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Review Article

Towards Sustainable Hospitality: Enhancing Energy Efficiency in Hotels

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Abstract: *This study examines the importance of energy efficiency in hotel operations. By analyzing various factors that affect energy consumption patterns, the study aims to explore innovative strategies for reducing energy use. Hotels are known for their high energy demands due to factors such as building design, occupancy rates, and amenities. Effective management is crucial to reduce environmental impact and operational costs. The study reviews energy-saving techniques like smart HVAC systems, energy management technologies, and the use of renewable energy sources. These strategies promote sustainability and lead to significant financial savings and reduced carbon footprints. The paper aims to provide insights into achieving more efficient and environmentally responsible hotel operations by analyzing current practices and challenges in hotel energy management.*

Keywords: *Energy Efficiency, Green Practices, Hotel Operations, Sustainability.*

I. INTRODUCTION

Environmental changes such as climate change and extreme weather events directly impact the tourism and hospitality sector. With global temperatures already more than 1°C higher than pre-industrial times, the lack of appropriate mitigation strategies could lead to a temperature increase of 3°C or more by the end of the century [1]. Severe weather events and fires caused after that can significantly disrupt tourism and hospitality operations, also posing a potential credit risk for the near future. Furthermore, worries regarding trash production, water scarcity, energy consumption, carbon emissions, and detrimental effects on regional ecosystems have sparked doubts about the industry's sustainability [2]. These issues highlight the need for the tourism and hospitality sector to address environmental challenges and adopt more sustainable practices to ensure long-term viability.

The World Travel and Tourism Council (WTTC) has taken significant steps to promote sustainable development practices [3]. Its guidelines, which focus on disclosing environmental, social, and governance (ESG) information for various stakeholders, including airlines, hotels, cruise lines, tour operators, and distribution networks, are a working framework towards sustainability. Although these guidelines include performance metrics that address environmental issues and personnel management, they do not fully consider the unique characteristics of the tourism industry. Hospitality is under increasing pressure to become more environmentally friendly due to consumer demand, growing environmental legislation, ethics concerns, customer satisfaction, and maintenance issues [4]. Therefore, the industry must take a closer look at enhancing its environmental performance through the planning and implementation of appropriate environmental management systems.

Literature records that for both developed and developing countries, the hospitality industry is increasingly focused on environmental management practices [5]. This includes implementing design, organization, and operational strategies that aim to reduce the environmental impact of hotels. As hotels are one of the most energy intensive facilities [6], energy efficiency has become crucial for the sustainable operation of hotels as energy loss is one of the most alarming issues hotels have to face in protecting the environment [7]. The hospitality industry is a major consumer of energy [8], with 60% of its carbon emissions resulting from energy consumption. Energy use has increased by 25-30% in recent decades, leading to an additional 3-6% operating cost for hotel businesses [9].

As sustainability and eco-friendly practices are highly valued in the contemporary tourism and hospitality industry, there is an increasing consumer demand for eco-friendly products and services [10,11]. Implementing green practices improves the hotel's image [12,13] and ensures its long-term success by minimizing negative environmental impacts [14]. In particular, energy efficiency processes, solid and liquid waste management practices, and water conservation are the key areas where green practices are most prominent in hotels. By prioritizing these areas and implementing sustainable strategies, hoteliers can contribute to a healthier environment while also benefiting from reduced costs and a positive brand image [15]. However, the industry often prioritizes revenue generation over environmental sustainability [16].

Today, a growing number of lodging establishments are using eco-friendly procedures in order to tackle ecological concerns and obtain a competitive edge [17,18]. These practices not only enhance the overall performance of hotel supply chains but also lead to significant resource efficiency and cost savings related to energy and water consumption [19]. Waste reduction through recycling, water conservation, and energy efficiency are crucial sustainable hotel practices [20-22]. Implementing sustainable practices not only improves efficiency but also acts as a marketing tool as there is a growing trend of tourists seeking an environmentally friendly hotel [23-25]. Sustainability initiatives can enhance the reputation and competitiveness of hotels by appealing to eco-conscious guests who prioritize environmental responsibility.

Hotels with advanced sustainable business operations could achieve improved business outcomes, leading to higher satisfaction and loyalty [26] among both tourists and employees as internal stakeholders [27]. The implementation of sustainable practices can assist hoteliers in bolstering their business reputation as responsible corporate citizens, thereby strengthening their position in highly competitive tourism marketplaces [28].

However, the industry is complex and diverse, and assessing the pursuit of sustainability initiatives is not straightforward [29]. In fact, some academics contend that a limited understanding of sustainability is the reason for the discrepancy between ESG metrics and real sustainable practices in the hospitality sector [30]. A complex business model whereby hotels are constructed and owned by different entities from those that manage them characterizes the hotel industry. Moreover, hotels are unique because they are located in different geographical areas, operate under different cultural contexts, and have varying development needs. They manage their own supply chain and serve as suppliers to other industries. The hotel industry typically involves many stakeholders with different levels of interest.

Implementing sustainable hotel practices presents several challenges that must be addressed to ensure successful integration. Previous studies have identified three key factors influencing hoteliers' willingness to adopt sustainable practices: cost, employee, and consumer support [31,32]. Although putting sustainable methods into practice can result in long-term cost savings, hotel managers are often reluctant to prioritize sustainability due to the significant initial investments required for properties to become sustainable [32]. Furthermore, the challenge of accurately measuring the profitability of green initiatives impacts top management's willingness to invest in such endeavours [33]. The active involvement of both employees and customers is essential in determining the willingness of hospitality businesses to engage in sustainable practices [31,32]. However, a significant barrier is guests' and employees' lack of awareness and knowledge about sustainability initiatives, highlighting the need for education and training to bridge this gap [34,35]. Implementing sustainable practices without employee support often increases costs [32]. The lack of knowledge and commitment to sustainability practices among hotel employees indicates the need for further training to ensure the effective development of sustainable practices [36,37].

This review focuses on current energy efficiency practices in hotel operations. It identifies several factors that influence energy consumption patterns in hotels, including building design, occupancy rates, and technological advancements. The paper explores energy-saving techniques and innovations such as smart HVAC systems and energy management technologies, highlighting practical strategies for reducing energy usage and operational costs. It also discusses the environmental and economic benefits of implementing these strategies, emphasizing their role in enhancing sustainability and reducing carbon footprints in the hospitality sector. Overall, the paper presents selected case studies for current practices and challenges in hotel energy management, aiming to guide stakeholders toward more efficient and sustainable operational models.

II. ENERGY EFFICIENCY IN HOTEL OPERATIONS

A) Energy Consumption Patterns in Hotels

Due to their high consumption [38], hotels must effectively manage their energy. Various parameters related to building facilities and operations must be considered to tackle the factors influencing energy usage in hotel buildings.

