

# An Implementation of Energy Awareness Management in Heritage Hotels of India

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## Abstract

The hospitality business is a major contributor to the growth of tourism, consuming a significant amount of energy and resources on the planet. Because the hospitality sector is such a big part of the tourism sector, more attention is paid to its environmental impact. The goal of this study is to look at power management and consciousness among stakeholders' perspectives of the extent to which heritage hotel practices contribute to attaining the environment-related SDGs. To do this, a questionnaire was created and sent to the person in control of environmental obligations in the hotels under investigation, which were chosen using a random sample approach. A sample of 49 people seeks heritage motels in Bangalore, Karnataka, India. The survey included 70 percent of Karnataka's total Accredited Heritage motels. With the help of a research paper, information is gathered via case interviews and observations with hotel managers. The Casa Cottage Hotel of Karnataka has been effective in executing environment protection operations focused on improving feasible tourism actions and gaining competitive benefits as a result of implementing green hotel planning, which involves ecologically hotel implementation, property use, energy consumption, quality of air, water conservation, and wastewater treatment. The creation of hotels that are environment-friendly and sustainable has been focused on via the control of operational operations to limit the effects of external harm caused by present environmental circumstances. The hotels' dedication to sustainable development via energy was the driving force for the implementation of hotel industry criteria. To accomplish the environment-related SDGs, hoteliers should effectively include Heritage hotel practices into their operations plans, according to the findings.

**Keywords:** wastewater treatment, conservation, hotels, sustainable, environment- friendly, power management, green energy

## 1. Introduction

Heritage Hotels are those that are located in Havelis, forts, palaces, and castles, which were built around 1950. These hotels have two functions. They have encouraged tourism, and they have also been successful in maintaining some of India's top monuments. The notion of Heritage Hotels originated in Europe, when French Relais et Chateaux hotel groups, British modest prestige hotel groups, Spanish par-adores, and other hotel networks linked some of the world's most historic and finest buildings into hotel networks. Since these motels specialize in specific interest tourism, they are often accessed by small groups, couples, and families. According to studies, 80 percent of environmental contamination in the hotel business is produced by operational operations for fuel and energy, which have a detrimental influence on the environment [1]. Changing climate is one of the key environmental repercussions of hotels that contribute to issues on a global scale [2]. According to studies, the average water use per guest per night at a five-star hotel was between 180 and 390 liters, releasing 120 to 190 kg of CO<sub>2</sub> per sq meter of room floor space each year and producing One kg of garbage per person per night [3].

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Electricity accounts for 80% of energy usage in hotels in large cities, with the ratio of energy consumption as seen in the graph below. This covers the expense of water consumption. The air conditioning system utilizes around 65 percent of the hotel's overall energy consumption [4]. [5] The concept of greening the hospitality industry is included in tourism development. Green hotels are sustainable tourism businesses that adhere to the basic principles of minimizing operational effects on the environment and community. "Green hotels are ecologically responsible businesses whose administrators are keen to introduce programs that conserve water, conserve energy, and minimize waste products while conserving income to support safeguard our only earth," according to a source of the energy concept." ("Green Hotels Association," n.d.).

[6] Although there is no uniform definition for hotels that employ sustainable practices, the phrase "green hotels" may be used to refer to programs and/or processes that reduce GHG emissions. Sustainable hotels are generally described as being environmentally conscious, high-performing, and so on. The expectations or criteria for a "green" or "sustainable" hotel are inconsistent.

## **2. Literature Survey**

### **2.1 Hotel industry sustainability standards**

Sustainability standards are a powerful planning tool for the hotel business since they address the socio-cultural, economic, and environmental implications all at once. Sustainability issues and standards of action have been produced by the UN System and other "bodies of government." In some nations, these standards of ethics serve as a forerunner to stricter regulation, while in others, they are reinforced by legislation [10]. [11] point out that few of the rules of conduct are more effective than regulations because of their worldwide nature. Agenda 21 (1994), and the Johannesburg Declaration on Sustainable Development are examples of international conventions (2003). The NRTEE and the TIAC have created tourism development rules of behavior in Canada. In Canada, the tourism planning strategy is established on a voluntary premise and acts as a leading tool for long-term sustainable tourism.

