

**Measuring Energy Conservation Techniques in Hotels  
(an empirical study on Sharm El Sheikh and Hurghada Resorts)**Fatma M. Abdel-aal<sup>1</sup>Hany A. Kouzmal<sup>2</sup>

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**Abstract**

Implementation of environmental management systems (EMS) in hotels and resorts is gaining popularity world-wide. The study aims to measure energy conservation techniques applied by the studied resorts in Sharm El Sheikh and Hurghada, in addition, measuring the awareness and knowledge of the hotels' managers about energy conservation techniques and environmental behaviors.

An interview was conducted with hotels' managers and their assistants. The findings indicate that almost the investigated resorts applied energy saving techniques, but the measuring methods they used to calculate the amount of saving is not predicated since most of them stated that they depend on the monthly consumption of electricity while the others depend on different factors such as number of occupied rooms, number of guests and average out-door temperature, in addition, the findings illustrate that most of the investigated interviewees suffer from shortage of knowledge and concepts concerning environmental behaviors and their applications. So, this study provides some guides that confirm the best practices of energy conserving in general and electricity in particular that can help hotel managers and operators more understanding of environment management practices.

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**Key Words** :Energy Consumption, Electricity Saving, Resorts, Rationalization of Energy, environmental management system(EMS).

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## Introduction

Businesses have become increasingly aware of the environmental implications of their operations, products and services. Environmental risks cannot be ignored, they are now as much a part of running a successful business as product design, marketing, and sound financial management. Poor environmental behavior may have a real adverse impact on the business and its finances. Punishment includes fines, increased liability to environmental taxes, loss in value of land, destruction of brand values, loss of sales, consumer boycotts, and inability to secure finance, loss of insurance cover, contingent liabilities, law suits, and damage to corporate image (Burritt et al., 2001).

Alexander et al., (2002) implied that tourist accommodations can have large, expensive energy requirements, especially for space heating and cooling systems. They stated that there are many options for conserving energy, strategies from designing for passive solar heating to something as simple as providing good insulation can help reduce or eliminate the need for costly heating and cooling. Simply changing thermostat settings can make a big difference.

The above authors also explained that hotels worldwide are recognizing opportunities to implement energy-efficient projects in space heating and cooling systems. For example, The Hyatt Regency International Hotel in New Zealand understood that guests often left appliances and heating and cooling systems on when they were out of their rooms. The hotel developed a project to link energy use with room occupancy. Now when a guest leaves the room, all energy appliances shut down, with the exception of refrigerators, alarm clocks, and other essential appliances. The project costs were \$16,000, while the payback period was only 14 months, with savings of \$14,000 annually. In another case, the Sheraton Auckland Hotel and Towers realized that the daily washing of sheets, towels, flannels, tablecloths, and other linens accounted for 35% of the energy consumed in the laundry process, while drying consumed 65%. The hotel simply changed the temperature of the wash from 85 degrees Celsius to 65 degrees Celsius. This change saved \$2,000 in energy costs



in the first 3 months alone, and the linens came out just as clean. This project, in addition to reducing energy costs, reduced the use of washing chemicals and decreased pollution of the hotel wastewater. Also, allowing the hotel guests the option of having linens washed every other day rather than daily can significantly assist in energy and water conservation.

Escalera and Perez (2014) stated that the consumption of water and energy are the second most important cost item in hospitality, after staff expenses. It is clear that success in managing a hotel establishment is closely linked to the implementation of reliable control system and target consumption without reducing comfort of customers.

It is difficult for the hotel business to expect successful energy conservation measures that have an underlying risk of damaging image and losing customers due to complaints of hotel users even about insignificant unpleasantness toward environment. More consideration to environment of guest rooms is required from the hotel business than public office facilities and buildings for business use. Comfort-oriented operations tend to prevail over energy saving operations. The hotel is open for 24 hours throughout a year, and air conditioning is operated for a longer time resulting in a higher level of specific energy consumption compared to buildings for general use (National Convention of Excellent Examples in Energy Conservation for Fiscal, 2004).