The 5 main energy-consuming operations in a hotel are:

- HVAC systems

The majority of the energy used is used to keep the inhabited rooms at the ideal temperature. [39]

- lighting
- production of hot water
- kitchens
- swimming pools

The energy consumption in hotel buildings can vary significantly depending on various factors such as location, climate, hotel standard (number of stars), size and age of the facilities, additional services provided (such as swimming pools, restaurants, laundry, etc.) and their operating conditions, occupancy rate, and equipment performance [40,41]. Energy-intensive

technologies are used to provide modern amenities and services, and as a result, many facilities—such as swimming pools, central air conditioning systems, and heating systems—consume a significant amount of energy [42].

Large buildings typically require more energy for heating, cooling, lighting, and other operations. However, the building's shape is also important. A compact design where all facilities are integrated into the same structure tends to be more energy-efficient than a sprawling layout [43]. This is because a concentrated layout minimizes heat loss and reduces the energy required for circulation within the building.

According to a study on energy use by European hotels [44], with air conditioning, ventilation, and heating/cooling combined, space conditioning makes up the majority of hotel energy end-uses, using around half of all energy used. This highlights the significant impact of outdoor weather conditions and room surfaces on hotel energy use. Indoor temperature levels also play a crucial role in determining the energy consumed in a building. Additionally, domestic hot water typically ranks as the second-largest energy user, accounting for up to 15% of total energy demand. The energy consumption for lighting can vary from 12-18% to 40%, depending on the installation category. Furthermore, services such as catering and laundry significantly contribute to energy consumption, particularly due to their comparatively lower energy efficiency. Finally, sports and healthcare facilities are generally substantial consumers of energy.

The number of people in a building directly impacts energy usage, as more occupants typically require more energy. While building occupants may even while they do not often have direct control over services like heating and cooling, they can nonetheless have an impact on indoor conditions and energy use. (e.g., opening windows, blocking air inlets/outlets, etc.) [45]. However, it is important to note that there are areas within buildings where energy consumption is necessary regardless of occupancy levels. Furthermore, a hotel's choice of technical equipment and appliances is crucial for energy efficiency [46]. Opting for energy-efficient HVAC systems, lighting, and other electronic devices can significantly reduce energy consumption. Passive technologies such as natural ventilation, high thermal mass structures, and energy-efficient windows also help reduce energy usage [44].

By implementing energy-efficient practices, hotels can enhance their performance and sustainability [38]. Energy-efficient measures lower harmful emissions and address global climate change, leading to financial savings, reduced maintenance costs, and environmental benefits [47].

B) Energy Saving Techniques in Hotels

As a big consumer of energy, the hospitality sector is bound to benefit from adopting and implementing energy-saving policies and techniques. The industry has seen the emergence of technologies designed to improve hotel energy efficiency as an enabler of such policies. These technologies offer innovative solutions to reduce energy consumption, optimize resource use, and minimize environmental impact.

Energy-efficient lighting and the installation of energy-saving devices are common methods used to achieve energy efficiency in hotels [48]. With the rapid development of new information technologies, the "Smart Hotel" era is emerging. A smart hotel is an intelligent information system that uses artificial intelligence, network technology, and digital and digital technologies to provide digital hotel information services. This method seeks to satisfy each customer's unique needs while assisting hotels in achieving efficiency and energy savings [49]. This technology can obtain real-time energy usage and management information, such as energy use frequency and voltage values, from remote devices [50]. Using this technology to develop hotel room lighting and temperature control systems can cater to individual customer needs, improve energy efficiency, and contribute to overall energy savings [51,52].

Heating, ventilation, and air conditioning (HVAC) systems are major energy consumers in buildings, accounting for 40% of their energy usage [53]. Smart HVAC energy management systems adjust to occupancy patterns in real time to ensure spaces are not overcooled or overheated when unoccupied while also optimizing HVAC operations to maintain comfortable conditions [54]. By utilizing occupancy information, these systems reduce energy consumption by optimizing HVAC and other building system schedules [55,56]. HVAC control systems in smart buildings can operate more efficiently and use less energy when they have access to precise real-time occupancy data [57]. A method for HVAC systems utilizing actual time occupant monitoring and occupancy estimation with a sensor network of cameras was developed by Erickson and Cerpa (2010) [58], showing potential 20% energy savings.

Just as smart HVAC systems use occupancy sensors to adapt to real-time occupancy patterns, smart lighting enables hotel operators to minimize energy costs by maintaining ideal lighting in individual rooms and shared spaces. It is estimated that the potential energy savings from occupancy-based HVAC and lighting controls range from 20% to 50% [59].

In addition, smart thermostats can pre-set temperature parameters during periods of peak usage and respond to real-time occupancy changes. In the hospitality industry, these devices can be programmed to reduce energy consumption during certain periods in unoccupied common areas or align with high-traffic occupancy patterns to ensure optimal temperature control. Furthermore, using smart thermostats empowers guests to adjust room temperatures remotely via their smartphones, even when not on-site [60].

The application of the Internet of Things (IoT) in the hospitality sector enables interactions with visitors and the gathering of data in real-time. This enables prompt, customized, localized services as well as precise assessment of visitor preferences and habits [61]. By investing in these technologies, hotels can reduce operational costs and demonstrate a commitment to environmental stewardship, enhancing their reputation among environmentally aware travelers.

Managing energy efficiently also involves using energy-efficient products, from large equipment to light bulbs. Improved technology has made these products more affordable, with immediate financial benefits for the hotel businesses.

Proper maintenance is essential for preventing equipment failure and avoiding additional costs from energy loss. Predictive maintenance is a strategic approach used in various industries, including the hospitality sector. It involves analyzing sensor data to forecast potential failures and scheduling maintenance tasks based on historical data to prevent unexpected breakdowns and unnecessary maintenance actions [62]. This method encompasses data acquisition, manipulation, prediction, decision-making, scheduling, and monitoring to ensure efficient operations [63]. Research has shown that predictive maintenance can reduce maintenance costs significantly by up to 20% and enhance the overall operational efficiency of hotels [64].

It is also imperative, when replacing large capital systems, to deliberate on acquiring the most energy-efficient products. Additionally, companies must consider the payback period, tax incentives [65], and potential productivity gains [66,67], encompassing reduced maintenance expenses, augmented production output, and enhanced occupational safety, when assessing energy efficiency measures.

Utilizing renewable energy sources is a proactive recommendation for hotel operations, enabling efficient energy conservation and cost savings. Renewable energy is obtained from natural processes that are constantly replenished, such as solar, wind, and tidal energy. By implementing systems like solar panels, the hotel can produce renewable energy that will eventually recoup the initial investment and ultimately supply free energy for the hotel. Solar power is the most popular form of renewable energy and can lead to carbon-neutral hotel operations in Mediterranean countries, meeting energy needs in an economically and environmentally desirable manner [68]. Designing hotels with solar energy in mind is highly effective, and while the most common approach is to install solar panels on existing buildings, integrating a solar energy infrastructure from the outset is even more beneficial. Adopting energy retrofit technologies in existing hotel buildings has resulted in significant energy savings, underscoring the importance of ongoing energy performance monitoring before and after retrofitting [69].

