ENERGY MANAGEMENT SYSTEMS AND ISO 50001 ACCREDITATION IN SHIPPING

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Abstract

The shipping sector is facing new challenges in energy consumption and management. In a recent study conducted by the European Sea Ports Organization (ESPO) has shown that energy consumption has risen from 7th place in 2009, to 2nd in 2016, as far as the 10 environmental priorities of European ports. Energy management is seen as the greatest risk for shipping companies, due to the variability existing in the oil and gas markets, in recent decades. Unsuccessful energy management strategies have been shown to have serious consequences for the natural environment, as well as for the companies themselves, which include the enhancement of global warming, and the destruction of a positive corporate image/reputation. Due to this, shipping companies now consider energy as an integral part of their overall strategy and adopt risk management assessments in order to attain the best returns on their investments. The ISO 50001 standard provides a useful tool to companies that are eager to develop and apply an efficient energy strategy consistent with modern Social Corporate Responsibility requirements and aspirations.

Key words: ISO 50001, Energy Management Systems, shipping, ports

Clasification JEL : M40, M41

1. Introduction

The European Sea Ports Organization (ESPO) conducts environmental reviews on a regular basis as shown in Table 1. Although air quality remains the number one priority of European ports, energy consumption has become the second priority issue of European ports. Since 2009, the importance of energy consumption has raised year over year. One of the reasons is the direct link between energy consumption and the carbon footprint of the ports and climate change [1].

Table 1. Top–10 environmental priorities of European ports for 2016 (ESPO 2016) [1]

	1996	2004	2009	2013	2016
1	Port development (water)	Garbage / Port waste	Noise	Air quality	Air quality
2	Water quality	Dredging: operations	Air quality	Garbage/ Port waste	**Energy Consumption**
3	Dredging disposal	Dredging disposal	Garbage / Port waste	**Energy Consumption**	Noise
4	Dredging: operations	Dust	Dredging: operations	Noise	Relationship with local community
5	Dust	Noise	Dredging: disposal	Ship waste	Garbage/ Port waste
6	Port Development (land)	Air quality	Relationship with local community	Relationship with local community	Ship waste
7	Contaminated land	Hazardous cargo	**Energy consumption**	Dredging: operations	Port development (land)
8	Habitat loss / degradation	Bunkering	Dust	Dust	Water quality
9	Traffic volume	Port Development (land)	Port Development (water)	Port development (land)	Dust
10	Industrial effluent	Ship discharge (bilge)	Port Development (land)	Water quality	Dredging: operations

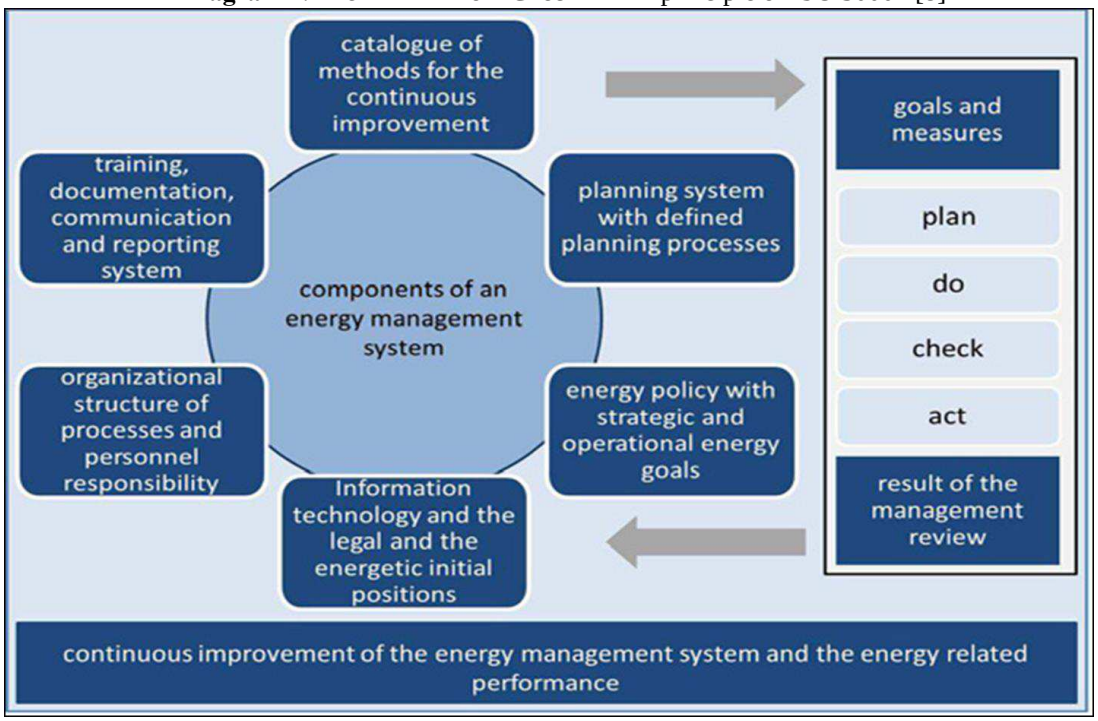
Faced with the global energy crisis and the continuous price increases, companies in recent years actively formulate various energy management options and develop technologies to improve their energy efficiency, thereby reducing harmful emissions such as greenhouse gases and improve the management of limited natural resources [2] [3]. Measures to reduce energy consumption and environmental pollution are now top issues facing the shipping companies [4].