According to Hotel Energy Solutions (2011) it was stated that the main energy consuming activities in a hotel are: heating rooms, cooling rooms, lighting, hot water use and other energy consuming activities by guests. Preparing meals (especially warm ones), swimming pool and others. Space conditioning (heating/cooling, ventilation and air-conditioning) is the largest single end-user of energy in hotels, accounting for approximately half of the total consumption – it is thus widely accepted that outdoor weather conditions and floor areas are among the main factors affecting energy use in hotels. The indoor temperature levels also greatly influence the quantity of energy consumed in a building.



The literature analysis of the Syke (2008) showed that the effect of consumption feedback on energy savings varies in most cases between 5-15 %. Not all energy savings experiments have induced energy savings but usually the studies that included consumer feedback and a personal approach were the most effective. The study also argues that according to the literature it can be concluded that giving feedback of energy consumption in some form is necessary, if the goal is to reduce energy use.

Among the key findings of Darby (2010) literature review are that there is no one way to reduce energy demand among the customers, there is rather a set of different measures that can reduce the energy use, but there is a lack of a standardized approach to researching impacts.

Hansen and Mendoza (1999) stated that environmental costs are incurred because of poor quality controls. Therefore, they advocate the use of a periodical environmental cost report that is produced in the format of a cost of quality report, with each category of cost being expressed as a percentage of sales revenues or operating costs so that comparisons can be made between different periods and/or organizations. They are indicated in their study that there are four sorts of estimation techniques: energy consumption per occupied room, gas usage per food cover, normalized performance indicator, and multiple regressions.

Chan and Mark (2005) and Wilco (2005) agree with Yu and Chow's (2000) findings that there are four methods used to estimate energy consumption these are: normalized performance indicator (NPI) has been commonly used to estimate the electricity consumption in non-domestic buildings., gas usage per food cover, multiple regressions and energy usage per occupied room.

It is necessary to develop an energy management program to save electricity consumption as recommended by Shiming and Burnett (2002). Their study suggested that a hotel should first have a clearly defined energy use policy and an action plan. Then, all staff should be trained and encouraged to get involved in energy management. In technical aspect, the hotel should carry out energy audits on a regular basis, preferably



once a year. It should also adopt technically advanced energy efficient equipment including lights, chillers, energy efficiency motors and so on.

Azumaya *et al.*, (2013) stated that to reduce and peak-shift the energy consumption by companies, limits are already being seen in the effectiveness of individual and local measures, and corporate management needs to be challenged to provide a company-wide environment that supports daily and continuous energy management and improvement.

Yet, the research area is more concerned nowadays in all industries especially hospitality industry, since the environmental behaviors and practices become necessity due to governmental and social responsibilities. consequently, the current paper focuses on the energy saving techniques used in Sharm El Shiek and Hurghada resorts, and to what extent the hotel managers and operators understand and applied these techniques.

## **Methodology**

The present study aims to measure energy saving techniques applied in the investigated resorts. Indubitably; it was too difficult to sample all resorts, because it is prohibitive in terms and conditions of cost, time and accessibility. Therefore, the study was limited to five-star resorts in Sharm El Sheikh and Hurghada. These have been selected due to variety of reasons: i.e., these areas have high volume share of tourism in Egypt, in addition, there are large number of resorts in these areas which facilitate the search process. A sample of 32 five star resorts out of 66 located in Sharm El Sheikh and Hurghada (42 +24 respectively (according to Egyptian Hotel Association "EHA" Guide, 2014), which represents 48 %of the total population.

## **Personal interviews**

Personal interview is one of the main source of evidence which represents one of the key aspects of this study. Ninety hotels' managers and their assistants and supervisors were interviewed in thirty-two resorts in Sharm El Sheikh and Hurghada as previously mentioned. The overall purpose of



these personal interviews is to measure the awareness and knowledge regarding energy saving techniques applied in their resorts.

