Energy Practices among Small- and Medium-sized Tourism Enterprises: a Case of Misdirected Effort?

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Abstract

Discussion of sustainable tourism has become dominated by the issue of climate change. As a major source of emissions, the tourism sector has a vital role to play in efforts to mitigate the effects of climate change. Within the current body of knowledge and among major policy discourses, the prevailing paradigm has been to encourage action: reduced emissions will follow innovations in managerial practices and the uptake of the latest, most resource-efficient technologies. This paper examines energy practices among small- and medium-sized tourism enterprises (SMTEs), reporting empirical research conducted as part of a five-year programme. Although energy was a significant cost of production, it did not feature prominently in the business administration of most SMTEs. A major knowledge gap was exposed regarding how energy was consumed and administered by individual businesses. The paper argues for a major shift in thinking away from the number of actions as the key success criterion. Action alone is no guarantee of emissions reductions in a sector where growth is the dominant imperative. Instead, a crucial reorientation towards stimulating higher levels of energy literacy among SMTEs is necessary in parallel to rebalancing of attention towards energy generation.

Keywords

Tourism; Climate change; SMEs; Energy; Literacy; Generation; Fuel Mix.

1. Introduction

There has been considerable interest in the extent to which the tourism sector may contribute to achieving targets for emissions reductions (Scott et al 2010; Gössling 2013; Peeters and Eljgelaar 2014). Following mainstream thinking (Stern 2007; Giddens 2009; Pinske and Kolke 2009), a major theme on the supply side has been the link between business innovation and climate change mitigation (Scott et al 2012; Coles et al 2014). Consistent with Stern's (2007) view that a delayed response does not postpone

climate change rather than compound the problem further, both academic and policy discourse has stressed the importance of as many tourism businesses innovating as far and as soon as possible (Scott et al 2010; Gössling et al 2010; Coles et al 2013). Central to this logic is that lower emissions should follow changes in managerial practices and production processes that serve to reduce demand for energy and other environmental resources. Business administration of this nature should result in favourable economic outcomes (Simpson et al 2008), although this relationship has yet to be definitively proven (Rodriguez and Cruz 2007; Claver-Cortes et al 2007; Singal 2014).

Of course, the supply side is only one dimension of the tourism sector response to climate change. Pro-environmental behaviour change among tourists (i.e. the demand-side) has an important role to play (Gossling et al 2012; Higham et al 2013) as does regulation and governance (Gossling et al 2010; Becken and Hay 2012; Hall 2013). However, accommodation businesses may be responsible for as much as 1% of all global emissions. Simpson et al (2008: 66) report that in 2005 the tourism sector contributed around 5% of global anthropogenic CO_2 emissions but this 'may be higher (from 5% to 14%) if measured as radiative forcing'. Of that, accommodation (hotels, motels, bed & breakfast, camping, apartments and second homes) accounted for 21% (via energy throughput only), although 'such businesses have considerable options to reduce energy use, which usually offer economic benefits, too' (Simpson et al 2008: 77). Set against this backdrop, this paper examines energy practices among small- and medium-sized tourism enterprises (SMTEs) in the accommodation sector in the South West of England. Within the European Union small- and medium-sized enterprises (SMEs) are defined as companies with fewer than 250 employees and/or turnover less than €50 million (EC 2014). In the UK, as elsewhere around the world, SMTEs dominate the tourism sector (Thomas et al 2011). In 2013, there were 169,000 SMEs involved in accommodation and foodservice (the standard government categorisation) and they accounted for 59.1% of employment and 56.1% of turnover in this area of economic activity (BIS

2013). It is therefore imperative to understand how they have responded to climate change. More specifically, the paper argues for a fundamental shift in thinking from merely implementing pro-environmental measures towards stimulating greater levels of energy literacy among SMTEs. In parallel, it advocates a rebalancing of attention towards energy generation in addition to -and not at the exclusion of- consumption. In the next section, these ideas are initially elaborated through an identification of the main ways in which energy has been studied in and around accommodation businesses.