The primary aim of energy efficiency is to reduce energy consumption, leading to economic savings, lower utility bills, reduced operating and maintenance costs, extended hotel lifespan, and environmental protection by minimizing harmful emissions and mitigating global climate change effects [47]. Embracing these technologies represents a proactive step towards achieving sustainability objectives and reducing the hospitality sector's carbon footprint.

C) Monitoring and Evaluation of Energy Usage

Efficient monitoring and evaluation of energy usage are crucial for sustainable hotel operations. Implementing a comprehensive monitoring system allows hotel managers to track energy consumption patterns, to improve energy usage, pinpoint inefficient areas and make well-informed judgments. One key technology gaining popularity is Energy Management Systems (EMS). These systems enable real-time energy use monitoring, allowing hotels to identify inefficiencies and make timely adjustments to improve overall energy efficiency. Effective EMS follow the four-step framework: Plan, Do, Check, Act (PDCA).

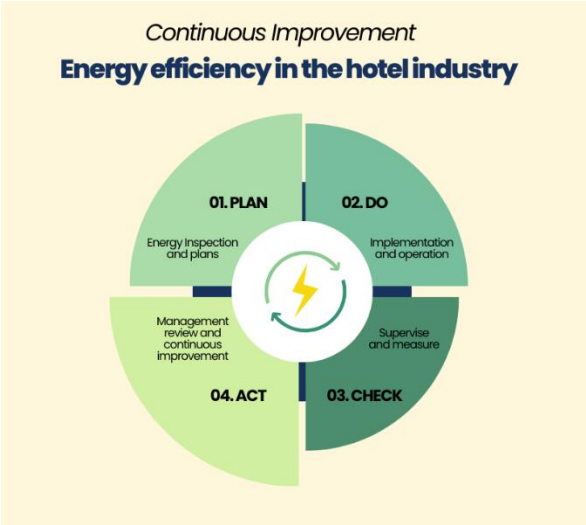

Figure 1: Key Objectives of PDCA for Energy Management System (Source: Driving Energy Management, All TSMC Fabs Have Achieved ISO 50001 Certification) [70]

Since all EMS are optional, organizations are not obliged to adopt them. However, the favorable correlation between this system and environmental practices becomes stronger the more an organization participates in EMS activities [71].

Despite that, surveys show that the adoption rate of integrated energy management systems in hotels remains relatively low, and only a small percentage of hotels are taking measures to address the resulting carbon emissions [72]. Hotels operate various facilities 24 hours/day, 365 days/year, to provide a wide range of services to their guests and augment user experience. These specific requirements challenge the implementation of energy management systems [73]. Hotels' energy management is made more complex by additional elements, including occupation levels, non-guest services (restaurants, conference rooms, etc.), and erratic hotel facility scheduling [42].

Energy audit programs [74] can monitor energy consumption in hotel buildings. These cost-effective programs have high adoption rates for improving energy efficiency [75]. Efforts to improve environmental performance in hotels through eco-efficiency and energy audits are essential for sustainable practices [76]. Monitoring energy consumption aids in evaluating whether expected energy savings can be achieved [77] and helps identify the most energy-intensive processes.

Research emphasizes the importance of government and industry interventions to monitor and regulate energy usage in the hotel sector [28]. To improve energy planning and implementation in hotels, using indicators that link energy consumption to the hotel's built area can enhance comparative energy efficiency studies [78].

Implementing energy and environmental efficiency evaluation systems with continuous monitoring [48] allows hotels to review their energy usage regularly and make necessary optimizations. Real-time data collection and analysis enable hotels to identify areas where energy is wasted and implement targeted strategies for improvement. Regular evaluations also facilitate assessing the effectiveness of energy-saving measures and adjusting as needed to meet sustainability goals.

Understanding the energy usage patterns in hotel buildings is essential to implement effective energy-saving strategies [76]. An active strategy is needed to achieve energy efficiency, including load control, system automation, and energy usage monitoring. Developing a better energy-saving scheme ultimately results in improved energy efficiency performance. This continuous feedback loop of monitoring and evaluation is crucial for ensuring that energy efficiency initiatives are implemented and maintained over time. By investing in robust monitoring and evaluation systems, hotels can enhance their operational efficiency, reduce environmental impact, and achieve long-term cost savings [29].

D) Employee and Guest Engagement

The effectiveness of sustainable practices is closely linked to employees' active involvement and commitment [79]. It is imperative that the entire organization maintains a high level of awareness and provides comprehensive training and education to its staff regarding the hotel's sustainability objectives and priorities [80]. Furthermore, coaching focused on sustainability should lead to increased productivity and the attainment of objectives [80].

Environmental awareness and training are critical in shaping employees' environmental behavior in alignment with the hotel's green policy [81]. This ensures that all staff members are equally prepared to contribute to implementing the energy policy and attaining energy performance goals during their regular operation duties. Training programs focused on fostering environmental values and behaviors among employees can be instrumental in implementing sustainable strategies [82]. In the hospitality industry, it is crucial to not only acquire operational skills but also to develop critical thinking, particularly concerning sustainability practices [83].

It is important to provide comprehensive information and training that covers a range of areas such as [84] understanding the environmental impact of business activities, implementing energy-saving measures and improving energy efficiency in daily operations, monitoring progress, effectively communicating the company's energy efficiency efforts to guests, and encouraging guests to support sustainability. Providing sustainability training for employees benefits the individuals receiving the training and contributes to the organization's overall success [29].

Despite extensive research on the reasons behind tourists' non-routine behaviors in hotels, there is still a lack of comprehensive understanding of the circumstances under which tourists will adopt or maintain sustainable behaviors, as well as when they might exhibit unsustainable behaviors [85]. It has been observed that consumers' positive attitudes towards green practices do not always result in actual behavior in hospitality contexts [86]. This misalignment is often attributed to consumers perceiving green practices as inconvenient, as they believe these practices detract from their comfort and luxury, ultimately reducing their satisfaction [87,88]. However, more recent studies [89-91] show that the behavioral outcomes of hotel visitors, such as satisfaction, word-of-mouth recommendations, loyalty intention, and revisit intention, are positively correlated with green hotel practices. Furthermore, guests with a heightened awareness of hotel sustainable practices tend to demonstrate higher satisfaction levels [92].

The impact of sustainable practices on consumer behavior intentions, coupled with the ongoing evolution of guest experiences, has emerged as a central focus for hotel chains worldwide [93].