## **Experimental**

### **The analysis of personal interviews**

The respondents' opinions toward energy saving techniques in the tested hotels could be summarized in their answers to the following questions:

#### **Question 1: Does your property implement the environmental management systems (EMS)?**

The aim of this question is to identify the perspectives of the interviewees in terms of their hotel implementation of the environmental management systems. Approximately 55% of the interviewees at the investigated resorts assured that their hotel implements the environmental management systems (EMS). while, 35 % of them stated that they were not applied this system, on the other hand, 10% of them have no idea about the (EMS).

#### **Question 2: What are the sources of electricity used in your hotel?**

The aim of this question is to identify the hotel electricity sources used in the studied sample. The vast majority of interviewees 95% noted that the governmental electricity line is the main source of electricity and each hotel has its generator to work if the governmental electricity shut down. Few investigated resorts have renewable resources (mainly limited sun cells) as supported electricity supply source but actually not very effective.

#### **Question3: Could you list some techniques actually applied in your property to conserve energy?**

The aim of this question is to evaluate the awareness of the investigators toward energy saving techniques applied in the tested sample. The finding of this question illustrated that almost the investigated resorts used similarity techniques in their resorts such as the follows:

- Some of hotels use the led lamps to save electricity. Some of them use Fluorescent Lamps (CFLs).



- Use less hot water: For example, shower instead of bath, use cold water where possible for laundry washing.
- Avoid overheating bedrooms and corridor areas.
- Install a solar water heater.
- Switch off equipment when not in use
- Reduce excessive heating or cooling: Only heat or cool occupied rooms.

**Question 4: Could you state some benefits of using these techniques?**

The aim of this question is to identify the awareness of the interviewees in terms of benefits of using energy saving techniques. The vast majority of the investigators (95%) assured that there are many benefits of using the environmental management systems (EMS), but they focused only on the financial perspective but ignore the legislation and social responsibilities. Moreover, few of the interviewees declared that saving of energy consumption can gain the hotel compatibility with environmental laws and regulations; Improve communication channels between the hotel and specialized government agencies; Lastly, the research concludes the benefits of using energy saving techniques as follows: saving money, less pollution and the key to preventing climate change, rationalize of energy consumption, avoiding wasteful energy consumption, maintaining a pleasant environment, running a successful business, increased liability to environmental taxes, reduce cost, assuring quality, researching and analyzing new technologies, products and staff practices to feed the continuous improvement cycle, improve the hotel environmental performance through more efficient use of resources and reduction of waste, gaining a competitive advantage and the trust of stakeholders, demonstrate compliance; satisfy the owner, the guest as well as the staff (as stated by Burritt et al., 2001).

**Question 5: How does your resort measure electricity consumption?**

This question was designed to determine the practical measures of electricity consumption in the tested sample. The finding showed that there are many ways to measure electricity consumption, as follows: most of the tested sample depends on monthly consumption of electricity and few of the investigated resorts depend on other variables such as the number of occupied rooms, number of guests, little of them depend on average out-door temperature. Therefore, the finding of this question summarized that most of the investigated sample depend on different variables to measure the electricity consumption. This results disagree with Wilco, (2005).

**Question 6: In your opinion what is the best temperature of cooling degree days for modeling electricity demand?**

The aim of this question is to identify the perspectives of the interviewees in terms of the best temperature of cooling degree days for modeling electricity demand. Indeed, majority of the investigators ignore the concept of cooling degree days so they didn't understand the question, but after they know this concept according to Alexander et al. (2002) who illustrated that cooling degree days' model means monitoring and targeting the relationship between energy consumption and outside air temperature. One of the most important complicating factors is the influence of weather on the energy use of buildings, they only recommend that turn geyser temperature down can be maintaining energy saving.

**Question 7: What is the department that concerned with the environmental management system?**

This question was designed to determine the department that concerned with the environmental management system, most of interviewees (67 %) noted that engineering and maintenance department is responsible for EMS, while some respondents assured that engineering and maintenance department cooperate with other departments in this issue. Moreover, some of the interviewees added that the engineering, rooms division, and kitchen the departments that more concerned about the environmental



management system. On the other hand, few of the respondents stated that until now their resorts not actually implement environmental management system, and they need governmental support to implement the environmental management system.