2. Theoretical Framework

Adoption of the principles of sustainable development has been a longstanding ambition for the tourism sector (Butler 1999). As an inherently consumption-oriented form of human activity (Hall 2011), the main challenge has been to ensure that tourism continues to offer economic and social opportunities but not at the expense of unacceptable levels of environmental resource use and degradation that challenge its future viability. Since the turn of the millennium, this aspiration has become ever more urgent in light of climate change (Hall and Higham 2005; Gossling and Hall 2006). As recent reviews testify (Becken 2013; Kajan and Saarinen 2013), the growing body of knowledge on tourism and climate change has explored a range of issues covering both adaptation and mitigation. As noted above, the tourism sector is a notable generator of emissions and, not surprisingly, there has been considerable interest in mitigation in three broad areas. Behavioural studies (effectively focusing on the demand side) have explored the responses of individual tourists to climate change. This has covered a wide range of issues around the themes of travel choices and behaviours in transit, in particular settings, and at destinations (Barr et al 2011; Cohen et al 2011, 2013; Mair and Laing 2013).

In parallel, supply-side studies have explored the business response. Various motivations to act on climate change have been identified. These range from a sense of corporate social responsibility among larger transnational enterprises (Bohdanowicz and Zientara 2012) to intrinsic personal interest in the environment and climate change among individual entrepreneurs (Sampaio et al 2012a, 2012b). Similarly, several broad syntheses of the academic and grey literatures have identified the many managerial and technological innovations that may contribute to the mitigation effort in accommodation providers in different settings (Simpson et al 2008; Gössling 2011; Scott et al 2012; Becken and Hay 2012). Neither intention to respond nor the identification of prospective solutions have been proven to be clear predictors of whether action will follow and the nature it will take. For instance, through a Cluster Analysis of travel agencies in Hong Kong, McKercher et al (2014: 685) identified five groups defined by their varying knowledge of, and commitment to act on, climate change. However, little action followed because 'the combination of lack of leadership among managers and ignorance among front line staff means that neither feels responsible for, nor able to address the issue'. Similarly, Coles et al (2014) identified three groups of businesses on the basis of their mitigation behaviours. The largest group, comprising over a half of accommodation providers, had taken the least action and implemented the fewest pro-environmental measures.

Connected to both demand- and supply-side perspectives has been discourse on the governance and regulation of travel and tourism. As Hall (2013) demonstrates, the centre of debate has been whether the state must intervene to ensure that tourism participates fully in emissions reduction, or whether producers and consumers will take sufficient voluntary action to ensure that the tourism sector contributes satisfactorily to international and national targets (Gössling 2013; Scott and Becken 2010; Coles et al 2013). Studies like those of McKercher et al (2014) and Coles et al (2014) have suggested very strongly that insufficient action has been taken to date. They have also

pointed to the limits of research on motivations on the supply side: if sub-sector prospects are to be accurately appraised, it is the nature and outcomes of action, not intention, that must be measured precisely.

For the accommodation sector, two principal strands of work have emerged on energy as the vector between tourism businesses and emissions. First, there has been a series of studies measuring the resources required by tourism businesses (and hence emissions), with a view to establishing benchmarks from which to monitor and manage future consumption (Bohdanowicz and Martinac 2007; Beccali et al 2009; Rossello-Batle et al 2010; Filimonau et al 2011). Detailed assessments of the efficiency of individual properties have been conducted, with estimates of resource use for hotels and other accommodation types in Hong Kong (Deng and Burnett 2000; Deng 2003), Singapore (Priyadarsini et al 2009), Taiwan (Wang 2012), Australia (Warnken et al 2005), Italy (Beccali et al 2009), Spain (Rossello-Batle et al 2010; Oreja-Rodriguez and Armas-Cruz 2012), and Turkey (Onut and Soner 2006). Similar exercises have been conducted across the accommodation estates of international hotel chains, like Hilton and Scandic (Bohdanowicz and Martinac 2007).

A second, connected strand has explored the possibilities of new technologies – especially related to renewable energy sources- to enhance the environmental performance of tourism premises and destinations (Karagioras et al 2006; Michalena and Tripanagnostopoulos 2010). For instance, Chan et al (2008) investigated solar control window film as an energy saving device in hotels in Southern China, while Bode et al (2003: 265) demonstrated the potential for holiday facilities to 'be supplied CO_2-emission free with the commodities [of] electricity, water, heat, cold (air) and mobility'. Of course, capability does not always translate into adoption and the rate of uptake depends on such issues as perceived business benefits, payback periods and the capacity for innovation (Dalton et al 2007; Coles et al 2014); the nature of the buildings and premises (Dalton et al 2008; 2009); governance structures and regulatory regimes

(Michalena et al 2009; Coles et al 2013); and the value sets of entrepreneurs, including their personal valorisation of climate change (Tzschentke et al 2008; Chan 2011; Sampaio et al 2012a, 2012b).

