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EXAMINING ENERGY USAGE PATTERNS AND SOURCES IN HOSPITALITY INDUSTRY: A COMPREHENSIVE ANALYSIS OF OVER FIFTEEN HOTELS WORLDWIDE

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Abstract

The hospitality sector, particularly hotels, is a significant contributor to energy consumption within the broader tourism industry due to the energy demands of maintaining guest comfort and operational efficiency. This study provides an in-depth analysis and literature review to assess current energy management approaches, energy consumption trends, and sources across hotels globally, with a focus on incorporating renewable energy and enhancing energy efficiency practices. Using case study data from over fifteen hotels across the USA, Europe, and Asia, we identify key determinants of energy usage and propose optimization strategies that emphasize sustainable design, resource-efficient site selection, and operational improvements. The findings provide actionable insights for improving operational efficiency, minimizing environmental impacts, and achieving sustainability goals in the hotels offering valuable guidance for industry stakeholders, policymakers, and hotel operators.

Keywords: Energy Consumption, Hospitality industry, Hotels, Energy efficiency, Sustainability.

Introduction

In contemporary society, reducing energy consumption is a key challenge for civilization, driven by economic imperatives and environmental concerns alike. The reduction of energy demand not only facilitates decreased operational expenditures for buildings and installations but also mitigates the adverse repercussions of human activities on the environment. Notably, the building and construction domain collectively represents a substantial portion, exceeding one-third, of global final energy utilization. Within this sector, hospitality establishments, particularly hotels, assume a prominent role in energy

consumption due to their continuous operation and diverse energy requisites. Efficient energy use in the hospitality sector has become essential due to growing environmental and economic pressures. While the hotel industry supports local and national economies, it also significantly impacts the environment and resources. Short-term profit motives have historically driven the over-exploitation of natural and cultural resources, risking the long-term sustainability of tourism destinations. A balanced approach that prioritizes energy efficiency and sustainable resource use is vital to preserve these assets for future generations while ensuring economic resilience in the sector. This happens because the industry relies heavily on these resources. To protect the beauty and value of tourist destinations for future generations and keep them profitable, it's crucial to adopt a more balanced and sustainable approach, especially regarding energy consumption.

This article is structured into seven sections, starting with a literature review on energy consumption statistics and key factors. It then outlines a methodology for analyzing data from over fifteen global hotels, examining energy and electricity usage, and identifying influential factors. Key findings follow, along with a detailed energy consumption pattern analysis across different hotel areas, supplemented with illustrations. The article discusses factors impacting energy use and strategies for sustainable energy management, offering recommendations for operators, policymakers, and investors. The conclusion summarizes insights and guides integrating renewable energy and sustainable practices in hotels.

1. Literature Review of Energy Consumption in Hotels

The tourism sector has expanded rapidly, emerging as one of the largest industries globally, employing over 200 million people worldwide by 2002. However, this swift growth has placed significant strain on local economies, cultures, and ecosystems. Current energy sources contribute to high levels of carbon emissions within the industry. According to the European Environmental Agency (EEA), tourism accounts for 5-7% of total emissions in Europe. It's estimated that transportation alone comprises 90% of energy consumption within the tourism sector today [1].

One of the tourist industry's sectors that uses the greatest energy and resources is the hotel sector. Hotels consume large amounts of energy to offer comfort and amenities to guests who often seek and are willing to pay for luxury experiences. With diverse end users and typically low energy efficiency, hotels have a greater environmental impact compared to other similarly sized buildings.

In the industry service, hotel facilities are ranked among the top five energy consumers [2]. The majority of the energy utilized in hotels is used to produce a comfortable indoor atmosphere for guests. The primary energy-consuming activities in hotel buildings include space heating, cooling, lighting, providing hot water, cooking meals, and swimming pool systems [2].

1.1. Main Factors Affecting the Use of Energy in Hotels

A hotel's energy consumption is impacted by both physical factors and building operating circumstances. Physical criteria include but are not limited to, the facility's size, structure, geographic and climatic location, age, and type of energy and water systems installed. The running schedules of functional sections, services provided, fluctuations in occupancy levels, and differences in customer preferences for indoor comfort are examples of operational parameters that influence energy consumption in hotels. Local energy-saving methods, the culture, and consumers' awareness of resource consumption are also important considerations [3].