Guests have an important role to play in reducing energy consumption. Simple, sustainable actions such as adjusting heating/cooling, opening windows, turning off lights, and being mindful of electricity usage can greatly contribute to a hotel's energy efficiency [84]. It is crucial to communicate to guests that the hotel business they choose is committed to sustainability and energy efficiency and to explain how they can easily contribute to a more sustainable hospitality experience. Various communication methods can be used, such as leaflets in the room and stickers on appliances or switches, as long as the information is not overly technical [84]. When these practices contribute to a relaxing and peaceful environment for guests, sustainable practices will have a positive impact on guest satisfaction [94].

III. CASE STUDY 1- NEARLY ZERO ENERGY HOTELS (NEZEH) IN EUROPE

The Nearly Zero Energy Hotels (neZEH) [95] Consortium was formed to help European hotels become nearly Zero Energy Hotels. neZEH has reached out to more than 56,000 hotels across Europe, involving them in the EU's nearly zero energy building (nZEB) strategy. The consortium provides technical advice for nZEB renovations, showcases the sustainability of such projects, and promotes industry leaders. This initiative aligns with the European Union's energy efficiency and climate change goals for 2020 and 2050, specifically focusing on transforming Europe's building stock into Nearly Zero Energy Buildings (nZEB).

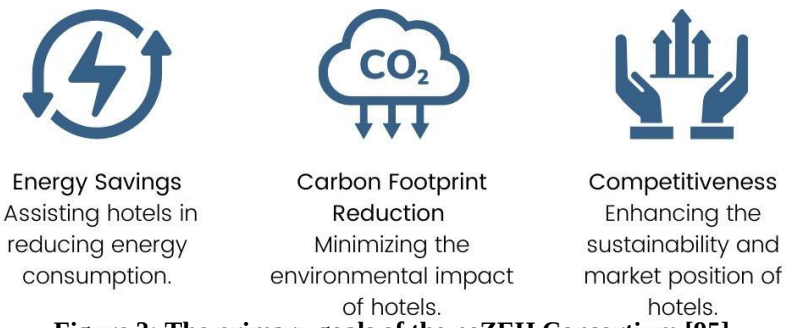

Figure 2: The primary goals of the neZEH Consortium [95]

Between 2013 and 2016, neZEH supported renovation projects in seven EU member states—Croatia, Greece, France, Italy, Romania, Spain, and Sweden. Sixteen hotels benefited from this initiative, achieving up to a 70% reduction in primary energy consumption. These hotels utilized a combination of energy efficiency measures, renewable energy sources, and behavioral changes among staff and guests.

Table 1: Support provided to neZEH Hotels [95]

Capacity Building	Training and informational materials for hotel staff and managers to enhance energy management skills.
Technical Expertise	Professional advice and energy audits suggesting technical solutions.
Feasibility Studies	Financial analyses to support renovation decisions.
Funding Guidance	Information on national financing alternatives.
EU neZEH Network	Facilitating exchanges between building professionals and hotel owners.
E-tool Development	Assisting hotels in assessing and improving energy efficiency.
Marketing Support	Guidelines and tools for promoting environmental performance.
Policy Intervention	Position papers and recommendations to remove barriers and upscale renovations.

The neZEH Consortium has significantly helped hotels across Europe reduce their energy consumption and carbon footprint by providing customized technical advice, sharing best practices, and offering extensive support; neZEH has influenced the hotel industry and contributed to the EU's efforts to reduce CO2 emissions.

IV. CASE STUDY 2- THE WORLD'S FIRST CITY HOTEL TO ACHIEVE A TRUE ZERO-ENERGY BALANCE

Boutique Hotel Stadthalle [96,97], located in Vienna, Austria, is renowned as the world's first city hotel to achieve a true zero-energy balance. This pioneering establishment moved into a restored, turn-of-the-century house in 2009, marking a significant milestone in sustainable hospitality. By generating as much energy as it consumes through innovative technologies, it sets a benchmark for eco-friendly hotel operations.

The concept of zero-energy balance at Boutique Hotel Stadthalle means that the hotel produces as much energy annually as it consumes. This has been achieved through:

- Groundwater Heat Pump: It uses the constant temperature of groundwater to provide heating and cooling, reducing energy consumption.
- Photovoltaic Technology and Solar Panels: A 130 m² solar energy plant and over 80 m² of photovoltaic panels generate electricity to power the hotel and heat water.
- Wind Wheels: Contribute to the hotel's energy production, ensuring an energy surplus that highlights the hotel's efficiency.

The hotel is dedicated to minimizing resource consumption and promoting sustainable practices through various innovative approaches in addition to energy generation. The Green Bonus initiative encourages guests to travel via reduced-CO2 transportation methods, thus reducing carbon footprints and rewarding eco-conscious travelers. The hotel utilizes energy-efficient amenities such as LED lighting and eco-shower heads to conserve water and forgo energy-intensive minibars. Additionally, a robust recycling program ensures that 100% of waste is sorted and recycled, supporting a circular economy. The hotel also promotes sustainability through its culinary offerings, serving organic breakfasts in the garden during summer and emphasizing local and sustainable food sources. Guest transportation is made eco-friendly by exclusively using hybrid taxis. Ongoing staff training ensures that all employees are well aware of the hotel's green initiatives and actively participate in them.

The hotel's design and infrastructure enhance its sustainability efforts. For example, a rainwater collection system in the garden supplies water for flushing toilets and watering plants, reducing dependence on municipal water supplies. In the summer, natural cooling is achieved by pumping cold groundwater through the building's concrete ceiling, eliminating the need for conventional air-conditioning systems. The lavender roof garden also acts as an insulator, improving energy efficiency while creating an aesthetically pleasing environment. The lavender harvested from this garden creates aromatic sachets for guests, adding a unique touch to their stay.

Boutique Hotel Stadthalle exemplifies the potential of sustainable practices in the hospitality industry. By integrating renewable energy sources, innovative water management, and upcycled materials, the hotel not only achieves a net zero energy balance but also enhances guest experience and environmental stewardship.

V. CASE STUDY 3- THE WORLD'S FIRST HYDROGEN HOTEL

Kawasaki King Skyfront Tokyu REI Hotel Sfd [98] has created a sustainable model for its operation in collaboration with government agencies in order to achieve a hotel that will operate 100% with renewable energy. It is the first hydrogen hotel in the world to utilize low-carbon hydrogen derived from plastic waste. It is not only using alternative fuels but also has introduced biofood recycling, which converts food waste into renewable energy. In addition to achieving a 100% recycling rate of food waste from the hotel, it implements an initiative to generate electricity by running a gas engine on biogas generated by methane fermentation of waste by microorganisms. The hotel reduces carbon emissions equal to planting 14,300 cedar trees while recycling enough garbage to power 82 four-person households per day.

VI. KEY FINDINGS AND DISCUSSION

Each year, large corporations spend substantial amounts of money directly on energy, as well as indirectly on various costs related to supply chain, outsourcing, and logistics. However, many firms outside of highly energy-intensive industries view energy consumption simply as a cost that needs to be managed. This approach overlooks significant opportunities to mitigate risks, enhance resilience, and generate new value.

