Exploring the viability of a new 'pay-as-you-use' energy management model in budget hotels

Abstract

Hotels consume significant amounts of energy, especially in guest rooms. Financial incentives can be given to hotel guests for conserving energy during their stay while financial penalties can be applied for excessive energy use. This can be achieved by deploying the smart energy meters (SEMs) in guest rooms that enable accurate energy monitoring and billing. This study explored the viability of a new business model for energy management in hotels underpinned by SEMs. Semi-structured interviews with managers of UK budget hotels revealed the determinants of industrial adoption of this new model. Despite positive appeal, the chances for the model's immediate commercialisation were found slim due to its novelty and the market disruption potential held. To enhance the business viability of the proposed model, close integration of energy conservation targets into the corporate agenda of budget hotels is necessary coupled with dedicated policy support.

Highlights

- Proposes a new energy management model for hotels based on intelligent technology
- Explores the viability of this model with managers of UK budget hotels
- Highlights the determinants of the model's industrial uptake
- Discards the idea of using the model to penalise guests for excessive energy use
- Shows the model can be used to reward guests for energy conservation

Keywords:

- Budget hotel
- Energy efficiency
- Smart metering technology
- Financial (dis)incentive
- Behavioral change

1. Introduction

Hotels represent one of the most energy-intense types of commercial building stock (Filimonau *et al.* 2011a). Steady growth in tourism intensifies demand for hotels and underlines the need to conserve their energy (Chan 2012). Energy conservation in hotels can be facilitated by technology but should also be achieved via changes to consumer behaviour (Teng *et al.* 2012). Hotels can incentivise guests for saving energy and disincentivise them for excessive energy use (Dolnicar *et al.* 2019). Financial (dis)incentivisation of guests in respect of hotel's energy conservation targets remains however under-studied (Nisa *et al.* 2017).

As part of their commitment to promote 'smart' and 'green' economy, a number of EU member states rolled out the installation of intelligent energy metering systems, also known as the smart energy meters or SEMs, in buildings (Wilson 2015). SEMs provide managers of commercial properties with accurate, real time, energy use readings, thus enabling more effective monitoring and subsequent billing of energy consumption (British Gas 2019). Importantly, for better accuracy, SEMs can monitor energy in different parts and/or specific units of a building (Worrall 2014). For example, in a hotel, SEMs can reveal patterns of energy consumption for major functional areas, such as a restaurant, a warehouse or an on-site laundry, but also for individual guest rooms (Centrica 2019).

SEMs can revolutionise the way how energy is managed in hotels by (dis)incentivising guests financially (Figure 1). First, SEMs calculate the annual energy usage in a hotel building with the associated costs. Combined with the data on annual hotel occupancy, this information can aid managers in identifying an average 'energy budget' per one guest night. For better accuracy of such an 'energy budget', historical energy use data can be employed by, for example, making use of the averaged data for the last five years, thus accounting for any inter-seasonal variations in weather conditions and/or addressing any recent anomalies in customer demand. Second, SEMs can reveal actual energy consumption and the associated

energy costs per each guest night. If the actual energy consumption of a hotel guest exceeds an average ‘energy budget’, then a financial disincentive can be applied, i.e. a customer can be asked to pay for any extra energy used. If the actual energy consumption falls below an average ‘energy budget’, then energy savings achieved can be incentivised, i.e. a customer can be reimbursed for the energy they did not use.

[Insert Figure 1 here]

Although already in late 1990s Couran Cove Resort in Australia adopted a novel, computer-based, energy management system which controlled all the resort's environmental loads and used the in-house television system to display the actual energy and water consumption to guests (Lim and McAleer 2005), this system has never become mainstream across the hotel sector. Nowadays, SEMs have provided hoteliers with an opportunity to look back in the past and re-consider the scope for adoption of energy use monitoring as a means to (dis)incentivise guests to save energy. To this end, this study has set to examine how hoteliers can take advantage of smart energy metering technology to facilitate energy conservation among their guests.

Energy conservation in hotels is an important managerial, but increasingly societal, challenge. The United Nation’s Organisation (UNSDG 2020) has included energy conservation in its Sustainable Development Goals (SDGs) 7 (affordable and clean energy), 11 (sustainable cities and communities), 12 (responsible consumption and production) and 13 (climate action). By capitalising upon the potential of SEMs, hoteliers can further address the SDG 9 (industry innovation and infrastructure). Further, by collaborating with guests on energy conservation, hotel managers contribute to the fulfilment of the SDG 17 (partnerships for the goals). The study has therefore set to aid the hotel industry in reaching its operational targets and achieving its wider societal goals by enhancing the business longevity of hotel organisations and by improving the environmental sustainability of hotel businesses.

2. Study background

2.1. Environmental footprint of hotel operations

The environmental impacts of tourism are manifold (Gössling and Peeters 2015). Although the travel component of tourism is traditionally viewed as most environmentally damaging, the growing environmental significance of tourist accommodation is also acknowledged (Alzboun *et al.* 2016). Hotels consume the largest amounts of natural resources within the services industries (Bohdanowicz and Martinac 2007) and generate significant amounts of solid waste (Radwan *et al.* 2012). They further use substantial amounts of energy and produce at least one per cent of the global carbon emissions (UNFCCC 2018).

The energy use challenge is of prime importance for hotels given the global energy demand of tourist accommodation grew by 25% during the past decade (Hawkins and Bohdanowicz 2012) and is expected to double by 2040 driven by a steady growth in international tourism (Gössling and Peters 2015). This underlines the need for optimised energy management in hotels which should be underpinned by the adoption of technological innovations, but should also be achieved through facilitated behavioural changes (Moscardo 2019). Optimisation of environmental (energy) performance should become an integral element of future hotel business models (Juvan and Dolnicar 2017).

2.2. Hotel business models and the environmental considerations within

Until recently, wealth creation for shareholders has been the main objective for traditional business models, often to the detriment of all other stakeholders, including the environment (Schaltegger *et al.* 2012). Growing environmental concerns have prompted changes to this vision and an increasingly large number of businesses have started incorporating environmental considerations into their routine business practices (Worthington 2013). ‘Going green’ is no longer considered an additional cost but believed to stimulate

innovation, improve corporate reputation and create new business opportunities (Bocken *et al.* 2014). As a result, new business models have emerged that view the environment as a key stakeholder (Whelan and Fink 2016).