Better Buildings Hospitality, a program supported by the Department of Energy, brings together groups to share insights on energy conservation. According to the program, hotels consume the highest levels of energy and water per square foot among buildings due to their continuous, year-round operation. Partners of Better Buildings Hospitality represent one billion square feet of the six billion square feet of floor space within the national hospitality industry [4]. For comparison, in 2019, the average monthly energy bill for U.S. residential consumers was $115, totaling $1,380 annually. This means that the energy cost for a single hotel room is more than double that of a typical household [5].

The quantity of energy used in hotels varies greatly depending on several factors, including the hotel's size, class or category, number of rooms, customer profile (business or vacation), location (rural, remote, or urban), climate zone, and the amenities and services offered to visitors [6].

A hotel can be conceptualized as the architectural fusion of three distinct zones, each serving a specific purpose. The guest area comprises individual rooms, such as bedrooms, bathrooms, and toilets, often designed with ample glass and characterized by asynchronous usage and variable energy demands. The public spaces include the lobby, restaurants, bars, conference rooms, saunas, and swimming pools; these areas have high internal loads due to people, furniture, appliances, and lighting, along with substantial heat exchange with the exterior, resulting in significant thermal losses. Finally, the service area, which contains machine rooms, staff facilities, kitchens, offices, storage, laundry rooms, and other technical zones, typically requires sophisticated air handling systems for ventilation, cooling, and heating [6].

Past studies on the consumption of energy in hotels have demonstrated that the industry's main energy source is electricity, with much lesser amounts coming from gas and oil. Therefore, the quantity of electricity used in hotels serves as a reliable gauge for the total amount of energy used in this industry [6].

Energy expenses in hotels typically represent 3-6% of total operating costs and a smaller portion of total revenue. Due to their seemingly minor impact, these costs are often overlooked. However, energy expenses are significant controllable costs, often second only to labor costs. In some documented cases, energy costs have accounted for about half of the total operational expenses [6].

Energy consumption in the hotel industry is varied and challenging to analyze in detail. While most hotels track total energy use, few monitor specific applications due to cost and complexity. However, studies on energy flows offer useful insights for estimating consumption profiles in similar hotels [6]. Over the previous decade, electricity usage in numerous hotels has risen from 25% to 30%, driven by several factors, including the proliferation of hotel facilities, heightened expectations for accommodation standards (such as the provision of TVs, mini-bars, and air conditioning units in all rooms), and advancements in operational equipment (such as electric heating and cooking appliances, cold storage rooms, elevators, escalators, and various accounting, computing, and control devices). Conversely, there has been a noticeable trend towards adopting more energy-efficient equipment and lighting in many regions worldwide. Nevertheless, despite these efforts, it is projected that energy demand may continue to increase by 10% to 25% in the foreseeable future [7].

2. Methodology:

This study conducts a comprehensive analysis of over fifteen hotels located in the United States, Europe, Asia, and Canada, focusing on their typical annual energy consumption as reported in various studies. A comparative assessment of energy efficiency ratings for different hotel categories is provided, with particular attention given to the distribution of energy use in a three-star hotel situated in Southern Europe. The analysis concludes by discussing additional factors that influence energy consumption within this industry.

According to a 2003 study, hotels in Europe consume approximately 39 TWh annually. It has been reported that hotels may generate up to 160 kilograms of carbon dioxide per square meter annually, translating to 10 tons of CO2 per bedroom, depending on the energy source utilized (hydro, wind, nuclear, oil, or coal-based) [7]. A 1997 study analysis of 49 hotels along the Adriatic coast revealed that gas expenses constituted about 3% of total energy costs, while electricity, heating oil, and water each accounted for approximately 32% of the overall expenses [8]. Further study involving 20 hotels in Rijeka owned by Liburnija Riviera Hotels (LRH) found that energy expenses as a percentage of total costs fluctuated between 2.94% in 1989 and 6.51% in 2001. During this period, energy prices increased steadily, and water costs rose from 0.85% of total costs in 1989 to 2.79%. The energy cost at night ranged from 1.6 to 2.3EUR (12–17 KN) [9].

The construction expenses for one guest room's HVAC and electrical systems fall between 10% and 13% and 11% and 13%, respectively, while the prices for public areas vary between 16% and 18% and 8 and 10% [7].

