45000	1814	243000	12% (over 2 years)
	Tyndall National Institute	Ireland	152373	7591	510	5.8% (over 3.5 years)
2021	Abastible S.A	Chile	18246	89.56	7.87	1.32% (over 1 year)
	Dubai Municipality	UAE (Al Twar)	679847	20432	3349	30% (over 9 years)
		UAE (Al Manara)	9056	272.178	45	20% (over 1 year)
	JW Marriott Washington, DC	USA	221551	9502	725	7.8% (over 3 years)
	Kuala Lumpur Golf & Country Club	Malaysia	1428565	51843	8544	22% (over 7 years)

It is evident that the adoption of ISO 50001 can help organizations improve their energy efficiency, reduce their carbon footprint, and achieve cost savings while complying with regulatory requirements and meeting stakeholder expectations. From the 78 cases studies of awardees of Award of Excellence in Energy Management and Energy Management Insight Award, benefits of implementing ISO 50001 can be summarized as:

**Technical Benefits:**

- a) Energy savings
- b) Cost savings
- c) Reduction of GHG emission
- d) Increased service life of machines and equipment
- e) Increased productivity
- f) Increased use of renewable resources

**Other Benefits:**

- a) New business opportunities
- b) Top management support for energy management
- c) Increased competitiveness
- d) Employee motivation, skill development and knowledge enhancement
- e) Strengthened company culture of continuous improvement
- f) Achieved social responsibility goals
- g) Compliance with regulations or governmental commitments
- h) Enhanced marketing value and company image

## 5. Conclusion

ISO 50001 has been proven as a globally accepted solution for addressing energy challenges, enhancing energy efficiency, and mitigating environmental impacts. The case studies analyzed in this article highlights that energy saving, energy cost saving and GHG reduction are the most frequently mentioned benefit achieved through the successful implementation of ISO 50001. The case studies also reveals that top management engagement can play an important role in establishing a successful energy management system. The study provides valuable insights and best practices for organizations looking to improve their energy management systems and achieve similar results. Moreover, this study also possesses practical implications. The findings of this study will guide policymakers to encourage companies in adopting ISO 50001 as a competitive tool. Global recognition and tailored communication can further engage companies, fostering a better understanding of the benefits and driving increased adoption of ISO 50001 for sustainable future. Due to limited information presented, this study illustrates important insight into the success of organizations that have already implemented ISO 50001 during the last three years. Additional research is recommended to address the benefits achieved by all the award winning organizations with greater geographical reach as well as a future random sample of companies that have attempted and not necessarily achieved ISO 50001 certification.

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