The hotel sector has started embracing the emerging agenda of 'greening' the business but remains slow when it comes to integrating the principles of environmental sustainability into day-to-day operations (Mihalič *et al.* 2012). Despite increased environmental awareness of hoteliers, the ever growing pressure of sustained financial performance and customer satisfaction pervades managerial stance (Kasim 2009). The nature of the sector also plays a role: given high competition and the dominance of small-to-medium sized enterprises within, there is often a reluctance to actively engage in environmental innovations due to the lack of initial investment, but also because of the fear to make mistakes, thus losing vulnerable markets (Chan 2011). This notwithstanding, hotels will have to respond to growing environmental concerns by adopting environmental innovations (Fraj *et al.* 2015). These can benefit hotels via enhanced customer satisfaction, improved corporate image and increased revenues, as innovation theory suggests (Victorino *et al.* 2005).

Environmental innovations present in the hotel sector to date have comprised of the initiatives aiming at adopting on-site and off-site renewable energy generation (Dhirasasna *et al.* 2020), including solar (Chan *et al.* 2013), wind (Dalton *et al.* 2008) and geothermal (Buonomano *et al.* 2015). They have further been represented by the use of in-room thermostats (Chedwal *et al.* 2015), including experiments with their 'eco' options (Buso *et al.* 2017). Environmental innovations have also been tested in the context of delayed house-keeping whereby hotel guests staying for multiple nights are given flexibility to decide on when their rooms (beds) should be cleaned (made) up (Cvelbar *et al.* 2019). Lastly, experiments with options of towel re-use in guest rooms as a means of energy and water conservation (Gossling *et al.* 2019), including the application of behavioural nudges and/or

principles of consumer choice architecture (Cui *et al.* 2019), represent another established example of environmental innovations in the hotel context.

Research shows that the main driver behind environmental innovations is attributed to personal (positive) beliefs and attitudes of hotel owners/top managers towards sustainability (Park *et al.* 2012). The corporate agenda striving to adopt the principles of sustainability management in pursuit of the goals of optimised costs, improved reputation and enhanced customer loyalty represents another reason for why hoteliers, especially large chain-affiliated, enterprises (Bohdanowicz and Martinac 2007), adopt environmental innovations (Sourvinou and Filimonau 2018). Lastly, the need to comply with the national legal requirements of, for example, energy and water conservation, provides another important rationale (Alonso-Almeida and Rodríguez-Antón 2011), especially in the context of destinations with scarce environmental resources and/or fragile ecosystems (Kasim 2009).

Research demonstrates that the (high) initial costs of investment represent a major off-putting factor for hoteliers to adopt environmental innovations (Zografakis *et al.* 2011). The (often) intangible nature of potential benefits that environmental innovations can bring about (for instance, reputational gains) provides another impediment (Pereira-Moliner *et al.* 2012). Personal scepticism and/or disbelief of hotel owners/top managers in environmental sustainability is also an important factor hampering the adoption of environmental innovations in the hotel sector (Kasim 2009). Lastly, consumer response to environmental innovations, which is not only difficult to accurately predict, but equally cumbersome to precisely measure, represents another barrier (Miao and Wei 2013).

Past research offers varied perspectives on how hotel guests respond to environmental innovations adopted by hoteliers. Whilst there is sufficient academic evidence pinpointing that customers are generally willing to stay in (see, for example, Teng *et al.* 2013), and even pay extra for (see, for instance, Kang *et al.* 2012), environmentally-friendly, 'green', hotels,

there is little empirical evidence to prove this is the case in real life settings. First, this is because most research conducted on this topic is underpinned by attitudinal studies of behavioural intentions, rather than actual consumer behaviour. The discrepancy between consumer pro-environmental attitudes and behaviour in the hotel context has long been established (Juvan and Dolnicar 2014a). Second, this is because many studies are underpinned by data from the market research which has different purposes and should, therefore, be taken with caution when drawing academic conclusions (Filimonau and Grant 2016). Studies measuring actual behavioural response to environmental innovations in hotels as expressed, for example, in proven repeat visitation and/or a higher spend carefully monitored in longitudinal / repeat testing research, are still rare (Warren *et al.* 2018).

To facilitate progress of the hotel sector towards the goal of environmental sustainability, there is a call for (more) research to better understand consumer response to environmental innovations adopted by hoteliers (Martin-Rios *et al.* 2018). Such research should enable hotels to co-create knowledge with their guests, ensure that environmental innovations can be customised to (better) fit guest expectations, and, ultimately, (better) engage customers in conservation of environmental resources (Warren and Coghlan 2016). In particular, 'smart' technology can play an important role in developing experiences of hotel guests and measuring their behavioural responses to environmental innovations in hotels (Warren *et al.* 2018). This current study will, thus, contribute to this call for research by exploring the potential of SEMs, as an example of environmental innovations in hotels, to (more actively) involve hotel guests in energy conservation.

2.3. SEMs in hotels

In 2016 the UK government launched the roll-out of smart energy meters (SEMs) in buildings (Sovacool *et al.* 2017). SEMs will enable managers of commercial properties to have real-time data about energy usage and the related expenses, thus contributing to a better

understanding of energy costs alongside the areas from where these arise (The Telegraph 2017). Although the rollout has seen a number of issues to date, causing installation delays (Buchanan *et al.* 2016), it is recognised that SEMs will soon become mainstream in most UK buildings (Vaughan 2018a).

Tourist accommodation outlets can have multiple benefits from the deployment of SEMs. For a start, these can 'visualise' the energy consumption data to hotel managers and help them break these down to energy use per occupied room, per guest or per guest night stay. According to Cornell Hotel Sustainability Benchmarking Index (2019), this can identify the operational areas within a hotel building with excessive energy use which, in turn, may prompt managerial thinking towards how this energy use can be optimised. For example, Karlin *et al.* (2015) posit that immediate feedback on energy use can encourage energy saving behaviour among the public, thus suggesting that it can also apply to hotel management. Further, accurate data on energy consumption across a number of functional areas in a hotel building enables hoteliers to more effectively control operational costs (Centrica 2019). This will become particularly important in the future given the predicted energy price rises (Vaughan 2018b). Energy expenses constitute up to 10% of hotel's total revenues (Webster 2000) or 60-70% of hotel's overall utility costs (Centrica 2019), thus representing a substantial proportion of controllable expenses, often second only to labour costs (Bohdanowicz *et al.* 2001). Further, there have been cases reported in the literature where energy accounted for almost half of operational costs in hotel buildings (Blank 2000 cited by Bohdanowicz *et al.* 2001), thus emphasising a significant reduction potential which can be achieved by using intelligent energy management solutions (Centrica 2019). According to Hotel Energy Solutions (2011), the energy conservation potential in hotels is at least 15%. Despite this, it is estimated that only 20-30% of hotels are pro-actively engaging in energy management which pinpoints an intervention opportunity (Walker 2014).