### **2.2 Energy-Saving Techniques**

In the hotel sector, energy conservation has been identified as one of the most important aspects of environmental sustainability. In general, hotels use a lot of electricity and fossil energy in their various operations. Various energy efficiency strategies in the hotel business have been implemented based on the examined literature [13]. Incorporating renewable energy programs such as wind and solar power, deploying energy-efficient equipment and devices, regulating guestroom power usage with digital appliances, using energy star products, inserting motion detectors that transform lights off in low regions, and implementing triple-glazed shutters or introspective glass are just a few of the initiatives which can be taken [14].

#### **2.2.1 Measures to Conserve Water**

The hotel industry has adopted water reduction planning as a key green operating method [15]. On a day-to-day basis, hotels use a significant amount of water. In the hotel economy, water consumption is determined by the hotel's capacity and size, rental yield, and the kind and grade of facilities and services supplied [16]. Installing water-efficient electronic gadgets ie, utilizing showerheads and low-flow restrooms and deploying thermal faucets, implementing bed or towel reuse programs, repairing leaks in restrooms and showers regularly, irrigating plants and grass early in the morning and late-night to limit vaporization, and reprocessing wastewater are all examples of water management measures used by the hotel industry.

#### **2.2.2 Wastewater Treatment Measures**

The hotel sector is a major source of greenhouse gas emissions, as it generates a large amount of sewage sludge ie, cooking oil waste and food waste, and dry garbage that is disposed of in landfills. As a result, hotel operators began implementing a variety of practices aimed at reducing hotel waste, including segregating hotel waste materials through

using clearly labeled containers and colored bins for accumulating recyclables, buying products with recycled substance, obtaining organic cooking wastes individually for soil recycling, buying food and washing compounds in bulk, and incorporating a donation program. [17]

### **2.2.3 CSR in the Hotel Industry**

CSR is defined by the World Business Council for Sustainable Development as a company's contribution to long-term economic growth. Industry Canada defines CSR as an effective and open means for businesses to incorporate economic, social, and environmental concerns into their principles, operations, judgment, plan, and culture, resulting in better business practices, more wealth, and improved society. However, because CSR was still a developing idea, there was no commonly acknowledged definition (Industry Canada, 2012). Given the degree of inaccuracy in concepts and terms that accurately interact viability for the hotel sector, predicting the achievement of CSR metrics in terms of market value, and also other justifications why investments in conservation could prove beneficial in the long run remains a challenge. The hotel business participates in CSR to encourage hotel businesses to embrace sustainable practices. The underlying concepts of durability in the hotel sector vary depending on the company. CSR, or "Responsible Business," is a concept that describes the basic concepts that guide the hotel sector's sustainability efforts (18). The triple-bottom-line metrics, which evaluate sustainability from social, environmental, and economic viewpoints, are used to define CSR. The hotel sector's level of responsibility fluctuates, with some organizations, such as chain hotels, being more strict about CSR policies than others. Essentially, hotel management, particularly chain hotels, adopts these steps voluntarily (18). Using standardized ethical business practices across many regions, cooperative initiatives give global hotel enterprises the resources to do responsible activities and maintain performance.

## **3. Materials and Methods**

### **3.1. Sample and Population of the Study**

Individuals responsible for environmental obligations in Karnataka Certified Heritage Hotels made up the study's population. The HSH is a national green accreditation issued by the Karnataka Hotel Owners Association (KHOA) [19] with the cooperation of the Karnataka Ministry of Tourism. The HSH gives Karnataka resorts a chance to be internationally recognized while also lowering their operating expenses and improving their social and environmental performance. The HSH program has an impact on 11 aspects of hotel operations, including guest data, sustainable development, house cleaning, and guest rooms, ecological sustainability, mentoring and guidelines, fuel, water, gardening, beverages and dining room, waste, and seaside area, as well as architecture, design, and environment. The hotels are given awards based on their dedication to environmental sustainability. Three, four, and five Green Stars are the 3 stages of accreditation. As per KHOA [20], there were 25 approved HSH in Hampi, spread over 18 locations in Karnataka. These were categorized as follows based on their Heritage Star rating: There are two hotels with 3 Green Stars, 40 hotels with 4 Green Stars, and 37 hotels with 5 Green Stars. In this research, we will only look at verified 4 and 5 Green Star hotels that demonstrate a strong commitment to environmental conservation in all areas.