A closer reading reveals there are several notable commonalities among the studies in both strands . First, the principal unit of analysis is the business, and energy consumption data are routinely presented in aggregate form. Variations associated with different fuel types are recorded only in few cases (cf Deng 2003; Deng and Burnett 2003; Priyadarsini et al 2009). Mostly this has been to explore the penetration of renewable energy technology into the supply chain and the emissions savings that follow (cf. Beccali et al 2009; Michalena and Tripanagnostopoulos 2010). Alternative scenarios for reducing emissions by altering the modes of generation for existing fuel types are mostly overlooked (cf. Rossello-Batle et al 2010: 553). Instead, a general but axiomatic inference is that reduced reliance on fossil fuels will result in lower emissions. Rarely is there discussion about whether it would be either strategically desirable and/or feasible for tourism businesses to engineer emissions reductions by targeting particular (fossil) fuel types and/or to target cleaner generation techniques in order to optimise the effort. This is curious because there are clear variations in emissions rates through different modes of energy generation (Carbon Trust 2013). Moreover, markets in many economies allow customers to select suppliers and tariffs based on their environmental credentials, not just price. Hence, it is not only reduced demand from a business, but also its sourcing practices that have the potential to result in emissions reductions for individual businesses and from the sector more widely.

In fact, as these studies demonstrate, almost exclusively energy consumption has fixed the scholarly gaze to date: in other words, energy has been examined from a 'downstream' perspective, as it were, after energy has 'entered' a property and has been used. Aggregation has largely obscured disparities in demand for energy from various divisions or activity domains (e.g. guest accommodation, food and beverage,

maintenance, amenities, transport and so), their different trajectories over time, and their capacity to contribute differentially to energy saving and emissions reductions. Some studies have started to interrogate energy use associated with particular services or divisions like laundry, catering services and in the provision of pools, spas and saunas (Bode et al 2003; Filimonau et al 2011). However, micro-geographical variations in consumption practices in particular spaces or settings like guest rooms have been largely overlooked. This is a crucial oversight because, in parallel, demand-side research has demonstrated that for many, travel is viewed as a time for indulgence, not prudence (Barr et al 2012; Hares et al 2010; Cohen et al 2013). Moreover, continued growth is the predominant imperative for the tourism sector globally (Hall 2009, 2011; Gossling et al 2010; Hall et al 2013).

Finally, most of this work starts from the position that there is a rational approach to management decision-making in tourism business. More specifically, it assumes that businesses habitually monitor energy use, and that they have the necessary time and competence to calculate, interpret and respond to the types of metrics that these studies present. Even more fundamentally, it supposes that business owners and managers have certain levels of knowledge within the business that may, for instance, encourage or enable them to adopt the latest energy-related innovations and practices.

Thus, mitigation has assumed a pivotal position in recent discourse because of the sector's contribution to global emissions. However, as the body of knowledge currently stands, there are important limitations in how energy is conceptualised in accommodation businesses. Energy consumption, not generation dominates analysis; basic levels of energy literacy among business owners, managers and employees are assumed; and the frequently-held view is that emissions reductions will follow the implementation of pro-environmental measures. It is to these ideas that we return later in the paper.

[Insert Table 1 near here]

3. Methods

Energy practices among SMTEs were examined as part of a five-year programme of research on climate change mitigation among accommodation providers in the South West of England. This commenced in 2009 and has proceeded in two stages (Table 1). In the first, a mixed methods strategy was employed to examine the motivations, barriers and stimuli to greater mitigation activity. Results from this stage and precise details of the method have been published elsewhere (Coles et al 2013, 2014). An extensive questionnaire survey was completed by 417 randomly-selected businesses. It was accompanied by a series of in-depth semi-structured interviews with 18 owners and/or managers of SMTEs. The methods were intended to be mutually-reinforcing covering such themes as the perceived relationship between the business and the environment; the environmental practices of the business; and business operating parameters (largely as explanatory variables).