SEMs can detail energy consumption patterns within hotel premises, thus highlighting the 'hotspots' in energy use (Centrica 2019). It is argued that, within the different operational/functional areas of a hotel, guest rooms should be closely monitored as their energy consumption can be extensive and the related energy costs can be high. For example, Cornell Hotel Sustainability Benchmarking Index (2019) suggests that, in 2017, the energy use across a sample of 258 UK limited service hotels ranged from 20.05 to 195.79 kWh per occupied room per night. Assuming the average unit price per kWh for UK businesses is £0.1436 (Business Energy 2020), the cost of energy consumption in guest rooms of UK limited service hotels can then range from £2.88 to £28.12 per night. Considering the starting price of a room in Premier Inn, a popular chain of UK budget hotels, which is £50 per night (summer season, single occupancy, hotels outside London) (Premier Inn 2020), then the cost of energy consumption may constitute 6-56% of the total room's price.

Managers should therefore think of interventions to reduce energy consumption in guest rooms and minimise the related costs, thus optimising energy use in a hotel building (Chang *et al.* 2016). Optimised energy use does not only improve the environmental performance, but can also align with the low-cost business philosophy, thus being of particular appeal to budget and/or limited service hotels (Teng *et al.* 2017). Here, SEMs can be employed to (dis)incentivise energy consumption behaviour of hotel guests, thus making use of the principles of behavioural economics in shaping more environmentally-benign consumer behaviour (Kahn and Liu 2016). This becomes possible due to the ability of SEMs to provide accurate data on the actual energy use of guests during their stay, but also the historical data on energy consumption in a hotel per guest night, thus revealing the patterns of under- or over-consumption.

It is important to note that, when calculating the patterns of energy use in guest rooms and subsequently utilising these figures to nudge customers towards energy conservation,

hotel guests should not be disadvantaged by asking them to pay for the energy they did not use. For example, the aggregate numbers on energy use per occupied guest room produced by Cornell Hotel Sustainability Benchmarking Index (2019) do not differentiate between the actual in-room energy consumption by hotel guests and any other instances of energy use within the hotel building. These instances are manifold and represented by energy consumption in other operational/functional areas of the hotel (for instance, reception, kitchen and warehouse, to mention a few). In particular, the patterns of energy use can be excessive in an on-site hotel's restaurant, conference facility, leisure facility and laundry (Filimonau *et al.* 2013). For example, Karagiorgas *et al.* (2007) found that, by adding a swimming pool and a restaurant facility to their amenities, hotels can more than double their energy use. Similar conclusions were derived by Castellani and Sala (2008) when assessing the environmental footprint of on-site laundry and catering services in hotels.

Hotel guests do not always use all hotel amenities/services; these can further be open to external customers, such as the business people (in the case of conference facilities) and local residents (in the case of restaurants) (Filimonau *et al.* 2011b). To ensure that hotel guests are only charged for the actual energy used in their rooms, SEMs should be installed across all operational/functional areas of a hotel building recording energy consumption in these respective areas. Any instances of energy use outside guest rooms should subsequently be excluded from guest bills. All exclusion criteria should be carefully evaluated by hotel managers prior to deploying SEMs.

The weather effect represents another important consideration for hotel managers when calculating the 'energy budgets' for guest rooms, especially in light of climate change with its increased frequency and unpredictability of extreme weather events (Andric *et al.* 2016). Excessively hot summers or cold winters suggest that averaging energy consumption will not be fair and can easily disadvantage customers. Hence, there is a need to account for the

(inter)seasonal variations in energy use in hotels driven by weather fluctuations. To this end, weather influence should be calculated for each month of the operational year using the principle of degree days (Xin *et al.* 2012). The weather data from a 10 or 30 year average (so-called standard degree days) and current degree days must be utilised to truly reflect if energy consumption on a given day/month is within the calculated energy use benchmark.

It has long been established that building retrofitting holds significant potential to conserve energy in hotels (Santamouris *et al.* 1996). In contrast, any additions to hotel buildings such as, for example, a leisure club or a catering facility, can significantly increase the energy use of tourist accommodation facilities (Becken *et al.* 2001). Hence, to avoid disadvantaging hotel guests, any improvements in hotel infrastructure and/or any changes to hotel building operations should also be accounted for when calculating the 'energy budgets' for guest rooms.

Most importantly, the financial aspects of installing numerous SEMs across the hotel building for the sake of accurate energy use assessments and robust evaluations of the 'energy budgets' for guest rooms should be carefully examined. Budgetary constraints represent a known barrier to energy conservation in hotels (Teng *et al.* 2012), so a careful cost benefit analysis is required prior to deploying SEMs. Likewise, the lack of expertise on energy management hampers hoteliers from saving energy, especially in the context of independent, non-chain affiliated businesses (Markis and Paravantis 2007). This underlines the scope for academia to aid the industry, thus working together towards a major societal goal of environmental sustainability.

This study explores the viability of a new energy management model underpinned by a technological innovation, i.e. a smart energy metering technology, in the context of facilitating pro-environmental behavioural changes among guests of budget hotels. It strives to examine the determinants of managerial adoption of such a model, especially the

operational, organisational and/or social obstacles towards its implementation alongside the potential to overcome these.

3. Research design

Due to the following reasons the qualitative research paradigm was employed for primary data collection and analysis. First, this study is exploratory as it seeks to understand the viability of a new model for energy management in hotels. The new phenomena in management and social sciences require prior testing on a handful of informants before deploying a large-scale research project with an aim to confirm the initial findings of the test, the purpose which qualitative research serves well (Gummesson 2006). Second, a deep(er) analysis of human perceptions is required when examining the viability of the proposed model of energy management in hotels, including professional opinions of hotel managers on it, but also their personal attitudes. Qualitative research offers a scope to gain this type of feedback given a more personalised, face-to-face and 'humane', approach to primary data collection it employs (Saunders *et al.* 2015). Lastly, although the main shortfall of the qualitative research paradigm is in the restricted generalisability and the limited representativeness of its outcome (Silverman 2000), it however facilitates the conceptualisation of the understudied, but societally significant, phenomena, such as energy conservation in the context of hotel stay (Schultz *et al.* 2008), and represents an appropriate research strategy for the situations where key study informants or data providers are difficult to reach, such as managers of hospitality enterprises (Filimonau and Krivcova 2017).