Currently, there is a growing emphasis on energy management within corporate strategies due to major environmental, social, and business trends. These trends encompass factors such as climate change and global carbon regulations, increasing pressure on natural resources, higher expectations regarding corporate environmental performance, advancements in energy technologies and business models, as well as declining prices of renewable energy. These overarching trends reshape the business landscape and present companies with new risks and avenues for creating value.

Energy consumption patterns in the hospitality industry are shaped by various factors, ranging from building design, occupancy levels, climate characteristics, and operational schedules to guests' behavior and lifestyle. Implementing integrated energy management strategies is crucial for adequately addressing all these factors and significantly reducing energy usage.

Adopting smart technologies, such as IoT-enabled systems and smart HVAC controls, presents significant opportunities for improving energy efficiency in hotels. These innovations enable real-time monitoring and adjustment of energy consumption patterns, resulting in considerable energy savings. Energy-efficient practices not only reduce operational costs but also help the environment by lowering carbon emissions and resource consumption. This dual benefit enhances a hotel's competitiveness while aligning with global sustainability goals.

Continuous energy usage monitoring and evaluation is essential for identifying inefficiencies and optimizing energy-saving measures. Implementing robust Energy Management Systems (EMS) and conducting regular energy audits are crucial steps toward sustained efficiency improvements.

Engaging both employees and guests in energy-saving initiatives is a decisive factor for the success of every policy, measure, and action to be undertaken. Comprehensive training programs can empower staff to adopt sustainable practices. Awareness raising campaigns can encourage and engage guests in participating in energy conservation efforts during their stay.

Despite technological advancements, challenges such as initial investment costs, technological integration, and varying guest behaviors remain. Overcoming these obstacles requires continuous and binding commitment from hotel management, integrated planning for energy efficiency measures, allocation of adequate resources, periodic review and monitoring and collaboration with industry peers and stakeholders to promote common needs and values for an energy-efficient – sustainable roadmap to the hotel of tomorrow.

VII. REFERENCES

[1] EU Science Hub Climate change: What will happen if we do nothing? Climate change: What will happen if we do nothing? | European Commission (europa.eu)

[2] Bohdanowicz P. Chapter: Theory and Practice of Environmental Management and Monitoring in Hotel Chains. Book: Sustainable Tourism Futures 2008. eBook ISBN9780203884256 Theory and Practice of Environmental Management and Monitoring in Hotels (taylorfrancis.com)

[3] World Travel & Tourism Council. Environmental, Social, & Governance Reporting in Travel & Tourism: 3. Sustainability reporting in travel & tourism.

[4] Foster, S.T.; Sampson, S.E.; Dunn, S.C. The impact of customer contact on environmental initiatives for service firms. International Journal of Operations & Production Management 2000, 20(2): 187-203. https://doi.org/10.1108/01443570010304251

[5] Dief, M. E. & Font, X. Determinants of Environmental Management in the Red Sea Hotels: Personal and Organizational Values and Contextual Variables. Journal of Hospitality & Tourism Research 2012, 36(1), 115-137. https://doi.org/10.1177/1096348010388657

[6] Pang, Z.; Chen, Y.; Zhang, J.; O'Neill, Z.; Cheng, H.; & Dong, B. Quantifying the nationwide HVAC energy savings in large hotels: the role of occupant-centric controls. Journal of Building Performance Simulation, 2021, 14(6), 749–769. https://doi.org/10.1080/19401493.2021.1994650

[7] Mensah, I. Waste management practices of small hotels in Accra: An application of the waste management hierarchy model. Journal of Global Business Insights, 2020, 5(1), 33-46. https://www.doi.org/10.5038/2640-6489.5.1.1081

[8] Jones, P.; Hillier, D.; Comfort, D. Sustainability in the global hotel industry. International Journal of Contemporary Hospitality Management, 2014, 26(1): 5-17. https://doi.org/10.1108/IJCHM-10-2012-0180

[9] Upadhyay, A.; Vadam, C. The role of energy consumption in Hotel Operations. In 22nd International Annual EurOMA Conference 2015. European