Data from the first stage are not a major component in the analysis that follows. Nevertheless, Stage One heavily influenced the design of Stage Two and some baseline data from Stage One are used to corroborate findings in later sections of this paper. As context, it is important to note that the sample size for Stage One was far larger than any other previous research on environmental management or climate change as it relates to tourism businesses, comprising as it did 2.8% of the population of accommodation providers in the region. Instead, this paper focuses mainly on the results from Stage Two which comprised the compilation of a series of more extensive case-histories of energy management and mitigation behaviour. These combined hard quantitative metrics with rich qualitative data. The use of detailed case-studies informed by multiple

data sources is widespread in business and management studies (Yin 2014). At the time of writing, 29 had been completed and no businesses participated in both stages. Details and thumbnail sketches of the subject businesses are provided in Table 2. A purposive sample was derived from businesses expressing interest to participate in a demanding review of their energy use and management. Access to each business, its premises, staff and data was initially requested for two day-long episodes.

[Insert Table 2 near here]

Financial, bill and meterage data were collected alongside key business parameters such as floor-space, occupancy and pricing during the first episode of Stage Two. A pro-forma was developed from the Stage One questionnaire to enable a degree of cross-comparability between stages. During the first visit, data on key operating procedures were also observed and the performance of environmental technologies was measured. Notes of short, unstructured interviews with owners, managers and other employees were taken (not recorded mainly for reasons of anonymity and feasibility). These data were then entered in a database and preliminary analysis was conducted, including the calculation of a series of standard metrics for resource use and efficiency (e.g. energy/CO_2 per m^2, energy/CO_2 per guest-night sold) as well as commercial performance (sales, occupancy, revenue per available room). The United Nations World Tourism Organization Hotel Energy Solutions web tool enabled broad comparisons to be made between participating businesses, and with other international enterprises (HES 2011). In the second episode of Stage Two, initial results were presented to, and discussed with, each business. In some cases additional data were collected and calculations were revised. However, the main role of the second episode was to corroborate, validate and 'sense-test' the initial findings directly with business officers.

Hence, it is through this second episode that a much greater richness of insight was generated. There are multiple methods by which case-studies may be reported (Yin 2014). Perhaps most common in business and management studies is the case-by-case basis. Here this would have been infeasible. Instead, as the quantitative and qualitative material had been entered into several database tables in order to facilitate comparison, Framework Analysis was employed (Barbour 2008). Framework Analysis is a technique used in qualitative research for handling large volumes of data in a relatively structured format (i.e. relating to certain interview questions or emergent themes), ostensibly by tabulation to facilitate cross-comparison. In this research, the technique was an effective means for managing and triangulating the wide range of qualitative and quantitative data that were generated. In fact, from the authors' readings and discussions of the various data, three main cross-cutting themes emerged about the energy practices of the SMTEs, and it is to those we turn in the next section. However, because of the method of data collection, this is for the most part without extensive verbatim quotations. Moreover, this paper does not employ 'quantisization' (i.e. calculating numbers of mentions as allegedly indicative of issue importance) because Stage Two was designed to surface salient issues regarding energy behaviour from a wide range of case histories, rather than establish their representativeness.

[Insert Table 3 near here]

4. Results

4.1 The Characteristics of Participating Businesses

As Table 2 indicates, the size and scale of operations among businesses participating in Stage Two varied markedly, although each satisfied the definitional parameters of an SME. In fact, all bar two are better described as micro-businesses; that is, of less than 10

employees and/or annual turnover less than €2 million (EC 2014). Revenue in the last-complete financial year ranged from £6.6k to £1.08 million. 27 businesses provided serviced accommodation from fixed premises. Just two provided space in touring parks but these were combined with other self-catering opportunities. The businesses ranged in size from 2 to 378 bed-spaces. Rates of annual occupancy varied markedly. The lowest was 14% and the highest was 83%. The businesses were located in both rural and urban settings, and there was a blend of businesses both off- and on-grid for gas supplies (Table 3). Twelve of the businesses had at one point or another been part of a green accreditation scheme, but two had subsequently left.