Semi-structured interviews were used to collect primary data as they allow for an in-depth comprehension of complex society- or management-related phenomena and a better evaluation of the determinants of public behaviour in specific consumption contexts (Ritchie and Lewis 2003). The choice of semi-structured interviews was further due to their significant interpretative power which provided study informants with a necessary freedom and

flexibility to communicate their ideas and beliefs (Bryman and Bell 2003). Interview schedule was forged based on the main themes identified through the literature review. Interview questions were designed to cover three major subject areas. First, managerial perceptions of the environmental impacts of hotel operations, especially energy use, were examined to set the scene and introduce participants to the context of the study. Second, managerial opinions on the need to reduce the environmental impacts of hotels were sought. In particular, the role of hotel guest behaviour in hotel's energy consumption was explored in order to comprehend the extent to which customers contribute to the hotel's energy footprint and the related costs of running a hotel business. Lastly, the new model of energy management in hotels was introduced and the views of hoteliers on its viability were examined, drawing upon their personal and professional experience.

Participants were recruited from among managers of budget hotels in Bournemouth, the UK. The focus on the budget segment of the hotel market was deliberate due to the 'low cost' business models employed within. It is argued that the proposed new model of energy management can fit this segment well or, at least, it can fit it better than the upmarket/luxury hotel segment whose business models are noticeably different. In the context of this project, a budget hotel is understood as a tourist accommodation facility of a small-to-medium size, with a limited range of amenities on offer, employing a low-to-medium pricing strategy. Internationally-known examples of such budget hotels are Premier Inn, Holiday Inn Express and Travelodge. Further, Bournemouth provides a good geographical setting for this study given that tourism represents a major economic activity in the town which hosts 221 hotels, including 70 budget hotels (Bournemouth Tourism 2017).

To recruit willing participants, the budget hotels that provided email contacts on their websites for non-customer related inquiries were first contacted by email with a brief description of the project and an interview request. This was followed on with an on-site visit

which enabled hoteliers to obtain more information about the project, raise any questions and get to know the research team. According to Churchill (2017), independent hotels dominate the market of UK budget hotels (51%) but the share of brand-affiliated budget hotels (45%) is growing. This market distribution was accounted for when sampling willing participants to ensure the sample resembles the structure of the UK budget hotel market.

The recruitment was undertaken in May-June 2018 with interviews taking place in July 2018. In total, 12 interviews were conducted and their number was determined by data saturation (Table 1). Thomson (2010 cited by Marshall *et al.* 2013) claims that the data saturation is generally achieved after 10+ interviews have been held, which this study fits into. Interviews were conducted on hotel premises at the time most suitable for study participants. Interviews lasted from 30 to 60 minutes; they were digitally recorded and transcribed. No financial incentives were offered for participation. Social desirability bias is a known drawback of qualitative research (King and Bruner 2000) and, to avoid its occurrence, the anonymity of the study participants was guaranteed. Further, in the interviews, the participants were asked for their opinion on the studied topics reflecting upon their professional experience *in general* rather than related specifically to their current hotel. While this, in theory, should have reduced the occurrence of social desirability bias, there is no guarantee its effect was eliminated entirely, thus representing a major shortfall of this project.

[Insert Table 1 here]

The data analysis was iterative with interim findings being regularly fed back to the interview schedule to inform subsequent interviews. Upon reaching saturation, thematic analysis following a semantic approach was applied to the data collected. To this end, data were coded and organised into themes that emerged from the literature review and in the interviews (Braun and Clarke 2006). Table 2 demonstrates the coding framework generated

through the analysis. Verbatim quotations were employed when writing up the outcome of thematic analysis to support the arguments held by the study participants.

[Insert Table 2 here]

4. Results and Discussion

4.1. Environmental impacts of hotels

Most participants agreed that hotel operations imposed substantial environmental impacts (Table 2) although quite a few did not see these as a major managerial issue, assigning a higher priority to other operational responsibilities, such as the need to retain employees, maintain customer loyalty and meet corporate and/or personal work objectives. This is in line with the literature which has previously established that, while hotel managers may have high environmental awareness and commitment, they will only tackle the tasks of environmental conservation once the other operational issues in their hotels have been adequately addressed (Kasim 2009). Arguably, this is of particular relevance to the context of budget hotels given the constrained nature of (human and financial) resources available within (Chan 2011), but also because of the competitiveness of the market in which they operate (Dief and Font 2012), which suggests that managers have to allocate the scarce resources available to them carefully. Environmental conservation is not always a priority in this allocation (Park *et al.* 2014). This calls for better integration of environmental considerations into the corporate agenda of budget hotels through dedicated support from the company's top administration which could then facilitate consumer demand for 'greener' hotel services (Tzschentke *et al.* 2008).

Food waste was a recurring environmental issue in hotel operations identified in most managerial responses (Table 2) which probably reflects increasing public, industry and political concern over the magnitude of food waste generation in hotels and foodservices

(Filimonau and De Coteau 2019). Surprisingly, and contrary to the initial expectations, participants did not see energy use as a major impact. This can be partially explained by the 'intangible' nature of energy consumption in hotels. Indeed, the environmental repercussions of energy use cannot be visualised as they relate to climatic changes that are long-term and abstract, rather than immediate and concrete. The abstractness of the concept of climate change alongside the associated negative effect of its mitigation urgency on public perception has long been recognised (Becken 2004) which holds true for hotel managers in this sample. Another important point to mention is in that energy use and the related carbon footprint are often associated by hoteliers with legal compliance, rather than with utility costs and/or environmental conservation. For example, prior to its closure, the UK's Carbon Reduction Commitment (CRC) energy efficiency scheme required UK chain-affiliated hotels not to exceed certain allowances in their carbon dioxide emissions (GOV.UK 2015). These legal requirements might have therefore become more important for UK hotel managers to address than the cost and, in particular, environmental savings.