### **Question 8: Does your resort concerned with energy saving on guest rooms or public areas?**

The aim of this question is to identify the perspectives of the interviewees in terms of hotel implementation environmental management system (energy saving) on guest rooms or public areas. Most of the interviewees at the investigated resorts (60 %) illustrated that their resorts implement energy saving techniques in all the departments as much as they can. Moreover, some of the correspondents noted that the environmental management system up till now not effectively implemented. This finding indicated that that both guest rooms or public areas require more environmental considerations. Some of the correspondents assured that guest rooms require more attention on energy saving, this due to that majority of the guests don't concerned about EMS. This agrees with the National Convention of Examples in Energy Conservation for Fiscal (2004).

### **Question 9: Which source of energy does the kitchen use in your property, gas or electricity?**

The aim of this question is to identify the source of energy used in the kitchen. Most of the interviewees at the investigated resorts (87%) stated that gas is the main source of energy used for the kitchen equipment's. Moreover, some of the respondents mentioned that gas is much better and cost saving and the trend is to replace electricity by gas especially when they buy any new equipment because they concerned to greening equipment. Additionally, some of the interviewees added that their hotels are using the renewable energy for the water heaters in the kitchen. On the other hand, few of the interviewees stated that electricity is the main source of energy in their kitchen because most of the equipment used are old. This finding agrees with what said by Chan and Mark (2005).



## **Question 10: Does your property involve guests in energy savings system?**

This question was designed to determine if the tested sample involves their guests in energy savings system. Majority of the investigated sample illustrated that their hotels involve their guests in energy savings system to assure customer satisfaction. Furthermore, they stated that guest satisfaction is the first priority and the hotel responsibility is to meet their needs. So, It is essential for the hotel to involve their guests in energy saving techniques and invite them to take simple actions to support the hotel efforts. Moreover, some of the correspondents mentioned that to go green is the new trend nowadays; guests are increasingly environmentally concerned. For example, their hotels put some signs in the guest rooms to show that they are sharing in green hotel system and ask the guest if he like to share and suggest if he doesn't mind to replace the bed sheets every two days instead of each day. This finding assured that a lot of hotels nowadays is likely to be concerned about environmental issues such as recycling bottles, cans and paper at home as well as making greener lifestyle choices, such as organic food or fuel-efficient vehicles. The implementation of environmental initiatives may play a smaller role in a guest's choice of a property. This finding agrees with the Darby's literature review (2010).

## **Question 11: Does your hotel concern with measuring the impact of hotel environmental behavior on the guests' perceptions?**

The aim of this question is to identify the impact of hotel environmental behaviors on the guests' perceptions. Most of the interviewees at the investigated resorts assured that they concerned with measuring their guests' perceptions on environmental behaviors through guest comment card, while few of them assured that their resorts not concerned with measuring the impact of environmental behavior on their guests' perceptions.

The literature accomplished by Skye(2008) and Escalera and Perez, (2014) assured that the environmental management practices are very effective on customers' perceptions since it can build guests' trust and



increasing their satisfaction; improve the image of the hotel's environmental performance and increasing the good reputation; gain appreciation and recognition of global bodies which opens export markets; improve the environmental conditions of the staff to work in a clean and safe environment free of contaminants.

**Question 12: How does the hotel measure the guests' perceptions about their energy saving techniques?**

The interviewees were asked to describe how the tested hotels measure their guests' perceptions about their EMS. The result indicated that some of the investigators usually use resorts websites and trip advisors (online website), and other websites such as holidays check or top hotels to gauge on the customer's perceptions. Furthermore, most of them usually use guest comment cards to assess guest satisfaction as mentioned previously. Moreover, there are other popular and common ways used in the investigated resorts to assess the guest's perceptions such as guest relations staff, tour operators, travel agent reports, travel agent representatives and complimentary party once or twice a week to give the managers the chance to be in direct contact with the guests to collect customers' opinions. Some of them stated that they usually use guest relation and guest contact staff as a direct tool to identify the guest requirements. Meanwhile, there are other common ways used in the investigated resorts to assess guests' perceptions such as word of mouth, market studies, guest surveys, and research studies. Moreover, few of the investigators added that the influence from customers however occurs when their level of awareness increases and they come to expect environmental practices such as recycling.