[Insert Table 4 near here]

The main heating fuel varied. Gas was only predominant where a business was connected to the main grid. All bar two businesses used a mix of energy types. Popular combinations were oil or gas with electricity. Renewable energy generation was not widespread across this sample, with only seven taking this course of action, despite the UK government's recent exhortations to cleaner production (Coles et al 2013). Table 4 presents a series of energy-related metrics. As with the other tables, standard measures of central tendency have little relevance because of the derivation of the sample. However, notable from this table are wide ranges in total annual energy bills, the costs of energy per kWh, and the ratio of total energy costs to revenue. The latter is a surrogate for energy as a percentage of total costs (in so far as SMTEs routinely do not have extensive profit margins). Here energy ranged from equivalent to 2.9% to 21.8% of revenue. The data were also compared to industry benchmarks (cf HES 2011; Hamele and Eckhardt 2006). Fifteen of the businesses were excellent in terms of their energy efficiency (kWh per m^2 per year) while just two were poor or worse (Table 4). Such benchmarks should only be considered indicative because of the original method of

their derivation. For instance, in this research there were some curious juxtapositions: among the 'excellent' category were an SMTE with third-highest energy costs as a proportion of revenue (Business 3) and with the second-highest carbon emissions (Business 5). Mann-Whitney Tests were conducted to examine whether there were significant differences in performance in terms of energy intensity (U=82.0, p=0.376), CO_2 emissions intensity (U=76.5, p=0.289) and benchmark status (U=82.0, p=0.325) between members and non-members of accreditation schemes. In each case there was not. This reflected previous research that membership in such a scheme is not always a strong predictor of enhanced environmental motivation or behaviour (Coles and Zschiegner 2011).

4.2 Energy data availability and use

Most notable from Table 4 is the degree of complexity and variability in the energy behaviours, outcomes and performance measures. Three cross-cutting themes, evident to varying degrees among all the participating businesses, emerged from the juxtaposition of the metrics with the qualitative data.

The first related to the availability and use of energy-related data among these SMTEs. As noted above, energy bills and meterage data were principal sources used in Stage Two. In principle, this sort of information should be readily-available in so far as energy and other utility bills represent a significant cost of production for SMTEs. Prior research in Stage One suggested that energy bills comprised 14.8% of the total cost base for over 400 SMTEs. When water (6.8%) was added, combined utilities comprised over a fifth of costs (Coles et al 2013). Values in Stage Two do not appear as high as averages in large Stage One sample (n.b. slightly different metrics were used). However, energy was still a major commitment for most businesses (Table 4). Even more revealing was that, despite the importance of energy to commercial viability, most of the participants could not immediately present bill or meterage data in the first episode. Instead, post

hoc searches and enquiries of their employees and/or co-workers had to be undertaken. Piecing together the energy profiles of the businesses was a more protracted process than it should have been in an otherwise well-run businesses. The majority of participants reported that they glanced at energy bills when they arrived before adding them to a 'pile of paperwork'. Moreover, where there were cursory inspections, these focused most on the financial quantum of the bill to be paid, not the amount of energy consumed. Once more, this finding was consistent with Stage One in which 10.6% of businesses reported that they did not look at their bills at all, with a further 43.9% looking only when arrived (Table 5).

[Insert Table 5 near here]

Several reasons emerged for this practice. The majority of the businesses were family-run. While the literature has pointed to employees in such enterprises typically taking on multiple roles (Thomas et al 2011), in this research there was routine separation between the person in charge of accounts (i.e. bills) and record-keeping on the one hand, and environmental management and practices (broadly defined) on the other. Extant studies have also stressed the time pressures on employees in SMTEs given their multiple roles (Thomas et al 2011) and the privileged position of revenue management over other business functions (Leask et al 2013; Legoherel et al 2013). This was also the case here. None of the businesses claimed to have a dedicated environmental or resource manager. Instead, energy and environment were part of a diverse portfolio, and all too frequently they plummeted down the list of priorities in the day-to-day running of the businesses. Concentration on the core business proposition was the common reason why greater environmental knowledge had not been further developed. Time to learn more about alternative energy sources or renewable technologies, to calculate payback periods on prospective energy-saving investments, or to estimate cost

savings through switching suppliers was regarded as a luxury. For most participants, such opportunities seldom arose. Servicing guests and the premises as well as sales, marketing and bookings consumed most of their time.