The energy efficiency rating for various hotel types is presented in Table 1 [10], while Table 2 displays the energy consumption intensity (EUI) of hotel facilities all over the world. EUI, defined as the energy consumption of a site per unit of gross floor area, was investigated to several parameters.

Nevertheless, no significant relationship was seen between the EUI value and the hotel occupancy, total gross floor area, hotel classification, or year of construction. However, EUI was significantly influenced by the average monthly outside air temperature.

Table 1 - Ratings of energy efficiency for various hotel categories [10].

Efficiency rating	Good	Fair	Poor	Very poor
A) Large hotels (< 150 rooms) with air conditioning, laundry and indoor swimming pool				
Electricity (kWh/m2 year)	< 165	165-200	200-250	> 250
Fuel (kWh/m2 year)	< 200	200-240	240-300	> 300
Total (kWh/m2 year)	< 365	365-440	440-550	> 550
Hot water (kWh/m2 year)	< 220	230-280	280-320	> 320
B) Medium-sized hotels (50-150 rooms) without laundry, with heating and air conditioning in some areas				
Electricity (kWh/m2 year)	< 70	70-90	90-120	> 120
Fuel (kWh/m2 year)	< 190	190-230	230-260	> 260
Total (kWh/m2 year)	< 260	260-320	320-380	> 380
Hot water (kWh/m2 year)	< 160	160-185	185-220	> 220
C) Small hotels (4-50 rooms) without laundry, with heating and AC in some areas				
Electricity (kWh/m2 year)	< 60	60-80	80-100	>100
Fuel (kWh/m2 year)	< 180	180-210	210-240	> 240
Total (kWh/m2 year)	< 240	240-290	290-340	> 340
Hot water (kWh/m2/year)	< 120	120-140	140-160	> 160

Energy usage in hotels is influenced by various factors, including size, classification, services offered, occupancy rates, operational schedules, building design, location, climate, building age, energy system efficiency, and energy management practices. These variables complicate the standardization of energy consumption classifications for hotels. Nonetheless, a general model showing the primary areas of energy usage can still be developed, as illustrated in Table 1.

Table 2 - The typical annual energy consumption intensity for hotel construction [11,12,14,15,16,17,18,19,20,21,22,23,24,25].

Country-Area	Annual energy consumption kWh/m^2	Annual energy consumption kWh/p.n.s.	Efficiency rating
Europe	305-330		Fair to Poor
Greece	200-290		Poor (Large); Fair (Small)

Greece		17.59-68.15	
Hong Kong	564		Very Poor (Large)
Singapore	427		Very Poor (Large); Poor (Medium)
Europe	285-364.3	47.8-89.5	Poor to Very Poor
Greece	273		Poor (Large)
New Zealand	144	43	Good (Medium)
Southern Europe	128-171		Good to Fair (Small/Medium)
U.K.		20.9-25.5	
Spain-Balearic Islands		7-77	
Greek Islands		5-25	
London, UK (1988)	715		Very Poor
Ottawa, Canada(1991)	688.7		Very Poor
US (1995)	401		Very Poor (Large)
Sweden (1999)	100–200		Good to Poor (Small/Medium)
Oslo, Norway	282 h/m²		Poor

3. Findings

The analysis of energy consumption patterns reveals several these key insights:

Annual Energy Consumption: The typical annual energy consumption for hotels varies significantly by region, with Europe showing an average of 305-330 kWh/m². In contrast, hotels in Hong Kong exhibit much higher energy usage at 564 kWh/m². This variation indicates regional differences in energy management practices and building designs.

Energy Use Intensity (EUI): EUI, a critical metric for assessing energy efficiency, is influenced by various factors, including hotel classification, size, and climatic conditions. However, our analysis found no significant correlation between EUI values and occupancy rates, total gross floor area, or hotel classification. This suggests that energy efficiency measures might be more effective if tailored to specific operational contexts rather than generalized across categories.

Impact of External Factors: The findings indicate that the average monthly outside air temperature significantly affects EUI values. This relationship underscores the importance of integrating climate considerations into energy management strategies for hotels, particularly in regions with extreme weather variations.