In contrast to energy use, food waste generation in hotels has an explicit physical element as it can be instantly observed and directly measured (Pirani and Arafat 2016), thus possibly explaining the currency and underlining the urgency of this environmental impact for participants. SEMs can therefore play a crucial role in assigning a more 'tangible' value to energy use in hotels. This will be a result of disclosing accurate costs of energy usage to hoteliers in real time, thus showcasing the magnitude of this important business expense.

4.2. The need to reduce the environmental impacts of hotels

Participants recognised the responsibility to mitigate environmental impacts from their hotels' operations although there were a number of managers who only preferred to do a bare minimum in order to meet legal requirements (Table 2). This is in line with Bonilla-Priego *et al.* (2011) who distinguish two major categories of hotels in terms of their environment

commitment, namely the 'strategists' who take the lead and the industry 'followers'. Importantly, the absolute majority emphasized the need to integrate environmental considerations into the corporate agenda for these to be implemented effectively on the ground. This confirms past research which has established the importance of a broader, cross-company, corporate commitment to nature conservation as a key driver of routine environmental management in hotels (Gil *et al.* 2001).

Further, participants consistently acknowledged the benefits of environmental commitment in hotels, especially in terms of enhanced corporate reputation and reduced operational costs (Table 2). This is in line with the literature which highlights monetary savings (Graci and Dodds 2008), better business image (Pereira-Moliner *et al.* 2012), improved employee retention (Sourvinou and Filimonau 2018) and enhanced customer satisfaction (Martinez and del Bosque 2013) as prime benefits of environmental conservation in hotels. Similar to the literature (López-Gamero *et al.* 2010), the need to protect the environment for future generations has not been mentioned as a main benefit, pinpointing the dominance of purely utilitarian, rather than altruistic, views on environmental commitment among the participants:

> *'Honestly, the main driver [of environmental management] is the cost. Unfortunately, that is the main driver for the hotel at the moment and it will be for quite a while. Also, the brand's image is definitely affected in a positive way. But it won't drive customer loyalty though. People are not ready for this environmental stuff yet'* (Darren)

4.3. The role of hotel guest behavior

Above, Darren underlines the importance of engaging customers when designing measures to mitigate the environmental impacts of hotels. Likewise, most participants characterised hotel guest behaviour as being irresponsible from the environmental conservation viewpoint. Desire to relax and escape from the stress of everyday life when on travel was referred to as a key reason for consumer disengagement in reducing the environmental footprint of hotel operations. This complements the results of previous research which has established that the indulgent nature of holidaying (Dolnicar and Grun 2009) combined with an element of travel infrequency (Gössling *et al.* 2012) prevents consumers from saving the environment when staying in a hotel. Further, a discrepancy exists between pro-environmental intentions and actual actions of tourists (Bergin-Seers and Mair 2009) and the positive effect of gradually increasing environmental awareness among the public is often offset by the unfettered resource consumption when travelling (Juvan and Dolnicar 2014b) with hotel guests being reluctant to engage in any actions that might compromise their personal comfort or the comfort of their family (Juvan and Dolnicar 2014a).

Interestingly, the all-inclusive nature of hotel room rates in terms of all miscellaneous costs, such as utilities, being pre-paid for was mentioned as a driver of irresponsible behaviour of hotel guests, as per the Miguel's quote below. Indeed, consumers tend to actively engage in environmental conservation at home without, paradoxically, transferring these behavioural patterns towards their holidays (Barr *et al.* 2010). In part, this is because, in the home environment, environmental conservation via, for instance, energy saving is translated into a direct reduction of household bills which acts as a powerful incentive (McMakin *et al.* 2002). The absence of such powerful financial incentives when on holiday may discourage tourists from engaging in environmental conservation. To change this status quo, Dolnicar *et al*. (2019) call to reconsider extant hotel business models by embracing the

principles of financial incentivisation of consumers. More specifically, Dolnicar *et al.* (2019) suggest that hotels should share the savings they make due to environmental conservation, such as from reused towels, with their guests. The new model of energy management in hotels proposed in this study takes this idea further by offering an opportunity to (dis)incentivise hotel guests for energy conservation in their rooms. Managerial opinions on the viability of this novel approach were discussed next.

> *'They [guests] treat this as a hotel room they have paid for and they don't care about leaving the light on. They just expect to use the place without any regard… So, they're not environmentally responsible at all. Sometimes I enter the rooms to find all the lights on or the water running when the guests are gone. Probably, it's bad to say, but I think, yes, it's because of the nature of the room rate'* (Miguel)

4.4. The new model of energy management in hotels

This part of interview started with establishing the levels of managerial awareness of SEMs. Although the majority knew about this initiative and welcomed its rollout in the UK as a means of achieving better billing accuracy, only a couple confirmed they had already installed and/or had firm plans for installing the SEM devices in their properties. Both managers represented chain-affiliated hotels, claiming the SEM installations were part of the corporate agenda to adopt smart technology. In contrast, the majority of the sample were either not informed of the corporate intention to install SEMs and/or remained undecided regarding the possible installation timescale (Table 2). The main reason for this was the desire to wait and see how the rollout spread across the sector. Interestingly, the initial investment

costs were not quoted as a major obstacle. This confirms the conservative nature of the hotel sector which is generally reluctant to embrace innovations despite the benefits they may bring (Orfila-Sintes *et al.* 2005). This holds true for environmental innovations that are often driven purely by the need to comply with legal standards (Martin-Rios *et al.* 2018).

When the new model of energy management in hotels underpinned by SEMs was presented to participants, the majority took it favourably (Table 2). The prime value of the model was seen in prompting pro-environmental changes to consumer behaviour which had been recognised earlier as one of the core drivers of excessive energy use in hotels. The managers who rejected the model straight away referred to its possible negative effect on customer satisfaction with the related detrimental impact on corporate image. Further, to them, the new model undermined the basic principles of hospitability which is effectively summarised by Katie below:

> *'Asking [guests] to pay for an extra [energy] would give them an opportunity to complain and nobody wants to deal with that… Also, the manager or the owner of a hotel should be responsible for the hotel's utilities. So, charging them [guests] an extra for energy use, isn't it the same when you invite your friends at home? Would you charge them for having a shower?* (Katie)

The reference of Katie to the home context is interesting as it contributes to the on-going academic debate on the conflicting nature of hospitality services that ought to balance out the inherent need to make profits with the need to provide exceptional guest services (Lugosi 2008). Another interesting point in this quote is a reference to the hotel manager being responsible for utilities. To some extent, this comment contradicts an earlier finding

where irresponsible guest behaviour was identified by the participants as a main obstacle towards environmental conservation in hotels, thus implying hotel guests' primary responsibility for energy conservation. This point may suggest that, despite irresponsible behaviour of many customers, hotel managers are prepared to sacrifice the goals of energy conservation for the sake of guest satisfaction.