### **3.2. Method of Data Collection**

The perspectives of energy and environmental management officials regarding the amount of Heritage hotel practices' assistance to accomplishing environment-related SDGs were investigated using a statistical survey centered on a questionnaire. There were 3 phases to the survey questionnaire. Participants were requested to give data on their age, gender, education level, present condition, and length of professional experience in the researched hotels, as well as the Heritage Rating system they had received. The second segment attempted to pinpoint the primary cause for the researched hotels' adoption of the Heritage Star standards. The third part was designed to show the respondents' opinions on how much their hotel activities aided in attaining the four SDGs by committing to implement Heritage hospitality practices. The degrees of agreement with the statements explored were determined using a five-point Likert-type scale (strongly agree = 5, agree = 4, neutral = 3, disagree = 2 and strongly disagree = 1) for each aim and its associated aims and behaviors. SPSS version 27.0 for Windows was used to compute and evaluate the information gathered from the participants. The standard and mean deviation, as well as frequency counts and % distributions, were calculated and examined. To establish if there was a numerically substantial variation between the averages in the 2 groups, an independent sample t-test was employed to compare 4 and 5 HSH.

**4. Results**

**4.1. Respondents' Demographic Profile**

The information obtained from the examined respondents (n = 45) revealed that males made up 89 percent (n = 48) of the total number of participants. Respondents between the ages of 36 and 48 years old were the oldest (60.2%), followed by those over 48 years of age (40.7%), and those under 38 years old (5.1%). When it came to respondents' educational levels, university graduates were the most common (90.2%, n = 39). Service engineers accounted for 67 percent (n = 40) of the participants' current positions, followed by sustainability administrators at 15 percent, and others at 16 percent and 5.9 percent, etc. Half of the examined respondents (n = 25) had worked in the hotel for a mean of 4 to 6 years, with those who had worked for more than five years coming in second (40 percent). In terms of hotel Green Star ratings, 49.2 percent (n = 30) were designated as four-star hotels, while the rest (50%) were designated as five-star hotels.

**4.2. The Importance of Heritage Star Criteria Adoption and Energy Administration Consciousness**

The purpose of this inquiry is to determine the primary reason for the researched hotels' adoption of the Heritage Star standards. The responders were only allowed to choose one explanation. The primary reason for adopting Heritage Star criteria, as indicated in Table 1, was their awareness of their dedication to energy and environmental sustainability, which accounted for 49 percent (n = 28). The percentages for improving the hotel's picture among competitors and customers, lowering operational expenses, and growing market share (clients concerned in ecological patterns) were 30 percent, 17%, and 7 percent, etc. These results are consistent with those of [21], who determined that the primary motivations for using eco-label standards were that they have been "environment-friendly and beneficial for the company's reputation." After the demographic profile respondents were asked to indicate their awareness level for various energy-efficient practices of Heritage hotels on 5 point scale ranging from 5 (Extremely Aware) to 1 (Not at all aware). Table 1 is presenting the mean score for every energy-efficient practice and it has been seen that maximum awareness score has been received for the Solar water heating system (Mean=4.67). It can be seen that hoteliers' are extremely aware of all the energy-efficient practices, however, they are moderately aware (Mean=4.10) about eco button.