Cost Structure of Energy: Energy expenses constitute a considerable portion of a hotel's operational costs. For instance, a study revealed that energy expenses accounted for up to 6.51% of total costs in some hotels, highlighting the financial implications of energy consumption. Additionally, the rising trend of energy

costs over the years indicates a pressing need for hotels to adopt energy-efficient practices to mitigate financial risks.

Energy Sources and Carbon Emissions: The analysis underscores the environmental impact of hotel operations, with hotels potentially producing up to 160 kilograms of CO2 per square meter annually. This emphasizes the need for hotels to transition to renewable energy sources and implement energy-saving technologies to reduce their carbon footprint.

4. Energy Consumption Patterns in Hotels

Various studies have demonstrated that approximately 50% of energy consumption in hotels stems from maintaining thermal comfort, with heating, air conditioning, ventilation, and cooling systems being the primary contributors. This distribution of energy end-uses is depicted in Figure 1, illustrating their respective shares in total energy consumption. However, it's important to note that these figures can vary depending on factors such as hotel category and seasonal operations, as each of these factors influences HVAC demand. Alongside HVAC systems, other significant energy end-uses include domestic hot water (DHW) production, lighting, and electricity for various amenities like elevators and catering services. Figure 2 provides a further breakdown of energy usage by various end-users within a hotel, based on data from the European Renewable Energy and Sustainable Tourism (REST) initiative. This breakdown illustrates that while HVAC remains the largest contributor to energy use, lighting, and DHW systems are also substantial energy consumers, particularly in hotels with extensive amenities.

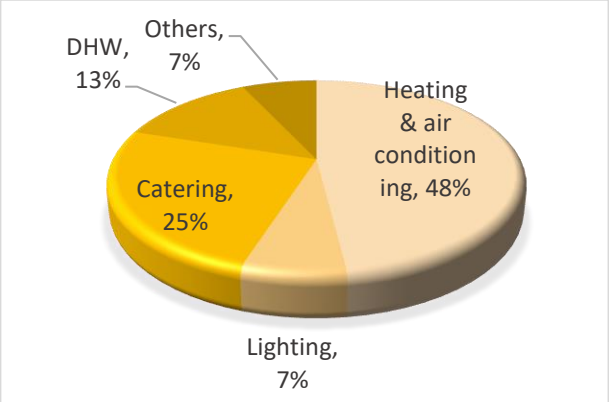

Figure 1-Distribution of energy consumption within a typical hotel [26]

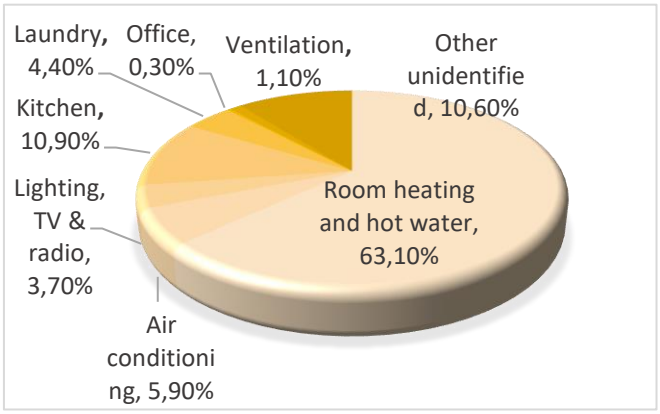

Figure 2 - Energy usage by various end-users within a hotel [27].

The provided data underscores the considerable impact of outdoor climate on overall electricity usage within hotels. Typically, around half of a hotel's electrical energy is dedicated to space conditioning, which fluctuates with external temperatures. Lighting energy consumption, for example, typically ranges from 12% to 20% of a hotel's total energy use, although it can reach as high as 40% in certain hotels with extensive public areas and amenities [10]. Demand for DHW also varies widely across hotel categories and occupancy rates, averaging between 90 and 150 liters per guest per day [10]. DHW production generally accounts for up to 15% of the overall energy demand, translating to an average annual consumption of 1,500 to 2,300 kWh per room in a medium-sized hotel with a 70% occupancy rate. Hotels with high occupancy or extensive amenities typically show a more pronounced DHW demand, highlighting the need for tailored DHW management strategies [10].

Table 3 outlines the distribution of energy usage for different activities and services in a typical three-star hotel located in Southern Europe. This hotel, with 120 rooms, 5,000 square meters of floor space, year-round operations, and an annual guest volume of 50,000 visitors, provides a representative model for analyzing energy usage patterns based on hotel features and services [10].