This confirms the literature pinpointing that environmental management practices in hotels are only seen favourably by managers when these do not interfere with the provision of a hotel's core services, such as maintaining guest satisfaction (Eisingerich *et al.* 2011). The impact of adopting the environmental management practices in hotels on guest satisfaction is ambiguous. One literature stream demonstrates that environmental initiatives in hotels can increase consumer satisfaction (Luo and Bhattacharya 2006). Concurrently, there are studies that have shown that customers can be concerned about the potential compromises to their comfort when staying in hotels that engage in environmental conservation (Gao and Mattila 2014). On a theoretical basis, consumers have long declared their willingness to engage in environmental conservation but they often fail to do so in reality (Manaktola and Jauhari 2007). Indeed, it has been found that hotel guests are reluctant to welcome the environmental management practices in hotels if they have the potential to affect their comfort (Miao and Wei 2013), aesthetic enjoyment (Antakyali *et al*. 2008) or budget (Peatie 1999).

Those managers who liked the new model praised the scope it offered to reward guests for saving energy. Concurrently, not all agreed to penalise guests for excessive energy use, fearing customer dissatisfaction as this action's possible outcome. A probe was made at this stage into treating any excess energy use in guest rooms as an ancillary service. Ancillary services are defined as any products or services that can be added to the original price of hotel stay, such as room upgrades, airport transfers, use of Wi-Fi, meals (including breakfast) and mini-bar drinks. As shown by successful examples from the airline industry, ancillary services

can provide value for both the businesses and customers, and are therefore increasingly considered by hotels as integral elements of their future pricing strategies (Hayes and Miller 2011). For example, the Hilton Midtown in New York has recently ceased operating traditional room service, opting for a grab-and-go choice, to reduce food costs for the guests (Fickenscher 2013). Further, some hotels have already started charging extra for energy-intense electric appliances, but also for cleaning services. For instance, the Tune Hotels require guests to pay for the use of hair dryers and for washing towels (Davies 2015), thus highlighting the industry's interest in optimising costs through the use of ancillary services. The idea of energy use in guest rooms as an ancillary service was mostly rejected by participants who feared customer dissatisfaction, but also claimed that it was not the 'right thing to do' from the perspective of hospitability, as effectively summarised by Daniel below. This contributes to the discussion held earlier on the challenges of balancing out business profitability and the high standards of customer care in hotels. Interestingly, a similar opposition towards selling ancillary services, such as hold luggage and/or on-board food and drinks, was first developed by the established, 'legacy' airlines that had however subsequently changed their perspective as a result of rapid market evolution (O'Connell and Warnock-Smith 2013):

> '*It doesn't seem like a very fair thing to do. There're limits to what you can charge. Charging people for extra energy use is a terrible idea. Personally, I wouldn't stay in a place that told me how much energy I could or I couldn't use. Energy costs should not be charged extra on people… Guests would never understand it. I think that they would struggle. And if they did eventually, they wouldn't accept it. They want one price, that's it. One price, I know exactly what is included in it, job done… I'd still expect that unlimited energy is*

included in the no frills. The way that hospitality is going gives you more products for your money rather than taking away products and services from people'

The reference to customer psychology was made by participants when highlighting the advantages of rewarding customers for saving energy. This is in agreement with Dolnicar *et al*. (2019) who argue that a sharing-based approach to distributing any profits made while conserving the environment in hotels can be successful in enticing the desired behavioural changes among the guests towards the environment. This is further in line with the Equity Theory based initiatives as first proposed by Adams (1963) as these suggest that the financial benefits gained from any environmental management related interventions should be distributed between the hotel management and hotel guests in order to set the psychological sense of fairness among the latter, thus driving pro-environmental behaviour. This contributes to the on-going academic discourse on the need to integrate the principles of environmental sustainability into the traditional business models as affected by the growth of the sharing economy (Daunoriene *et al.* 2015):

'In terms of rewarding I think it's the way peoples' brains think. They will think that we're getting something here, so we're winning. I think it'll work and it's going to be quite effective as rewarding people for good behaviour is an amazing idea. That would be a selling point as opposed to charging people extra. You should always go the opposite way. Give the carrot rather than the stick. People are very easy to control and the way to control them is to reward them always' (Jonathan)

Given positive managerial perception of rewarding customers for conserving energy, a probe was made into the type of rewards that hotels would be willing to provide. Loyalty points (for chain-affiliated hotels) and money-off vouchers to be spent on in-house products and services, such as food and beverages, were the most popular categories of rewards mentioned (Table 2). This, again, demonstrates the value of profit sharing as proposed by Dolnicar *et al.* (2019) which, in this case, works in a dual way. The hotel shares its profit from conserving energy with its guests who, in turn, share the rewards received back with the hotel, thus offering a 'win-win' situation for both parties involved.

Next, interviews tried to establish if budget hotels represented the right hotel sector for the adoption of the new model of energy management. All managers rejected the idea of deploying the model in upscale, luxury properties given it did not align with their values and/or pricing strategies. However, some participants felt that budget hotels were not the good targets either with the model being more suitable for the tourist accommodation facilities representing the lowest segment of the low cost range of hotels, such as hostels and the low budget/'no-frills' hotels (Table 2). Further, some managers highlighted a better scope for the application of a new model in newly built, recently opened properties, referring to the potential technical difficulties of installing SEMs in old and/or listed buildings, but increasingly to the organisational complexities of introducing novel policies on energy conservation in established businesses. Again, this confirms the conservative nature of the hotel sector in terms of embracing environmental innovations (Orfila-Sintes *et al.* 2005) alongside the need for genuine corporate support of such innovations across all management levels (Graci and Dodds 2008). In terms of a better suitability of the new model for independent versus chain-affiliated hotels, a common opinion was that it could be relevant to

any property regardless of its ownership category, subject to corporate commitment to adopt it.