The implementation of energy management systems has proved that it can enable companies to identify their potential for reducing energy consumption and increase the efficiency of their operations [5].

2. ISO 50001

The ISO 50001 standard also specifies the measurement of energy, the documentation of the required consumption, the reporting, the design and practices for the procurement of equipment and systems and procedures that help to optimize energy efficiency [6]. Additionally, it is worth noting that applies to all variables affecting energy efficiency, which can be monitored and influenced by the organization [7] and is based on the "Plan – Do – Check – Act" principle, as described in Diagram 1, below.

Diagram 1. The "Plan – Do – Check – Act" principle of ISO 50001 [8]



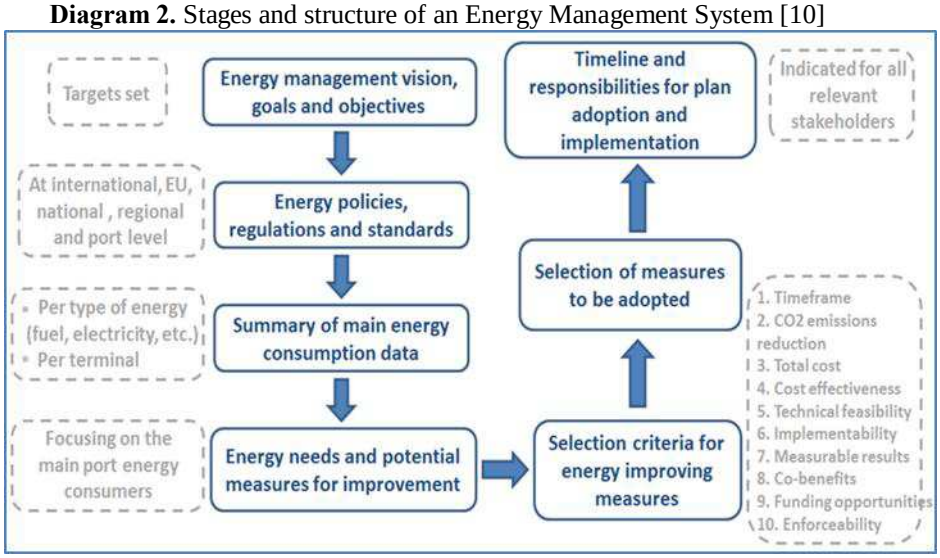
ISO 50001 is a strategic tool that helps businesses and organizationsimplement an energy management system thus making energy usage more efficient.

As is described in Diagram 1, ISO 50001 provides a set of requirements that enable organizations to :

- Develop a policy for more efficient use of energy
- Fix targets and objectives to meet that policy
- Gather data to better understand and make decisions concerning energy use and consumption
- Measure the results obtained
- Review the effectiveness of the policy
- Continually improve energy management

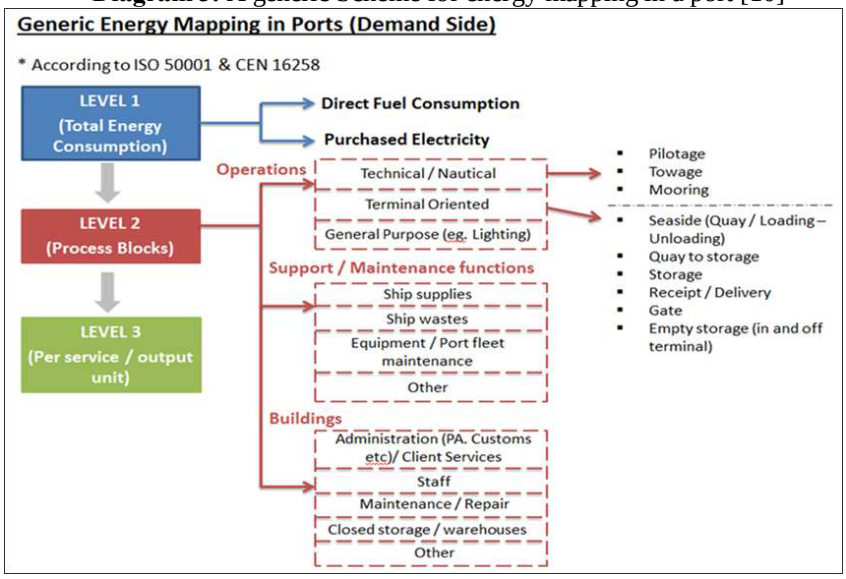
Energy Efficiency Management promotes continuous improvement of energy efficiency through i) organizational practices and policies, ii) team development, iii) planning and evaluation, iv) monitoring and measurement, v) communication and employee engagement and vi) evaluation and corrective measures [9]. The guidelines and steps involved in developing and applying an Energy Management System are presented in Diagram 2, which include steps for forming an energy policy, design, testing, implementation and systematic monitoring of an energy plan.