Table 3 - Energy consumption distribution by service at a typical three-star hotel in Southern Europe [10].

	With AC throughout the building	With AC throughout the building	With AC only in common areas	With AC only in common areas
Concepts	With restaurant, 40000 servings/year	Without restaurant	With restaurant, 40000 servings/year	Without restaurant

Heating	12 %	13 %	13.7 %	16 %
AC	10.6 %	12 %	8.6 %	10 %
Lighting	11.8 %	13.3 %	10.6 %	12.4 %
DHW	34.3 %	38.7%	38.7 %	45 %
Various Equipment	19.5 %	22 %	14 %	16.3 %
Kitchen	12.5 %	-	14.1 %	-
Total	(171 kWh/m2)	(150 kWh/m2)	(150 kWh/m2)	(128 kWh/m2)

The energy consumption distribution of hotels along the Adriatic coast, taking into account factors such as hotel category and seasonal versus year-round operations, as depicted in Table 3, highlights that energy consumption levels are significantly influenced by the hotel's service configurations, such as the presence of a restaurant and the extent of air conditioning. Hotels that provide both AC throughout the building and full restaurant services show an increased energy demand for lighting, HVAC, and kitchen operations. This demonstrates the importance of customizing energy management strategies to fit the specific service offerings and layout.

The findings in Table 3 and Figures 1 and 2 emphasize the role of tailored energy management strategies in achieving sustainability goals. For instance, the large share of energy devoted to HVAC and DHW suggests that adopting more energy-efficient technologies in these areas—such as high-efficiency HVAC units, smart thermostats, and solar thermal systems for DHW—could yield significant reductions in overall energy usage and carbon emissions. Moreover, replacing conventional lighting with LED systems in public spaces and guest rooms could lower lighting energy consumption by up to 75%, aligning with the sector's sustainability objectives.

Variations in energy consumption between areas (e.g., common areas vs. guest rooms) and configurations (e.g., presence of restaurants) highlight the potential for customized energy management approaches. Hotels can leverage these insights to implement precise energy-saving solutions, such as motion-activated lighting in hallways and smart zoning for HVAC, to reduce unnecessary energy use in low-traffic areas without compromising guest comfort.

5. Factors Influencing Energy Consumption in Hotels

Energy usage in the hospitality industry is impacted by a range of technical, architectural, geographical, and managerial elements. These diverse factors contribute to notable variations in energy consumption, complicating the establishment and prediction of energy benchmarks for hotels, given their unique characteristics. The factors influencing energy consumption are summarized in Table 4, along with their level of influence and impact on overall energy usage.

Table 4 - Factors that affect energy consumption in the hotel.

Factors Affecting Energy Consumption	Influence	Impact
Building Characteristics		
Size	Larger buildings require more energy.	Medium
Shape	A hotel with a compact, consolidated structure is generally more energy efficient due to increased structural compactness.	Medium
Age	Newer buildings are typically better insulated.	Medium
Materials	The choice of materials affects insulation and lighting.	High
Technical appliances	Energy-efficient appliances contribute to lower consumption.	High
Hotel amenities		
Category	Higher-category hotels generally require more energy. Economy (17.30kwh per available room) to luxury (89.35kwh PAR) categories exhibit varying energy needs.	High
Facilities / Services	Hotels with more services/facilities consume more energy in comparison to hotels with fewer facilities.	High
Location Factors		
Climate	Climate influences HVAC usage; local policies affect energy sources and prices. Hot/cold climates impact heating and cooling requirements.	High
Domestic policies	Local energy regulations affect costs and GHG emissions because they dictate which energy sources—gas, electricity, nuclear, wind—are employed.	High
Operational Factors		
Energy management	Effective energy management that sets clear goals, establishes best practices and involves staff, investors, and guests can greatly reduce costs.	High
Occupancy	Energy consumption increases with occupancy levels, as more occupants require more energy. However, certain areas still require energy usage regardless of occupancy.	Medium
Operational hours	Operational hours may affect energy costs and a hotel commonly runs 24h/7.	Low

The diversity of these factors illustrates the complexity involved in achieving energy efficiency in hotels. Not only do architectural design, building size, and materials influence energy consumption, but so do external factors such as climate and local energy policies. Hotels in warmer climates, for example, face higher HVAC demands, while those in colder areas may need enhanced insulation and heating.

