WATER-ENERGY SAVING METHODOLOGIES FOR MID-SIZED TOURIST LODGING UNITS

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ABSTRACT

The hotel sector represents one of the most important parts of the tourist industry causing environmental stress in both natural and built environment with the intense consumption of water and energy and the production of liquid and solid waste. The tourist lodging units are unique regarding their size, location, business plans and the services they provide. Their operation usually relies on the consumption of natural resources and this results to a significant important environmental footprint. Moreover, tourism has an effect on the environment like the industry and the agriculture. In a hotel water and energy uses are closely related. Energy is consumed for cooling and heating of rooms, for lighting, hot water, the operation of the pool, preparation of meals, etc., while these activities increase water consumption as well. As these two streams are linked, water-saving measures can lead to reduction in energy consumption as well. The reduction in operating costs, a priority for every company, can be reached through the rational management of resources. The owners of the hotel facilities often go to renovations, so if these are combine with water and energy saving measures, energy benefits will be multiple. The aim of this work was to assess the environmental performance of mid-sized hotel units and it was achieved by quantifying the use of resources (water and energy). The reduction of the operational cost was then calculated for each hotel by adopting different investment scenarios related to water and energy saving measures.

Keywords: Water – Energy Nexus, tourist lodging mid-sized units

1. BACKGROUND

More than 30% of international tourist destinations are placed within the Mediterranean basin placing it among the most popular and visited tourist areas globally. The tourist sector in Mediterranean region has traditionally been characterized by strong seasonality, with large differences in occupancy rates between winter and summer. Climatic factors, such as temperature, sunshine hours and precipitation rate determine a large share of the international tourism flows within Europe creating tremendous pressure to natural resources of a region (Amelung and Viner, 2006).

Mass tourism activities and lodging units led to degraded natural environment by putting high pressure to the current status of vulnerable natural resources such as water and soil. Crete, Rhodes and Corfu are among the most well-known tourist destinations in Greece, where large size tourist units are operating to serve the largest portion of tourist load during primarily summer season. On the other hand in most small Greek islands in the Aegean Sea, local businesses are investing in ideas that will reduce the negative social-economic and environmental impacts of mass tourism by promoting actions that will increase the additive value of their local tourist product. For this reason, a turn to high quality tourist services is encouraged by the local commercial and tourist chambers to invest in small and mid-sized tourist units in order to increase their environmental profile by providing quality services focusing on specific tourist groups that are interested in knowing the significant advantages of local physical and cultural environments.

Lodging operations could be characterized as successful and efficient as long as they provide the right combination of characteristics to attract and retain guests. Two decades ago, the lodging factors consider to determine the quality of a tourist lodging unit were primarily: facility features, room amenities, housekeeping, security, food-service operation (Griffin, 1998). Nowadays, most of the potential visitors are looking for something that will improve their hotel stay by providing top-level environmental-friendly services. A lot of discussion is made on how tourists are choosing between lodges with identical quality services but different environmental practices. Energy saving potential in hotel infrastructure requires significant financial burden however wherever advance. Energy Efficiency Measures (EEMs) were implemented a significant energy saving is obtained (Chedwal et al., 2015). However, limited interventions related to energy saving equipment and use of renewable energy sources are among the practices that tourists are willing to pay in a lodge (Tsagarakis *et al.,* 2011).

Even though water consumption is an essential factor to evaluate hotel sustainability, it still remains in high figures. Barberan *et al.*, (2013) showed that a small investment in water saving practices could lead to a significant reduction in water consumption and its associated costs, including energy related costs.

This paper contributes to the analysis of water and energy saving potential in lodging units, by following a two-step approach: (i) mapping of water and energy use by adopting an end-use approach, and (ii) assessment of saving practices using three main criteria: savings, cost of investment, and payback time. That way owners and managers can have a detailed view of their current water and energy use rates as well as of the benefits of investing in alternative saving practices.

2. METHODOLOGICAL APPROACHES

The present analysis focused on mid-sized lodging units which are the main accommodation option in most Greek islands. They are primarily small family businesses that appeal to medium-income tourists offering high quality services by taking advantage of the natural environment and cultural heritage of Greece. In order to enhance their environmental behavior they intend to invest in rational water management and energy technologies which will improve their performance, reduce operating costs and enhance their environmental identity.

2.1. Water Saving

For the purpose of this analysis, an application in Excel© environment was developed considering variable water saving technologies that could be applied in a mid-sized lodging unit.

Table 1. List of water related data

Unit Characteristics	- Unit Type (hotel, apartment, villa) - Number of rooms - Number of beds - Providing services (eg breakfast, pool, linen washing) - Garden Features - Number of employees - Number of Visitors
Occupancy	- Completeness beds (monthly) - Number of nights (monthly)
Water equipment	- Pool Capacity - Irrigation system - Equipment Type and frequency of use - leakage %
Related costs	- Tiered water invoice - Pricing sewerage services (fixed fee, a percentage of the value of water consumed)

The water demand was estimated considering four main water uses: (i) Hosting customers, (ii) pool, (iii) garden irrigation, and (v) other services and uses (washing of towels/linen, cleaning, use

of employees and visitors, preparing light meals). The calculations are based on water use devices that are already installed in a lodging unit and their use (frequency). Water leakages are also taking in to account for a more representative estimation of the water demand. In this application the water demand for each lodging unit is estimated based on data and information related to unit's characteristics, occupancy, water/energy equipment and related cost (water/sewage invoice) (Table 1).

2.2. Energy Saving

The energy which is used in a hotel includes the cooling and the heating of the rooms, the energy consumed for the lighting, the swimming pool and the meal preparations. Some tourist units use their own laundry as well, an activity that consumes a great amount of energy.
In most of the energy-consumed activities, water is being spent as well, so the water-saving measures lead to energy saving as well.

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