**Table 1: Hoteliers' Awareness for Energy Efficient Practices of Heritage Hotels.**

<b>Energy Efficient Practice</b>	<b>Mean Score</b>	<b>Awareness Level</b>
Solar panels	4.43	<b>Extremely Aware</b>
Electronic key card	4.27	<b>Extremely Aware</b>
Eco button	4.1	<b>Moderately Aware</b>
Energy efficient lights	4.46	<b>Extremely Aware</b>
Motion sensor lighting system	4.3	<b>Extremely Aware</b>
Solar water heating system	4.67	<b>Extremely Aware</b>
Garden and open space solar lighting	4.52	<b>Extremely Aware</b>
LED , CFL , & other energy saving appliances	4.51	<b>Extremely Aware</b>

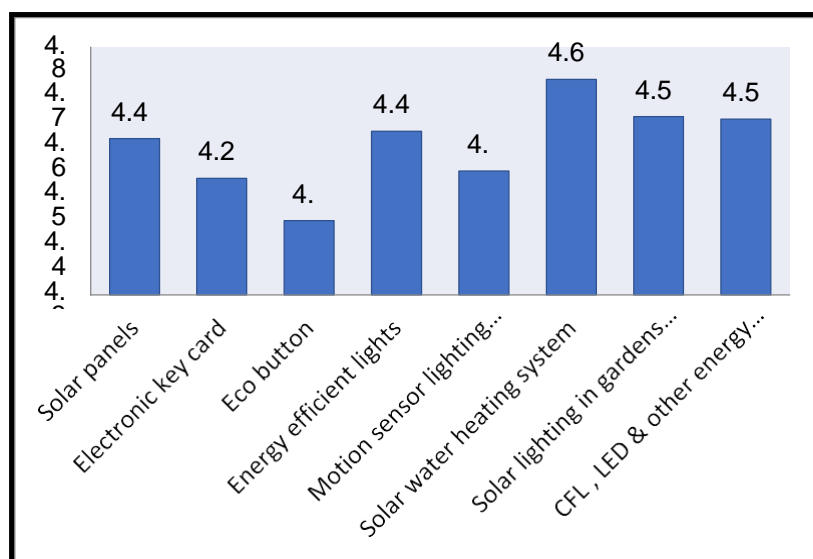


Figure .1 : Hoteliers' Awareness for Energy Efficient Practices of Heritage Hotels

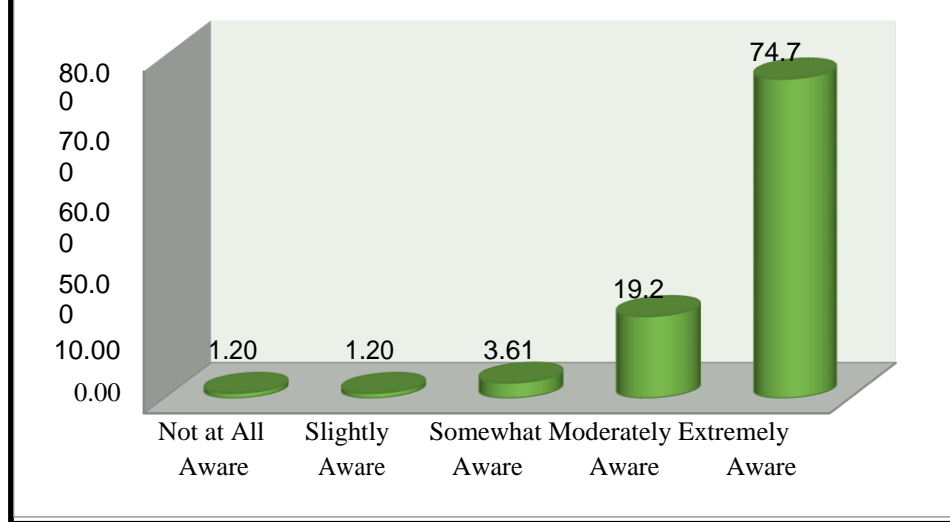
From Figure 1 it is clear that among the hoteliers many are aware of the solar heating system almost 4.67 were aware of it. Which can be practiced in heritage hotels. Next one of the easy practices such as the solar lighting system in the garden (4.52%), LED light can be used for saving applications (4.51%). They are aware about energy-efficient lights was found to be (4.1%). The eco button (economical button) in the vehicles Once the driver presses that Eco Mode button (4.1%), the function will alter specific features of the car, while the driver is maneuvering the vehicle.