Operations Management Conference (EurOMA). https://research.brighton.ac.uk/files/485427/EurOMA-Full%20paper%20.pdf
[10] Hwang, J.; Choi, J.K. An Investigation of Passengers' Psychological Benefits from Green Brands in an Environmentally Friendly Airline Context: The Moderating Role of Gender. Sustainability. 2018; 10(1):80. https://doi.org/10.3390/su10010080
[11] Trang, H.L.T.; Lee, J.S.; Han, H. How do green attributes elicit pro-environmental behaviors in guests? The case of green hotels in Vietnam. Journal of Travel & Tourism Marketing, 2018, 36(1), 14–28. https://doi.org/10.1080/10548408.2018.1486782
[12] Moise, M. S.; Gil-Saura, I.; Ruiz Molina, M. E. The importance of green practices for hotel guests: does gender matter? Economic Research-Ekonomska Istraživanja, 34(1), 2021, 3508–3529. https://doi.org/10.1080/1331677X.2021.1875863
[13] Dwivedi, RK; Pandey, M.; Vashisht, A.; Pandey, D.K.; Kumar, D. Assessing behavioral intention toward green hotels during COVID-19 pandemic: the moderating role of environmental concern, Journal of Tourism Futures, 2022. ahead-of-print. https://doi.org/10.1108/JTF-05-2021-0116
[14] Foris, D.; Crihalmean, N.; Foris T. Exploring the Environmental Practices in Hospitality through Booking Websites and Online Tourist Reviews. Sustainability. 2020; 12(24):10282. https://doi.org/10.3390/su122410282
[15] Fukey, L.N., & Issac, S.S. Connect among green, sustainability and hotel industry: A prospective simulation study. Energy conservation, 2014, 6(8). https://doi.org/10.5281/zenodo.1090835
[16] Okumus, F.; Köseoglu, M.A.; Chan, E.; Hon, A.; Avci, U. How do hotel employees' environmental attitudes and intentions to implement green practices relate to their ecological behavior?, Journal of Hospitality and Tourism Management, 2019, 39, 193-200, https://doi.org/10.1016/j.jhtm.2019.04.008
[17] Balaji, MS; Jiang, Y., Jha, S. Green hotel adoption: a personal choice or social pressure?, International Journal of Contemporary Hospitality Management, 2019, 31(8), 3287-3305. https://doi.org/10.1108/IJCHM-09-2018-0742
[18] Molina-Azorín, J.; Tarí, J.J.; Pereira-Moliner, J.; López-Gamero, M.D.; Pertusa-Ortega, E.M. The effects of quality and environmental management on competitive advantage: A mixed methods study in the hotel industry, Tourism Management, 2015, 50, 41-54. https://doi.org/10.1016/j.tourman.2015.01.008
[19] Kularatne, T.; Wilson, C.; Månsson, J.; Hoang, V.; Lee, B. Do environmentally sustainable practices make hotels more efficient? A study of major hotels in Sri Lanka. Tourism Management, 2019, 71, 213-225. https://doi.org/10.1016/j.tourman.2018.09.009
[20] Han, H.; Hyun, S.S. What influences water conservation and towel reuse practices of hotel guests?, Tourism Management, 2018, 64, 87-97. https://doi.org/10.1016/j.tourman.2017.08.005
[21] Singh, N.; Cranage, D.; Lee, S. Green strategies for hotels: Estimation of recycling benefits, International Journal of Hospitality Management, 2014, 43, 13-22. https://doi.org/10.1016/j.ijhm.2014.07.006
[22] Wyngaard, A.T.; de Lange, R. The effectiveness of implementing eco-initiatives to recycle water and food waste in selected Cape Town hotels, International Journal of Hospitality Management, 2019, 34, 309-316. https://doi.org/10.1016/j.ijhm.2013.04.007
[23] Dalton, G.J.; Lockington, DA; Baldock, T.E. A survey of tourist attitudes to renewable energy supply in Australian hotel accommodation, Renewable Energy, 2008, 33(10):2174-2185. https://doi.org/10.1016/j.renene.2007.12.016
[24] Rodríguez, C.; Jacob, M.; Florido, C. Socioeconomic Profile of Tourists with a Greater Circular Attitude and Behaviour in Hotels of a Sun and Beach Destination. Int. J. Environ. Res. Public Health 2020, 17(24), 9392; https://doi.org/10.3390/ijerph17249392
[25] Lee, K.H.; Lee, M.; Gunarathne, N. Do green awards and certifications matter? Consumers' perceptions, green behavioral intentions, and economic implications for the hotel industry: A Sri Lankan perspective. Tour. Econ. 2019, 25, 593–612. https://doi.org/10.1177/1354816618810563
[26] Almomani, I.; Nasseef, M.A.; Bataine, F.; Ayoub, A. The effect of environmental preservation, advanced technology, hotel image and service quality on guest loyalty. International Journal of Business Administration, 2017, 8(4), 49. https://doi.org/10.5430/ijba.v8n4p49
[27] Chan, E. S., & Wong, S. C. Motivations for ISO 14001 in the hotel industry. Tourism management, 2006, 27(3), 481-492. https://doi.org/10.1016/j.tourman.2004.10.007
[28] Salehi, M.; Filimonau, V.; Asadzadeh, M.; Ghaderi, E. Strategies to improve energy and carbon efficiency of luxury hotels in Iran. Sustainable production and consumption, 2021, 26, 1-15. https://doi.org/10.1016/j.spc.2020.09.007
[29] Legrand, W.; Chen, J. S., & Laeis, G. C. Sustainability in the hospitality industry: Principles of sustainable operations. Routledge. 2022. ISBN9781003081128.
[30] Raub, S. P., & Martin-Rios, C. Think sustainable, act local–a stakeholder-filter-model for translating SDGs into sustainability initiatives with local impact. International Journal of Contemporary Hospitality Management, 2019. http://dx.doi.org/10.1108/IJCHM-06-2018-0453
[31] Cvelbar, L. K. & Dwyer, L. An importance–performance analysis of sustainability factors for long-term strategy planning in Slovenian hotels. Journal of Sustainable Tourism, 2012, 21(3), 487–504. https://doi.org/10.1080/09669582.2012.713965
[32] Deraman, F.; Ismail, N.; Arifin, A.I.M.; Mostafa, M.I.A. Green practices in hotel industry: Factors influencing the implementation. Journal of Tourism, Hospitality & Culinary Arts, 2017, 9(2), 305-316.
[33] Rosenbaum, M.S. and Wong, I.A. Green marketing programs as strategic initiatives in hospitality, Journal of Services Marketing, 2015, 29(2): 81-92. https://doi.org/10.1108/JSM-07-2013-0167
[34] Al Ghazali, A.; Zaloumis, B.; Khan, F. R. Sustainable Practices in International Chain Hotels in Muscat, Sultanate of Oman. International Journal of Research in Entrepreneurship & Business Studies, 2021, 2(2), 17-28. https://doi.org/10.47259/ijrebs.223
[35] O Idahosa, L. & E Ebhuoma, E. Limitations to sustainable resource management in the Global South: evidence from the accommodation industry. Tourism and hospitality management, 2020, 26(2), 337-358. https://doi.org/10.20867/thm.26.2.
[36] Giardina, G. Expo 2020 and sustainability: luxury hotel properties challenges and future outlook. Worldwide Hospitality and Tourism Themes, 2019, 11(3):314-326. https://doi.org/10.1108/WHATT-01-2019-0005
[37] Mohamed, E. M.; Helmy, N.; Fawi, W. Adoption of Green Human Resources Management Practices by Hotels in Egypt: Drivers, Perceived Benefits and Challenges. International Journal of Tourism and Hospitality Management, 2022, 5(2), 155-186. https://doi.org/10.21608/ijthm.2022.270152
[38] Casteleiro-Roca, J.-L.; Gómez-González, J.F.; Calvo-Rolle, J.L.; Jove, E.; Quintián, H.; Gonzalez Diaz, B.; Mendez Perez, J.A. Short-Term Energy Demand Forecast in Hotels Using Hybrid Intelligent Modeling. Sensors. 2019; 19(11):2485. https://doi.org/10.3390/s19112485
[39] Borowski, M. .; Zwolińska, K. .; Czerwiński, M. Energy consumption patterns in a hotel building: A case study. CLIMA 2022 Conference. https://doi.org/10.34641/clima.2022.187
[40] Bohdanowicz, P., & Martinac, I. Determinants and benchmarking of resource consumption in hotels—Case study of Hilton International and Scandic in Europe. Energy and buildings, 2007, 39(1), 82-95. https://doi.org/10.1016/j.enbuild.2006.05.005
[41] Tang, M.; Fu, X.; Cao, H.; Shen, Y.; Deng, H.; Wu, G. Energy Performance of Hotel Buildings in Lijiang, China. Sustainability. 2016; 8(8):780. https://doi.org/10.3390/su8080780
[42] Deng, S. M., & Burnett, J. A study of energy performance of hotel buildings in Hong Kong. Energy and Buildings, 2000, 31(1), 7-12. https://doi.org/10.1016/S0378-7788(98)00067-X
[43] Kalnæs, S. E., & Jelle, B. P. Phase change materials and products for building applications: A state-of-the-art review and future research opportunities.