Lastly, given the overall positive feedback on the new model received, participants were asked to elaborate upon their professional willingness to adopt it in the hotel they currently managed alongside any improvements to the model that would need to be made in order to enhance the probability of its commercial uptake across the sector. All managers, politely but firmly, discounted the idea of adopting the model in their hotels at this time. Despite the recognised potential the model held to stimulate more environmentally-benign consumer behaviour and to save on hotel's utility costs, its 'extreme' market novelty and unconventionality, with a potential negative effect on customer perception and, consequently, loyalty was referred to as a prime reason for non-acceptance. Overly restrictive corporate policies that prioritised guest satisfaction over environmental conservation were also put forward as obstacles for the model's adoption. Lastly, the effect of political instability in the UK/Europe was mentioned (i.e. Brexit) with the need for hoteliers to retain the current market position rather than experiment with technological innovations. The last point is interesting as business and technological innovations have the potential to disrupt the market, thus offering multiple benefits to their early adopters, as demonstrated by the on-going success of AirBnB and/or similar platforms (Guttentag 2015). The industry's current reluctance to adopt the new model for energy management in budget hotels is effectively summarised by George:

> *'Generally, it's [the new model of energy management in hotels] an incredibly interesting idea, very adventurous. Far too adventurous for where we're at the moment. I think you're 30 years early. The industry is struggling at the best of times in the UK… At the beginning I thought that it'd not make a difference but now that we had a chat about it I think that this kind of thing would work. But,*

like I said, people will take a while to get used to it. Because, at the end of the day, as we said, people go for the bargains and I think that it'd really help, and I'd be interested to put something like that here, although not for now. At the end of the day, it can only do good'

5. Conclusions

This paper contributed to the literature on environmental management in the hotel industry by exploring the viability of adopting a new model of energy management in hotels, which is underpinned by intelligent technology and the principles of behavioural economics, within a sample of budget hotels in the UK. It examined the personal perception of the model by hotel managers alongside the professional vision on the scope of its broader adoption across the sector. In terms of practical implications of this study, its findings demonstrated that, while the new model of energy management was well perceived by managers on a personal level, it was not considered viable from the commercial viewpoint. The model was referred to as being overly novel for the current stage of the hotel market development in the UK although its potential for the future rollout across the sector was recognised, subject to genuine corporate commitment and dedicated policy support.

The study evidenced the conservative nature of the budget hotel sector which prevents it from engaging in cutting-edge initiatives that hold the potential for market disruption. It showed that, for the new model to succeed, there is a need for a champion across the sector, who would be prepared to take the lead in adopting the novel and unconventional solutions to energy management and making consumers ready for them. Potentially, an established hotel chain which invests into new hotel builds could become an industry champion, subject to understanding the risks of leading on such a disruptive innovation. While engaging with the

new model could make the champion a market leader, this could equally well impose a detrimental effect on customer loyalty, thus representing a challenging task for the hotel management when deciding on their participation in such market disruptions.

National policy-makers could aid hoteliers in their preparedness to disrupt the current market with the new model of energy management by offering direct and indirect support towards such cutting-edge initiatives. For a start, the installation of SEMs can be made mandatory in tourist accommodation facilities given the disproportionate amounts of energy they generate. Second, policy-makers could urge hoteliers to make use of intelligent technology to inform guests of the energy intensity of their stay and/or educate them about the environmental consequences of energy over-use. This information could be presented to consumers, for example, on their hotel bills in an attempt to trigger behavioural changes to conserve energy. Lastly, policy-makers could encourage hotels to use SEMs not only to passively monitor energy consumption in guest rooms, but also as a tool of pro-active nudging of consumer behaviour. The hotels that strive to facilitate pro-environmental changes to consumer behaviour by employing the data from SEMs could, for example, be favored in public tenders on the right to cater for public service employees whilst on business travel.

As with any research, this one had a number of limitations. First, it was limited to a small sample of managers that operate budget hotels in a single destination in the UK. Primary data were collected in qualitative research with a drawback of non-representative and non-generalisable results and a tendency to be affected by social desirability bias. Lastly, the study only explored the perspective of providers of hotel services on the novel energy management model but excluded, due to space and budget constraints, the perspectives of hotel guests, policy-makers and developers of the SEM technology.

The study outlined a number of promising research avenues. First, future research should utilise the results of this small qualitative, exploratory, project to inform the design of

a large-scale, sector representative and/or more generalisable, quantitative survey. Next to the questions on the commercial viability of the new model of energy management, the survey should examine the scope for hoteliers to share profits from energy conservation with their guests alongside the perceived impact of such innovative profit-sharing approaches on consumer willingness to return. The ways to reward customers for energy conservation through the use of SEMs should also be investigated in this survey as the rewards for energy conservation not only hold the potential to enhance guest satisfaction but also to improve the level of their environmental awareness, with a potential spill-over effect towards the consumption contexts outside travel. Second, this study is limited to opinions of budget hotel managers in a destination heavily reliant on seasonal tourist demand. Therefore, future research should aim at extending the scope of analysis towards destinations that cater for tourists all year around, within the UK but also abroad. Third, opinions of managers of hostels and 'no-frills' hotels on the viability of the new model of energy management should be sought given it represents a good fit with their business concept according to this study's participants. A comparative study of opinions of managers of independent and chain-affiliated budget hotels would shed light on any organisational and/or brand reputation related factors that can determine the success of sectoral adoption of the proposed model. Indeed, independent hotels may have more flexibility in the redesign of their business vision as they are not required to adhere to strict brand standards, thus offering a better scope for application of the new model. However, chain-affiliated hotels are more likely to build brand-new tourist accommodation facilities where the new energy management model could be rolled out as an experiment. Further, chain-affiliated properties may be in a better position to offset any potential negative effects of deploying the new model on customer satisfaction which is due to their economies of scale. Fourth, future research should examine the perspective of property owners on a new model of energy management given that most hotels do not own

hotel buildings nowadays, but only manage the accommodation and catering businesses on these buildings' premises. Opinions of hotel brand franchisees should also be studied given that the decision to install SEMs may equally come from the brand owner and/or its franchisee, thus leaving one or another in a disadvantaged position should a disagreement on the need for SEMs in a hotel property emerge. Inter alia, this dedicated research stream should look at the technical feasibility of installing SEMs across the hotel building alongside its seamless integration into extant property management systems (PMSs). Last but not least, consumer opinion on the viability of the new model of energy management should be studied which is due to growing evidence that hotel guests have become price-sensitive and look for price bargains. Future research should aim at examining a consumer perspective on the viability of the novel energy management model in hotels either by the method of in-depth semi-structured interviews/focus groups or through a public opinion survey. Alternatively, field experiments (Delmas and Aragon-Correa 2016) can be conducted to reveal the levels of public acceptance or rejection of the novel model among the different categories of hotel guests and among customers of different hotel categories. Further, the inter-generational analysis could be held given that the Millennials are often described as being more tech-savvy and environment-conscious than the other generations of hotel consumers. This could involve a comparative research held in the countries where the levels of public environmental awareness are higher than in the UK (for example, Germany, Austria and the Netherlands) and/or where hotel guests have higher price sensitivity than in the UK, such as in the developing and transitional markets of Eastern Europe and Africa.