#### 4.2.2 Hoteliers' overall Awareness about Energy Efficient Practices

Table 2 is presenting the overall awareness of respondents about energy-efficient practices. It can be observed that 74.70% of respondents (N=62) are extremely aware of energy-efficient practices whereas 19.28% of respondents (N=16) have indicated moderate awareness of energy-efficient practices. Very few respondents (N=3, Percentage=3.61) were somewhat aware of energy-efficient practices. As per the mean score (35.25), it can be concluded that hoteliers are extremely aware of energy-efficient practices.

Table 2: Hoteliers' overall Awareness about Energy Efficient Practices

Overall Awareness	N	Percentage
Not at All Aware	1	1.20
Slightly Aware	1	1.20
Somewhat Aware	3	3.61
Moderately Aware	16	19.28
Extremely Aware	62	74.70
<b>Total</b>	<b>83</b>	<b>100</b>
<b>Mean Score</b>	35.25	
<b>Level</b>	<b>Extremely Aware</b>	



**Figure.2 : Hoteliers' overall Awareness about Energy Efficient Practices**

Figure 2 states that the hotelier are highly aware of energy saving practices in heritage hotels of Karnataka. It can be observed that 74.70% are extremely aware about energy efficient practices whereas 19.28% respondents have indicated moderate awareness of energy efficient practices. Very few respondents were somewhat aware of energy efficient practices. As per the mean score it can be concluded that hoteliers are extremely aware about energy efficient practices.

#### 4.3 Hotel Operational Development from an Environmental Perspective

At the Casa Cottage hotel, adopting a sustainable policy was an important aspect of direct energy and environmental management. Procurement, purchasing of products from vendors, and selection of operating products are all done in an eco-friendly manner. Quality, adapting to advantages or uses, energy consumption, reusable materials, "ecolabel" certification, and avoiding waste products are all examples of green purchasing criteria. Some of the demands of chosen providers are those that comply with the rules of eco-friendly architecture when it comes to the appointment and selection of product providers. The hotel presently utilizes paper bags instead of plastic bags and plans to utilize cassava versions in the future. Cassava bags are no longer constructed of plastic, but cassava, which is easily dissolving in hot water and composed of organic ingredients. Furthermore, according to an interview with the administration, the labeling of paper bag hotels will be developed in the future to combine boxes and paper bags into one to limit the usage of paper.



**Fig. 3. Paper Bag**

#### 4.4. Management of Food Safety

Food hygiene and safety refers to the steps taken to guarantee that food is safe for human usage and does not constitute a health risk to the environment. The Casa Cottage Hotel's administration has used sanitary concepts and a HACCP methodology to manage food till now. The food manufacturing component of The Casa Cottage Hotel's kitchen was built utilizing durable construction materials depending on findings in the field. The procedure of disinfection may be carried out in the producing area. Non-toxic components and soundproofing are used on floors and partitions, wall heights are appropriate for food preparation activities, and a sewage system is included in the floor removal process. In terms of staff hygiene amenities, administration ensures that a high level of worker hygiene is sustained so that food poisoning is avoided. One of them is to provide a hand washing station complete with soap and sanitary tissue.



**Fig. 4. Area for Hand washing**

**4.5. Per-guest-room Energy Intensity**

The authors are attempting to calculate the quantity of electrical energy used per guest room in kWh per m<sup>2</sup> so that the quantity may be compared to the aim of the renewable energy program that has been executed. The no. of motel rooms per kWh m<sup>2</sup> in 2018 and the no. of rooms booked are necessary for this computation.