Energy and Buildings, 2015, 94, 150-176. https://doi.org/10.1016/j.enbuild.2015.02.023
[44] Hotel Energy Solutions. Analysis on Energy Use by European Hotels: Online Survey and Desk Research, Hotel Energy Solutions project publications, 2011. 9789284414970 (e-unwto.org)
[45] Demanuele, C.; Tweddell, T., & Davies, M. Bridging the gap between predicted and actual energy performance in schools. In World Renewable Energy Congress XI, 2010, UAE Abu Dhabi.
[46] Wang, Y.; Dong, L.; Li, H. Economic Evaluation of Energy-Saving Retrofit of Existing Hotels. Energies. 2022; 15(3):757. https://doi.org/10.3390/en15030757
[47] Su, Y. P.; Hall, C. M.; Ozanne, L. Hospitality Industry Responses to Climate Change: A Benchmark Study of Taiwanese Tourist Hotels. Asia Pacific Journal of Tourism Research, 2012, 18(1–2), 92–107. https://doi.org/10.1080/10941665.2012.688513
[48] Teng, C.-C.; Horng, J.-S.; Hu; M.-L.; Chien, L.-H.; Shen, Y.-C. Developing energy conservation and carbon reduction indicators for the hotel industry in Taiwan, International Journal of Hospitality Management, 2012, 31(1), 199-208. https://doi.org/10.1016/j.ijhm.2011.06.006
[49] Strazdins, G.; Elsts, A.; Nesenbergs, K.; Selavo, L. Wireless Sensor Network Operating System Design Rules Based on Real-World Deployment Survey. Journal of Sensor and Actuator Networks. 2013; 2(3):509-556. https://doi.org/10.3390/jsan2030509
[50] Liu Y. Wireless Sensor Network Applications in Smart Grid: Recent Trends and Challenges. International Journal of Distributed Sensor Networks. 2012;8(9). https://doi.org/10.1155/2012/492819
[51] Feng, J.; Yang, Y.; Shen, H.; Cai, Z. Development of lighting control system for smart hotel rooms. International Journal of Performability Engineering, 2017, 13(6), 913. https://doi.org/10.23940/ijpe.17.06.p12.913921
[52] Hernandez-Martinez, A.R. Advanced Functional Membranes for Sensor Technologies, Materials Research Foundations, 2022, 120, 315-333. https://doi.org/10.21741/9781644901816-10
[53] Jazaeri, J., Gordon, R. L., & Alpcan, T. (2019). Influence of building envelopes, climates, and occupancy patterns on residential HVAC demand. Journal of Building Engineering, 22, 33-47. https://doi.org/10.1016/j.jobe.2018.11.011
[54] Sun, B., Luh, P. B., Jia, Q., Jiang, Z., Wang, F., & Song, C. (2013). Building energy management: integrated control of active and passive heating, cooling, lighting, shading, and ventilation systems. IEEE Transactions on Automation Science and Engineering, 10(3), 588-602. https://doi.org/10.1109/tase.2012.2205567
[55] Valdiserri, P., Biserni, C., & Garai, M. (2015). Energy performance of a ventilation system for an apartment according to the italian regulation. International Journal of Energy and Environmental Engineering, 7(3), 353-359. https://doi.org/10.1007/s40095-014-0159-4
[56] Tzempelikos, A. and Athienitis, A. (2007). The impact of shading design and control on building cooling and lighting demand. Solar Energy, 81(3), 369-382. https://doi.org/10.1016/j.solener.2006.06.015
[57] Candanedo, L. M. and Feldheim, V. (2016). Accurate occupancy detection of an office room from light, temperature, humidity and co 2 measurements using statistical learning models. Energy and Buildings, 112, 28-39. https://doi.org/10.1016/j.enbuild.2015.11.071
[58] Erickson, V. L., & Cerpa, A. E. (2010, November). Occupancy based demand response HVAC control strategy. In Proceedings of the 2nd ACM Workshop on Embedded Sensing Systems for Energy-Efficiency in Building (pp. 7-12). https://doi.org/10.1145/1878431.1878434
[59] Bakker, C., Aries, M. M., Kort, H. H., & Rosemann, A. A. (2017). Occupancy-based lighting control in open-plan office spaces: a state-of-the-art review. Building and Environment, 112, 308-321. https://doi.org/10.1016/j.buildenv.2016.11.042
[60] Tom Dieck, M. C.; Jung, T. H.; Kim, W. G.; Moon, Y. Hotel guests' social media acceptance in luxury hotels. International Journal of Contemporary Hospitality Management, 2017, 29(1), 530-550. https://doi.org/10.1108/IJCHM-10-2015-0552
[61] Kansakar, P.; Munir, A.; Shabani, N. Technology in the hospitality industry: Prospects and challenges. IEEE Consumer Electronics Magazine, 2019, 8(3), 60-65. https://doi.org/10.1109/MCE.2019.2892245
[62] Mobley, R. K. (2002). Benefits of predictive maintenance. An Introduction to Predictive Maintenance, 60-73. https://doi.org/10.1016/b978-075067531-4/50004-x
[63] Cavalieri, S. and Salafia, M. G. (2020). A model for predictive maintenance based on asset administration shell. Sensors, 20(21), 6028. https://doi.org/10.3390/s20216028
[64] Иванов, С. and Webster, C. (2019). Conceptual framework of the use of robots, artificial intelligence and service automation in travel, tourism, and hospitality companies. Robots, Artificial Intelligence, and Service Automation in Travel, Tourism and Hospitality, 7-37. https://doi.org/10.1108/978-1-78756-687-320191001
[65] Short, W.; Packey, D. J.; Holt, T. A manual for the economic evaluation of energy efficiency and renewable energy technologies (No. NREL/TP-462-5173). National Renewable Energy Lab. (NREL), 1995, Golden, CO (United States). https://doi.org/10.2172/35391
[66] Boyd, G. Development of a performance-based industrial energy efficiency indicator for cement manufacturing plants (No. ANL/DIS-06-3). Argonne National Lab.(ANL), 2006, Argonne, IL (United States). https://doi.org/10.2172/926137
[67] Worrell, E.; Laitner, J. A.; Ruth, M.; Finman, H. Productivity benefits of industrial energy efficiency measures. Energy, 2003, 28(11), 1081-1098. https://doi.org/10.1016/S0360-5442(03)00091-4
[68] Vourdoubas, J. Possibility of using solar energy for the creation of carbon neutral hotels in Mediterranean countries. Energy and Environment Research, 2019, 9(1), 1-8. https://doi.org/10.5539/eer.v9n1p1
[69] Amanda, H. A. H., & Sanjei, C. Energy Performance and Energy Efficiency Retrofitting in Existing Hotel Buildings – A Review. Engineer: Journal of the Institution of Engineers, 2019, 52(4), 51-61. https://doi.org/10.4038/engineer.v52i4.7393
[70] Hu, C.C.; Lee, F.Y.; Yang, S.D.; Chang, D. Driving Energy Management, All TSMC Fabs Have Achieved ISO 50001 Certification, 2020 Driving Energy Management; All TSMC Fabs Have Achieved ISO 50001 Certification
[71] Sroufe, R. Effects of environmental management systems on environmental management practices and operations. Production and Operations Management, 2003, 12(3), 416-431. https://doi.org/10.1111/j.1937-5956.2003.tb00212.x
[72] Dascalaki, E. & Balaras, C. A. XENIOS—a methodology for assessing refurbishment scenarios and the potential of application of RES and RUE in hotels. Energy and Buildings, 2004, 36(11), 1091-1105.https://doi.org/10.1016/j.enbuild.2004.03.007
[73] Milojković, A.; Nikolić, M.; Stanković, V. Improvement of energy efficiency in hospitality—Towards sustainable hotels. In Proceedings of the IV International Symposium for Students of Doctoral Studies in the Field of Civil Engineering, Architecture and Environmental Protection, 2012, Nis, Serbia (pp. 20-21).
[74] Biantoro, A. W. Analysis of electrical audit and energy efficiency in building Hotel BC, North Jakarta. In IOP Conference Series: Materials Science and Engineering, 2018, 343(1), 012033, IOP Publishing.
[75] Harris, J.; Anderson, J.; Shafron, W. Investment in energy efficiency: a survey of Australian firms, Energy Policy, 2000, 28, 12, 867-876. https://doi.org/10.1016/S0301-4215(00)00075-6
[76] Saputra, K.A.K.; Subroto, B.; Rahman, A.F.; Saraswati, E. Eco-Efficiency and Energy Audit to Improve Environmental Performance: An Empirical Study of Hotels in Bali-Indonesia. International Journal of Energy Economics and Policy, 2022, 12(6), 175–182. https://doi.org/10.32479/ijeep.13565