This relegation of energy monitoring and management also resulted from a false sense of security; that is, such issues would 'take care of themselves' as one participant put it. Direct debit payments (often with preferential payment terms), the persistence of billing based on 'estimates', and the visual layout and presentation of bills were frequent reasons why businesses did not engage with energy data. Direct debits meant that energy was 'one less thing to worry about', 'one suppler we don't have to worry about paying', and as long as the monetary value of a particular bill seemed fine, 'there's no point querying it'. 'Estimates' refers to the practice of energy suppliers sending bills in the absence of readings provided by the customer or sourced by the supplier. Based on historical trends, estimates were comforting to many businesses because they were assumed to be correct. They were also helpful because many participants did not take time or responsibility for recording data or entering them to utilities companies. Moreover, they reported they did not have to invest time in 'decoding' complicated, 'hard- to decipher' bills.

In fact, several participants reported that they had little or no idea what the consumption data on their bills actually meant. At their most basic, units like kWh were criticised as being quite abstract. They lacked obvious or direct reference points to their businesses, for instance in the operation of appliances. Hence, they had little use in helping the respondents to make even rudimentary sense of the energy they were using. In none of the businesses was there consideration of how much energy is required as an input to each guest night or for each Pound of revenue generated. As Table 4 indicates, this ranged from under £1 to nearly £4 per guest night. Just like marketing spend, energy is a cost of doing business, a vital component of the balance sheet, and a line to be controlled and managed. However, energy was habitually overlooked in this respect.

Furthermore in many businesses the skills and understanding to calculate metrics similar comparable to Table 4 were lacking.

4.3 Strategic management and energy (il)literacy

The previous account paints a picture of energy as being understood in a basic manner; energy not featuring prominently in routine business administration; and low levels of energy literacy among owners, managers and employees exacerbating this problem. In fact, the research in Stage Two added further, more subtle features regarding how energy featured in the strategic management of SMTEs.

First, rising wholesale and retail prices of utilities in the UK have been the subject of regular public discourse (Doward 2013) because of the common perception of above-inflation increases. From this perspective then, it is remarkable the extent to which business models were orientated so heavily towards revenue generation. For many businesses their future resilience, for some their future success was reported to be aligned almost exclusively with securing future bookings, not to controlling rising costs. Where the idea of cost control was raised, there was a ranking of priorities. The need to manage labour costs (i.e. wages), property costs (interest payments, maintenance) and ancillary services (such as laundry, food and beverage supplies) far outweighed the importance of controlling the costs of utilities. Indeed, energy was perceived as a cost for which more favourable deals with suppliers could not be easily secured. This was consistent with research on household switching (Wilson and Waddams Price 2010). In the few cases where the potential for savings was recognised, a rudimentary trade-off was suggested: more significant savings could be made and more easily in other aspects of the business. Indeed, a potential opportunity cost was identified by a small minority of participants. Significant cost savings for energy were not obvious from basic inspections of bills, offers and promotions. Marginal gains from switching did not warrant the (cost of the) time that had to be invested in assessing

offers. One participant somewhat pejoratively observed that suppliers 'are all as bad as each other'.

Second, energy use and consumption was often managed through the 'line of least resistance' or by 'picking the low hanging fruit' as it was frequently observed. A majority of participating businesses reported that they had taken, or it was their intention to take, a series of relatively straightforward, 'soft' pro-environmental measures, such as installing energy-efficient appliances, lighting, boilers and greater insulation (cf. Coles et al 2014). This is perhaps not surprising in so far as a leading green tourism initiatives in the UK have highlighted such energy- and water-saving initiatives relative to the possibilities of renewable solutions (GTBS 2008). Notwithstanding, a small minority had started to tackle a greater challenge: energy generation (Table 3). As this step required a higher level of knowledge, it was frequently claimed to feature in business plans (much) further in the future. Among this subset, almost all were non-specific about what this meant in practical terms.

Third and connected, several conceptual truncations were evident. Energy was almost always used as a collective noun and there was very little differentiation of the fuel mix by gas, oil, electricity or other sources. This was despite the fact that almost all of the observed businesses used multiple fuels (Table 3). Little thought was given to how heat was (or could be) generated as well as the relative costs (and implications for the business) of generating equivalent heat from oil, gas or electricity (Carbon Trust 2013). Even among businesses heavily or solely reliant on electricity, most were subject to variable tariffs, the exploitation of which would have been beneficial to the balance sheet. Where they were considered, energy sources were for the most part understood in a siloed manner, and without relation to one another. Very few businesses reported taking a 'whole business approach' combining data from different energy sources to create an overall picture of consumption and costs. This was especially the case for fuel types, like oil and wood, that were not readily converted into kWh equivalents. These

fuels also proved more difficult to monitor on a continuing basis. In most cases, costs and quantity were dictated by suppliers through their systems for managing deliveries to customers (i.e. automatic restocking). Of more concern, routine monitoring of gas and oil consumption levels by suppliers was reported by several participants to obviate them of the need to take responsibility.