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1 Table 1. Interview participants (n=12)

Pseudonym	Gender	Age	Managerial position occupied	Managerial experience in this position	Hotel type
George	Male	In his 40s	Director of Facilities	5 years	Independent
Daniel	Male	In his 30s	Duty Manager	2 years	Independent
Jenny	Female	In her 30s	General Manager	5 years	Independent
Darren	Male	In his 30s	Sales Manager	5 years	Chain-affiliated
John	Male	In his 40s	General Manager	15 years	Chain-affiliated
Sophie	Female	In her 30s	Front Office Manager	5 years	Chain-affiliated
Ryan	Male	In his 60s	General Manager	20 years	Independent
Jonathan	Male	In his 30s	General Manager	6 years	Independent
Katie	Female	In her 20s	General Manager	2 years	Independent
Miguel	Male	In his 30s	Front Office Manager	4 years	Chain-affiliated
Christina	Female	In her 30s	Operations Manager	3 years	Independent
Leonardo	Male	In his 30s	Marketing Director	7 years	Chain-affiliated

2

Table 2. Coding structure with themes, codes, sub-codes and the number of text passages assigned for each sub-code. In red are the sub-codes with the largest number of quotes attracted.

Themes	Codes	Sub-Codes	Number of quotes	% of participants
Environmental impacts of hotels	Magnitude	Substantial	8	67
		Minimal	3	25
		Medium	2	16
	Main impacts	Food waste	9	75
		Water use	4	33
		Energy use	2	16
		Consumption of natural resources	1	8
The need to reduce the environmental impacts of hotel operations	Responsibility	High	8	67
		'Follow the flow'	4	33
	Benefits of reduction	Improved reputation	8	67
		Reduced costs of operations	7	56
Guest behaviour as a driver of energy consumption in hotels	Hotel guests are generally…	Do not care about the environment	10	83
		Have certain levels of environmental awareness	2	16
The new model of energy management in hotels	Installing a SEM	No firm corporate decision made yet / Unsure about the installation timescale	10	83
		Preparing for installation / Already installed	2	16
	Perception of the model	Mostly positive	10	83
		Negative	2	16
	Rewarding guests for using less energy	Positive	11	92
		Negative	1	8
	Type of reward	Loyalty points	8	67
		Money-off vouchers	6	50
		Discount on future stays	1	8

		Guest choice	1	8
	Hotel type the model is best suited for	Hostels	7	58
		Low budget hotels	5	42
		New builds	5	42
		Hotels in rural areas	2	16
		Lifestyle brands	1	8
		Holiday resorts	1	8
		‘Green’ hotels	1	8
		Smaller properties e.g. guesthouses and B&Bs	1	8
		Midscale hotels	1	8
		Any type	1	8

1

2

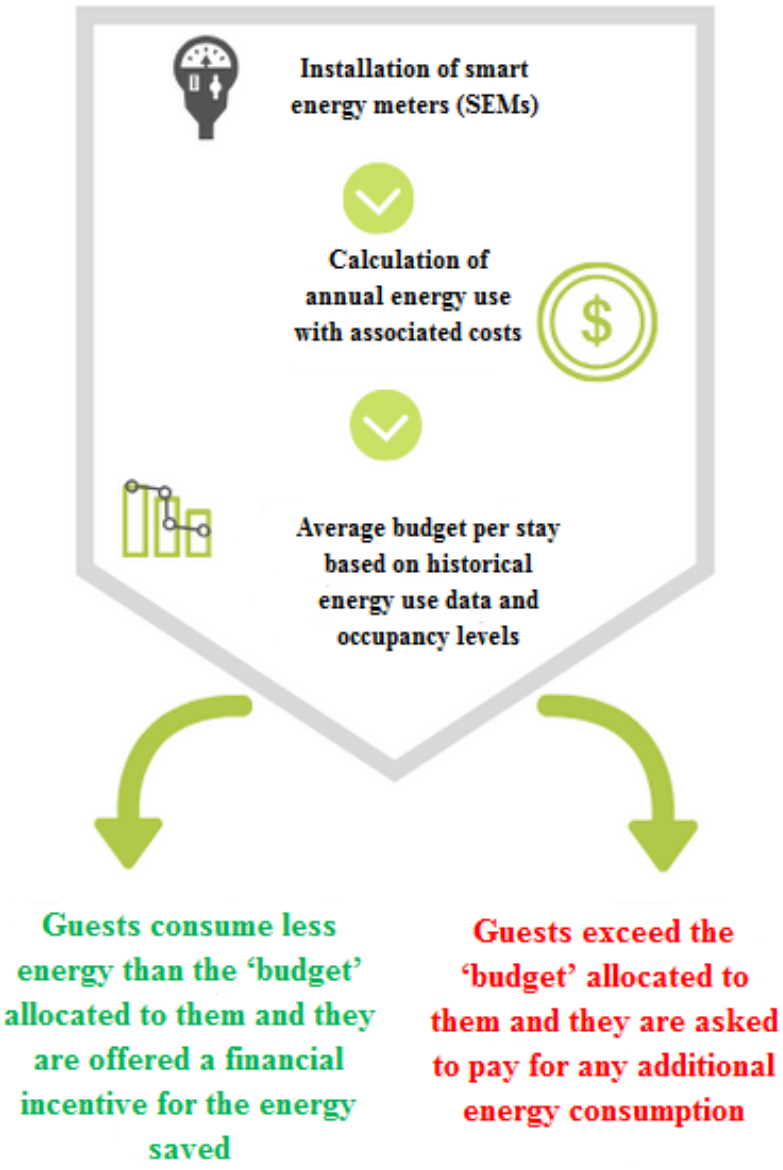

Figure 1. A new 'pay as you use' energy management model for hotels underpinned by the smart energy meter (SEM) technology