[77] Kannan, R.; Boie, W. Energy management practices in SME—case study of a bakery in Germany, Energy Conversion and Management, 2003, 44, 6, 945-959, ISSN 0196-8904, https://doi.org/10.1016/S0196-8904(02)00079-1
[78] Toscano, A. R.; Cabello Eras, J. J.; Viviente, F. G.; Gutierrez, A. S.; Gomez, Y. P. Energy Planning Implementation in Hotels. Case Study in a Hotel in the City of Barranquilla-Colombia. Journal of Engineering Science & Technology Review, 2019, 12(5). http://dx.doi.org/10.25103/jestr.125.10
[79] Kim, S. and Choi, Y. Hotel employees' perception of green practices. International Journal of Hospitality & Tourism Administration, 2013,14(2), 157-178. https://doi.org/10.1080/15256480.2013.782220
[80] Legrand, W.; Sloan, P.; Chen, J. Sustainability in the hospitality industry, 2019, 2nd ed., ISBN9780203116265 https://doi.org/10.4324/9780203116265
[81] Tang, G.; Chen, Y.; Jiang, Y.; Paillé, P.; Jin, J. Green human resources management scale. PsycTESTS Dataset. 2018 https://doi.org/10.1037/t69820-000
[82] Babagbale, E. Employees' perceptions of the effects of green training and practices on hotel sustainability in Ilorin, Nigeria. African Journal of Hospitality and Tourism Management, 2020, 2(1), 46–60. https://doi.org/10.47963/ajthm.v2i1.146
[83] Schweinsberg, S.; Wearing, S.; McManus, P. Exploring sustainable tourism education in business schools: the honours program. Journal of Hospitality and Tourism Management, 2013, 20, 53-60. https://doi.org/10.1016/j.jhtm.2013.05.003
[84] Guidance and Solutions to raise Energy Efficiency in the European Hospitality Industry. HOTREC Hospitality Europe https://www.ghr.fr/IMG/pdf/201812_hotrec-brochure-energy-bat-webversion-ilovepdf-compressed.pdf
[85] MacInnes, S., Grün, B., & Dolnicar, S. (2022). Habit drives sustainable tourist behaviour. Annals of Tourism Research, 92, 103329. https://doi.org/10.1016/j.annals.2021.103329
[86] Kim, S. H.; Lee, K.; Fairhurst, A. The review of "green" research in hospitality, 2000-2014: Current trends and future research directions. International Journal of Contemporary Hospitality Management, 2017, 29(1),226-247.
[87] Berezan, O.; Raab, C.; Yoo, M.; Love, C. Sustainable hotel practices and nationality: The impact on guest satisfaction and guest intention to return. International Journal of Hospitality Management, 2013, 34(1),227–233. https://doi.org/10.1016/j.ijhm.2013.03.010
[88] Baker, M. A.; Davis, E. A.; Weaver, P. A. Eco-friendly attitudes, barriers to participation, and differences in behavior at green hotels. Cornell Hospitality Quarterly, 2014, 55(1), 89–99. https://doi.org/10.1177/1938965513504483
[89] Dang-Van, T.; Wang, J.; Vo-Thanh, T.; Jiang, X.; Nguyen, N. Green practices as an effective business strategy to influence the behavior of hotel guests in the luxury hotel sector: Evidence from an emerging market. Business Strategy and the Environment, 2023, 32(6), 3612-3627. https://doi.org/10.1002/bse.3318
[90] Assaker, G. The effects of hotel green business practices on consumers loyalty intentions: An expanded multidimensional service model in the upscale segment. International Journal of Contemporary Hospitality Management, 2020, 32(12), 3787–3807. https://doi.org/10.1108/IJCHM-05-2020-0461
[91] Moise, M.S.; Gil-Saura, I.; Ruiz-Molina, M.-E. "Green" practices as antecedents of functional value, guest satisfaction and loyalty. Journal of Hospitality and Tourism Insights, 2021, 4(5), 722–738. https://doi.org/10.1108/JHTI-07-2020-0130
[92] Olya, HG; Bagheri, P.; Tümer, M. Decoding behavioural responses of green hotel guests: A deeper insight into the application of the theory of planned behaviour. Int. J. Contemp. Hosp. Manag. 2019, 31, 2509–2525
[93] Grosbois, D. d. and Fennell, D. A. Determinants of climate change disclosure practices of global hotel companies: application of institutional and stakeholder theories. Tourism Management, 2022, 88, 104404. https://doi.org/10.1016/j.tourman.2021.104404
[94] Chikita, M. Analyzing the impact on consumer satisfaction, behavior and attitudes by using eco-friendly practices and products in Surfers Paradise/Gold Coast city hotels, Australia. HAAGA-HELIA University of Applied Sciences, 2012.
[95] Nearly Zero Energy Hotels in Europe. Flagship Projects and tools for hoteliers. Final Report www.nezeh.eu
[96] Boutiquehotel Stadthalle - the worldwide first zero-energy balance hotel https://www.hotelstadthalle.at/index-en.html
[97] Ecolabel, Success Story Boutique Hotel Stadthalle, https://ec.europa.eu/environment/ecolabel/documents/Boutiquehotel%20Stadthalle%20Success%20Story.pdf
[98] Kawasaki King Skyfront Tokyu REI Hotel Sfd. The world's first hydrogen hotel, https://www.tokyuhotelsjapan.com/global/kawasaki-r/facility/104152/index.html