6. Sustainable Energy Management Strategies

6.1. Building Management System (BMS)

Building Management Systems are essential for modern energy management in hotels, enabling centralized control over key energy-consuming systems like HVAC, lighting, and water heating. BMS can optimize energy usage in real time by adjusting settings based on occupancy and demand. Research indicates that implementing BMS can reduce energy costs by up to 20%, ensuring a comfortable experience for guests while significantly lowering emissions. Larger hotels or those with complex layouts particularly benefit from BMS, as they provide precise control over extensive areas, preventing energy waste in unoccupied rooms. Furthermore, dynamically adjusting energy use according to occupancy helps achieve efficiency without compromising comfort.

6.2. Energy-Efficient HVAC and Lighting

Since HVAC systems represent a significant portion of energy expenses in hotels, upgrading to energy-efficient units can greatly reduce overall energy consumption. High-efficiency HVAC systems, combined with smart thermostats and zoning capabilities, enable precise temperature control for different areas and times of day. Additionally, transitioning to LED lighting and maximizing natural daylight can lower lighting energy usage by 50-75%. In areas with extreme temperatures, energy-efficient HVAC systems can help mitigate high heating and cooling costs. Furthermore, using high-insulation materials and energy-efficient windows enhances these systems by minimizing thermal loss, resulting in a more sustainable overall energy strategy.

6.3. Renewable Energy Integration

Hotels can further decrease their dependence on traditional energy sources by incorporating renewable energy systems like solar panels, wind turbines, and geothermal heating. For example, solar panels can provide electricity for lighting and heating water, especially in areas with high solar irradiance. Research shows that renewable energy integration can meet up to 30% of a hotel's energy needs, significantly reducing carbon emissions and long-term energy costs. This approach is particularly effective in regions with favorable conditions for solar or wind energy. Additionally, hotels in areas with supportive local policies and

incentives for renewable energy can achieve even greater energy savings while aligning with sustainability regulations.

6.4. Water Conservation and Heating Systems

Hot water production is a major energy consumer in hotels. Installing solar thermal systems to preheat water or utilizing heat recovery systems can reduce the energy required for DHW significantly. Additionally, low-flow fixtures and recycling systems for greywater reduce water and energy costs by minimizing the demand for heating water. Hotels with high occupancy or extensive amenities, such as spas or restaurants, face increased DHW demands. Using water conservation systems in high-usage areas helps manage the load more sustainably and can contribute to lower operational costs without compromising service quality.

6.5. Sustainable Design and Materials

Bioclimatic building design and sustainable materials play a crucial role in achieving long-term energy efficiency in hotels. By utilizing passive solar design, natural ventilation, and green roofs, hotels can enhance energy conservation. High-insulation materials and energy-efficient windows minimize heating and cooling needs, creating comfortable, eco-friendly environments year-round. Compact building shapes and quality insulation further reduce energy consumption, particularly in energy-efficient hotels. Additionally, sustainable designs that include smart appliances and efficient materials lower operational costs while appealing to eco-conscious guests.

Addressing the environmental and economic issues related to high energy consumption in hotels necessitates the adoption of sustainable energy management strategies. These practices help reduce operating costs and enhance sustainability credentials, attracting eco-conscious guests and supporting global carbon reduction efforts. Successful implementation requires collaboration among hotel management, operations, and design, with tailored approaches that consider each hotel's unique characteristics. Ultimately, comprehensive energy management strategies enable hotels to lower their environmental impact while improving their reputation and long-term financial stability.

7. Conclusion

In the hotel industry, there is a growing demand for more efficient utilization of energy and other resources, reflecting the increasing popularity of reducing energy consumption nowadays. Effective energy management strategies are imperative for mitigating the environmental impact and operational costs associated with the hotels, given the substantial energy demand inherent in their operations. As highlighted by research findings, the hotel industry's highest energy-consuming operations encompass air conditioning, lighting, DHW, heating swimming pools, kitchens, and recreational activities, underscoring the need for targeted energy conservation measures.