**Tab. 3.Per-guest-room Energy Intensity**

Month	Total Kwh	Room Sold	Energy Intensity per guest Room
January	220.343	1098	189
February	250.872	1500	150
March	209.234	1300	132
April	290.983	1600	198
May	299.098	1900	180
June	210.875	1100	198
July	289.012	1654	109
August	209.111	1234	112
September	209.765	1987	165
October	206.147	1456	167
November	210.124	2000	109
December	199.987	1999	130
Total	2309.987	19902	130

The Casa Cottage Hotel's Standards for Energy Efficiency Execution classify it as "effective" depending on the mean Power intensity per guest room worth for guest rooms in 2018 of 145 kWh/m<sup>2</sup>. The Casa Cottage Hotel's administration has effectively handled the energy usage sensibly and increased its energy efficiency performance without impacting the quantity and quality of service to visitors in this scenario.

**5. Discussion**

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## 5.1 Making decisions in the hotel industry about green technology programs

The hotel sector's decision-making on renewable energy efforts is based on proposed mitigation measures. Logical energy outcome advocates the idea of maximizing resources to perform more efficiently and, ultimately, minimize carbon emissions by switching to green technology. Rather than highlighting any one strategy, a hotel company must identify the success of the strategy i.e., eliminate, decrease, replace, and balance energy control in terms of sustainability. Additional practical considerations for the deployment of sustainable energy sources include growing energy costs and securing dependable sources of energy. [21], on the other hand, advocated such regulations in the Caribbean hotel business, citing certain severe challenges with renewable energy technology diffusion. The need for capital and the disruption of guests' comfort were cited as major obstacles. At present, an absence of environmental management, awareness about climate and energy challenges, and market and organizational pressure all contributed to a reluctance to adopt. Better exposure to worldwide best practices and more study in other locations would increase knowledge and information while also allowing operators who take voluntary initiatives to share lessons learned. Studies have also been conducted to determine the viability of green technologies in the hotel business to fulfill increased energy demand. This is an approach pursued by hotels trying to achieve CO neutral or "best scorers" in energy conservation.

## 5.2 Energy demand reduction vs. fossil fuel reliance

According to the findings of a study performed by [21] in Hawaii, energy efficiency or conservation measures like substituting cooling towers, installing renewable energy systems with VFD, and switching to electricity lighting saved between 10 and 25 percent of energy, based on the renovation project. When contrasted to upgrading with green technology, these solutions were deemed to be viable options in terms of energy and cost savings. From a business standpoint, the 2 types of technology substitutions described below analyze decision-making. In Case 1, air conditioning was provided by 1350-ton capacity coolers in a full-service 1900-room hotel. As part of determining the value argument for upgrading air processing units with energy-efficient technology such as an EMS and VFD, or upgrading the entire system with solar PV. The hotel might save 149 KW (30%) with the first choice, which would cost \$1,653,000 and have a payback term of 5 years. Without state and federal subsidies, the sustainable energy project (699 KW potential) might cost \$6,879,000 (\$15 per KW for implementation), with a cash flow of 18 years after benefits.

## 6. Conclusion

This paper concluded that improved sustainability practices included not only using but also protecting cultural and natural heritage, as well as trying to serve a wider range of communities and stakeholders. In general, if the hotel industry is handled sustainably, it will aid in the conservation of natural resources and traditional culture, and also support the construction of ecologically friendly architecture. To mitigate the effect of environmental harm caused by present natural situations, hotel organizations should concentrate on the construction and administration of environmentally sustainable sound motels as a tourism commodity in terms of operational and building activities. The sustainable hotel administration has been implemented so far by management, which emphasizes environmental concepts in addition to profitability, highly-priced value, and well-informed guests. Green hotels are becoming increasingly popular as customers become more conscious of energy and environmental conservation. In comparison to other hotels in Karnataka, the Casa Cottage Hotel is a luxury hotel with huge rooms, amenities, and a structure. Naturally, the area consumes more energy, water, rubbish, waste, and construction materials. The Casa Cottage Hotel of Karnataka has been effective in executing environmental protection activities focused on developing viable tourism activities and gaining marketable benefits as a result of implementing green hotel administration, which incorporates ecologically hotel organizational, pollution levels, land use, energy conservation, and wastewater treatment.

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