**Question 13: How does your property involve the staff in the energy saving techniques?**

The aim of this question is to identify the perspectives of the interviewees if their resorts involve their staff in the EMS in general and energy saving in particular. Most of the interviewees at the investigated resorts approximately 90 % stated that the hotel improve their staff awareness, through meeting and collect staff suggestions and recommendations, to



improve staff practices requires awareness, training, revisions of standard operating practices, and incentives for staff compliance. Furthermore, some of the investigators mentioned that they train the staff to reduce waste and conserve resources and incentivized to the benefits of environmental management. Moreover, few of the respondents assured that involving the staff in the hotel's energy action plan is not only essential for energy efficiency policy to be successful, but it is also a very effective way to motivate them and give a new meaning to the business. The staff will be happy to support the hotel efforts for a more sustainable business. Policies work best when staff understands their responsibilities in achieving the policy objectives. This finding agrees with Shiming and Burnett (2002) who stated that the environmental programs have proved to be an effective means of generating enthusiasm and motivating staff to work as a team to achieve a common purpose and financial savings.

**Question 14: What are the issues used by your resort to evaluate the energy conserving techniques?**

The aim of this question is to identify issues used by the selected sample to evaluate energy conservation techniques. The majority of interviewees noted that they depend on the occupancy report, the departments meeting and daily bereaving to estimate the energy conservation. Moreover, some of the interviewees assured that their resorts depend on a daily report from the engineering department describe the daily consumption and the reasons, and breakdown consumption by areas in the property such as outlets, restaurants, and kitchen or guest rooms and by end use lighting or irrigation, and calculate energy consumption average based on respective energy consumption and activities to estimate the energy conservation. lastly, the finding indicated that almost of them assured that daily monitoring is the effective way to estimate the energy conservation through monitoring the energy consumptions.

**Question 15: What are the variables you depend on to measure the effectiveness of your energy saving techniques?**

The aim of this question is to identify the perspectives of the respondents in terms of the variables the hotels depend on to measure the



effectiveness of the energy saving techniques. The vast majority of interviewees (80 %) stated that saving costs and guest satisfaction are the main indicators to measure the effectiveness of the energy saving system. Moreover, few of them indicated that there are some important indicators to measure the effectiveness of the energy system in each outlet separately (as restaurant / bar, laundry, room use, kitchen)

### **Conclusion**

The previous results indicate that some resorts try to be environmental behaviors through conserving energy consumption in all areas in the property, such as guest rooms, outlets, restaurants, and kitchen; lighting or irrigation. This due to that most of them become intolerant to be green hotels, i.e. green washing with the most common complaint that replaced the towel they intentionally hung to use again. Moreover, many hotels have put in place customer-focused initiatives such as towel and linen reuse programs and EMS in general. In line with this, the study 's findings recommend that using gas in the kitchen instead of electricity can reduce energy consumption. Reducing water heating will reduce the size of energy used in heating water system requirement to achieve a targeted reduction. Train the staff to reduce waste and conserve resources it is important especially the least educated staff to gain the benefits of environmental management practices. In this respect, to improve staff practices it was required increasing awareness of EMS practices, training, revisions of standard operating practices, and incentives for staff compliance. Without a comprehensive and reinforcing approach, most staff will revert back to standard practices. Water efficient technologies include green equipment, such as in laundry low-flush and waterless (vacuum) toilets. Also, it is important to encourage resorts to invest in renewable energy systems. Lastly, the study supports that the realization of the correct conservation energy techniques in resorts can give them a competitive advantage and help to achieve profitability.



## REFERENCES

Alexander S., Kennedy C., and Alliance Z., (2002). "Green Hotel : Opportunities and Resources for Success" Zero Waste Appliance. Available from : <http://www.zerowaste.org>.

Azumaya N., Xiang D., and Tatta N., (2013). "Energy Management Solutions to support Energy Conservation Activities". Measurement and control Technologies Supporting Society and Industry. pp.8-13.