The deployment of specialized energy management solutions is paramount due to the intricate nature of hotel designs and the diverse array of amenities they provide. Centralized control systems, exemplified by BMS, serve as pivotal tools in orchestrating the efficient operation of various installation components, such as HVAC and DHW systems. These systems enable hotels to optimize energy utilization while maintaining optimal guest comfort levels.

Efficient planning for enhanced energy efficiency within hotel establishments demands meticulous attention to a multitude of factors, including site selection, access to local resources, impacts on operational expenses and service offerings, and design considerations. By leveraging bioclimatic design strategies, utilizing eco-friendly materials, and integrating renewable energy technologies like solar, wind, and geothermal, hotels can significantly cut energy use and environmental impact. This shift reduces dependence on non-renewable energy, lowers carbon emissions, and boosts sustainability, aligning with global climate initiatives and promoting environmental responsibility in hospitality.

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РЕЗЮМЕ

ИЗУЧЕНИЕ МОДЕЛЕЙ И ИСТОЧНИКОВ ЭНЕРГОПОТРЕБЛЕНИЯ В ГОСТИНИЧНОМ БИЗНЕСЕ: ВСЕСТОРОННИЙ АНАЛИЗ ОТЕЛЕЙ В МИРЕ

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Гостиничный сектор в целом и, в частности, отели, вносит значительный вклад в потребление энергии в рамках более широкой индустрии туризма из-за потребности в энергии для поддержания комфорта гостей и операционной эффективности. Это исследование содержит углубленный анализ и обзор литературы для оценки современных подходов к управлению энергопотреблением, тенденций в области энергопотребления и источников энергии в отелях по всему миру с акцентом на использование возобновляемых источников энергии и повышение энергоэффективности. Используя тематические исследования более чем пятнадцати отелей в США, Европе и Азии, мы выявляем ключевые факторы, определяющие энергопотребление, и предлагаем стратегии оптимизации, в которых особое внимание уделяется экологичному дизайну, выбору ресурсосберегающего места для размещения и улучшению операционной деятельности. Полученные результаты дают практическую информацию для повышения операционной эффективности, минимизации воздействия на окружающую среду и достижения целей устойчивого развития в отелях, предлагая ценные рекомендации заинтересованным сторонам отрасли, политикам и гостиничным операторам.

Ключевые слова: энергопотребление, индустрия гостеприимства, отели, энергоэффективность, устойчивое развитие.

Түйіндеме

ҚОНАҚ ҮЙ БИЗНЕСІНДЕ ҚУАТ ТҰТЫНУ МОДЕЛЬДЕРІ МЕН КӨЗДЕРІН ЗЕРТТЕУ: БҮКІЛ ӘЛЕМ БОЙЫНША ҚОНАҚҮЙЛЕРДІ ЖАН-ЖАҚТЫ ТАЛДАУ

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Қонақжайлылық секторы, әсіресе қонақүйлер, қонақтардың жайлылығы мен пайдалану тиімділігін сақтауға байланысты энергия қажеттіліктеріне байланысты жалпы туристік индустрияда энергияны тұтынуға айтарлықтай үлес қосады. Бұл зерттеу жаңартылатын энергия көздерін пайдалануға және энергия тиімділігін арттыру әдістерін жетілдіруге баса назар аудара отырып, бүкіл әлем бойынша қонақүйлердегі энергияны басқарудың ағымдағы тәсілдерін, энергияны тұтыну тенденцияларын және көздерді бағалау үшін терең талдау мен әдебиеттерге шолу жасайды. АҚШ, Еуропа және Азиядағы он бестен астам қонақүйлердің жағдайлық зерттеулерінің деректерін пайдалана отырып, біз энергияны пайдаланудың негізгі детерминанттарын анықтаймыз және тұрақты дизайнға, ресурстарды үнемдейтін нысандарды таңдауға және операциялық қызметті жақсартуға баса назар аударатын оңтайландыру стратегияларын ұсынамыз. Нәтижелер саланың мүдделі тараптарына, саясаткерлеріне және қонақ үй операторларына құнды ұсыныстар бере отырып, операциялық тиімділікті арттыру, қоршаған ортаға әсерді азайту және қонақүйлердің тұрақты даму мақсаттарына жету үшін тиімді ақпарат береді.

Түйінді сөздер: энергияны тұтыну, конақжайлылық индустриясы, қонақ үйлер, энергия тиімділігі, тұрақты даму.