Diagram 2. Stages and structure of an Energy Management System [10]



Data from [10]

Diagram 3. A generic Scheme for energy mapping in a port [10]



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These in turn are supported by an internal control system, special monitoring, measurement and analysis. In the case where a deviation from the desired goals occurs, preventive and remedial action alternatives are also provided. The last stage involves a periodic review of the proper application of the model from the top management [4]

A typical example of an energy mapping strategy, necessary to Make a public commitment and assess performance and set goals is presented in Diagram 3, where the energy demanding activities of a port are highlighted and analyzed in terms of operations, support/ maintenance functions and buildings. It is evident that an Energy Management System must be able to highlight and quantify all energy demanding activities, in order to successfully develop and apply an efficient Energy Management System.

3. Conclusions

Although the advantages of adopting the above described approach are quite obvious, for many companies, the adoption of a new way of energy management is an important change, which if not properly integrated into the operations and culture of the company, can have the opposite effect [11] Shipping companies are a prime example since workers and management often resist the adoption and integration of energy efficiency management, thus not applying ISO 50001 correctly [12]. To understand and overcome this problem an important factors is to strengthen the staff's commitment to a sequential implementation of the stages described above. Finally, an important issue that can reduce the problems created by such a change is the incorporation of the principles of an effective energy management

system into the Corporate Social Responsibility strategy of the shipping business. It has been shown that socially responsible companies that use natural resources more efficiently provide a significant advantage over their competitors in the international market and ensure the growth of their profits in the long term [13]

4.Bibliography

[1] http://www.espo.be/news/espo-reveals-new-top-10-environmental-priorities-o

[2] Zhou, Q., Chan, C.W., Tontiwachiwuthikul, P. "Development of an intelligent system for monitoring and diagnosis of the carbon dioxide capture process", J. Environ. Inform., Vol. 18, No. 2, pp. 75–83, 2011

[3] Mirchi, A., "World energy balance outlook and OPEC production capacity: Implications for global oil security", Energies, Vol. 5, pp. 2626–2651, 2012

[4] Johnson, H., Johansson, M., Andersson, K. and Södahl, B., "Will the ship energy efficiency management plan reduce CO2 emissions? A comparison with ISO 50001 and the ISM code", Maritime Policy & Management, Vol. 40, No. 2, pp. 177-190, 2013

[5] European Commission, "Energy efficiency plan". 2011

[6] McKane, A., Desai, D., Matteini, M., Meffert, W., Williams, R., and Risser, R. 2009. Thinking Globally: How ISO 50001 - Energy Management can make industrial energy efficiency standard practice. Berkeley, CA: Lawrence Berkeley National Laboratory

[7] Chiu, T.-Y., Lo, S.-L. & Tsai, Y.-Y. 2012. Establishing an Integration-EnergyPractice Model for Improving Energy Performance Indicators in ISO 50001 Energy Management Systems. Energies 5, 5324-5339.

[8] International Standards Organization ISO 50001. Energy Management Systems. http://www.iso.org/iso/iso_50001_energy_management_systems.pdf

[9] Dutrow E., US Environmental Protection Agency, ENERGY STAR Industrial Partnership, May 26, 2010

[10] Boile, M., Theofanis S., Sdoukopoulos E., Plytas,C., . Developing a Port Energy Management Plan: Issues, Challenges and Prospects, TRB 2016 Annual Meeting, Washington DC. 2016

[11] Sorrell, S, O'Malley, E, Schleich, J and Scott, S., The Economics of Energy Efficiency, Elgar: Cheltenham, UK., 2004

[12] Lloyd's list, "Ship-owners still appear reluctant to move towards energy efficiency", Lloyd's list, Monday, June 21, 2010.

[13] Štreimikienė, D., Ališauskaitė-Šeškienė, I. and Karlaitė, D., "Social Responsibility of Business – Important Instrument in Implementing Sustainable Energy Development", Societal Innovations for Global Growth, Vol. 1, No. 1, pp. 774-791, 2012.