Chan, W. and Lam, J. (2002), "Prediction of pollutant emission through electricity consumption by the hotel industry in Hong Kong", *International Journal of Hospitality Management*, Vol. 21 No. 4, pp. 381-91.

Chan, W. and Mark, B. (2004), "An estimation of the environmental impact of diesel oil usage in Hong Kong hotels", *Journal of Sustainable Tourism*, Vol. 12 No. 4, pp. 346-55.

Darby, S. (2010). "Literature review for the Energy Demand Research Project". Great Britain.

Escalera A. and Perez C. (2014). " Environmental Control for the Industry: A Water Consumption Model" *Certified International Journal of Engineering and Innovative Technology (IJEIT)*. Volume 3, Issue 8.

Hansen B. and Mendoza E. (1999). " *Environmental Management Accounting*" Available from student accountant hub page. 10 Aug 2015.

Hotel Energy Solutions (2011). "Analysis on Energy Use by European Hotels: *Online Survey and Desk Research*", Hotel Energy Solutions project publications.

National Convention of Excellent Examples in Energy Conservation for Fiscal, (2004). " *Measures to Save Energy of Introduction of BEMs and Operational Improvement by ANA Hotel TOKYO*"

Shiming, B. and Burnett, J. (2002), "Energy use and management in hotels in Hong Kong", *International Journal of Hospitality Management*, Vol. 21, pp. 371.

Syke R. (2008). "Energy use and management in hotels in Hong Kong",



*International Journal of Hospitality Management*, Vol. 21, pp. 371-80.

Wilco W. C., (2005), "Predicting and saving the consumption of electricity in sub-tropical hotels", *International Journal of Contemporary Hospitality Management*, Vol. 17 Iss 3 pp. 228 – 237

Yu, P.C.H. and Chow, W.K. (2000), "Sizing of air-conditioning for commercial buildings in Hong Kong", *Applied Energy*, Vol. 66, pp. 91-103.

Zmeureanu, R.G. (1994), "Energy performance of hotels in Ottawa", *ASHRAE Transactions*, Vol. 100 No. 1, pp. 314-22.

العربي

## قياس تقنيات حفظ الطاقة المستخدمة في الفنادق

مما لا شك فيه ان نظم الإدارة البيئية و الحفاظ علي الطاقة و الموارد المختلفة هي الشغل الشاغل لكل الحكومات و الصناعات المختلفة و من بينها صناعة الضيافة. حيث ان نفقات الطاقة تحتل المرتبة الثانية من بين نفقات أي فندق بعد النفقات المتعلقة بالعمالة و المرتبات و الأجور. و علي الرغم من أهمية هذا الموضوع الأ ان كثير من القائمين عليه في الفنادق يفتقد الكثير عن المفاهيم و التطبيقات المتعلقة به . لذا قامت الدراسة الحالية بإلقاء الضوء علي بعض التطبيقات و الممارسات المتعلقة بالحفاظ علي الطاقة في بعض المنتجعات بمدينة شرم الشيخ و الغردقة ، و ذلك من خلال عقد مقابلات شخصية مع مديري و مساعدي هذه الفنادق لمعرفة مدي المامهم بالتطبيقات و الممارسات و المفاهيم المتعلقة بالحفاظ علي الطاقة و البيئة بشكل عام. و قد أظهرت الدراسة ان هناك بعض التطبيقات و الممارسات القليلة المتعلقة بالحفاظ علي الطاقة مطبقة بالعينة محل الدراسة و لكن هناك قصور في تقييم مدي كفاءة الاستهلاك فكثير من الفنادق يعتمد علي طرق تقليدية لتقدير حجم الاستهلاك من الطاقة مثل الاستهلاك الشهري للطاقة او نسب الأشغال او عدد النزلاء. لهذا أوصت الدراسة ببعض التطبيقات و الممارسات التي تساعد الإدارة الفندقية علي تحسين و رفع كفاءة هذه الممارسات البيئية لتحقق أقصى استفادة منها و اعلي مردود علي الفنادق و النزلاء و ايضا العاملين، بالإضافة الي المحافظة علي البيئة و المسؤولية الاجتماعية للفندق.