A small minority did take an integrated view on the basis of energy costs as this was the easiest index to compile for all fuel types. Nevertheless, cost was not an especially sound basis for comparison as regular changes in fuel prices, in particular for heating oil, were reported. The relationship between patterns of cost and consumption was rarely considered. Rising energy bills were the primary concern. Their rise was viewed as a vague threat to profitability, in particular where news stories about wholesale prices were invoked. The primary driver for acting on energy was to make the business more commercially resilient, not to reduce emissions or respond to climate change messages. Where renewables had been introduced, they were primarily a means of attempting to decrease or offset bills through micro-generation tariffs and/or lowering payments to external suppliers. They were not perceived as a means to decarbonise the business.

4.3 Muddled energy-related behaviours and thinking

The majority of participants were disappointed that, despite their best intentions and what many believed to be their best efforts, they had not seen clear progress in bill reduction. Many assumed a clear and almost automatic correlation between costs and consumption: energy saving measures would result in falling consumption which, in turn, would result in lower bills. However, closer inspection through this research revealed that this was frequently not the case. Energy bills had either stayed broadly constant or they had continued to rise, albeit at a slower rate. In some cases, there was evidence of the Jevons Paradox: namely that, although some energy saving measures

had been introduced, total energy consumption had continued to increase, thereby compounding the rate of bill increase.

Among the participants, three common reasons were invoked for this. Each related to a failure to think-through the implications of consumption changes. First, from our reading of the bills and meterage data, unit price increases for fuels had negated the effect of any reductions in consumption. Very few businesses had recognised that consumption has to decline at a rate equivalent to price rises just to have a zero-sum effect on total energy costs. In one of the most perverse cases, a business had converted to a cheaper green tariff. The participant reported that a subsequent increase in total consumption was acceptable in so far as there had been no net change in bills (Business 3). The net increase in emissions that resulted from rising in-business consumption was apparently legitimised by cleaner generation! Another reported that their environmental motivations had led them to install renewables (biomass and solar thermal) at the time of converting the building into a residential conference centre. They had also taken up a green tariff for their electricity use, and they could be confident that they were a low carbon business. However, although they were monitoring regularly they never considered whether their consumption figures were high or low, and it was only through this research and its benchmarking that consumption was discovered to be much higher than it should be (Business 2; Table 4). This was further emblematic of the wider problem: namely, that most businesses generally lack the foundation of understanding what their consumption is, whether this is a good or bad level compared to industry-wide international benchmarks, or where the majority of energy is being used in their businesses.

A second driver behind increased consumption was consumer preferences. Over half of the participants reported that customers demanded higher temperatures, especially in winter, and they made greater use of cooling in the summer. This was reminiscent of recent findings on domestic and office spaces (Hitchings 2013). Over

time there has been an increase in the temperatures at which people feel comfortable especially at home (Palmer and Cooper 2013; Johnston 2014). Participants felt that their businesses were obliged to allow greater heating because their guests' perception of the service environment is 'crucial' to customer satisfaction, re-bookings, and positive word-of-mouth marketing. There were, though, some frustrations. Many businesses reported that their customers had raised thermostats. Towel rails, which were usually electrical (not plumbed into the central heating), were left on during the day. Customers of one business had even altered the storage heaters to operate for longer during day time (when most visitors were out) so that their rooms would be ready warmed for their return (Business 5, Table 4). Unfortunately, electricity was being sourced at peak rates, and the change was only discovered during this research.

Finally, consumption had increased through the upgrading of facilities. Once again this was driven by the perceived need to enhance the customer experience, with the anticipated marketing benefits of stimulating repeat visits and favourable word-of-mouth marketing. It was frequently reported that extensions, in particular new bedrooms, had been added to premises. Larger TVs, more advanced IT equipment, new lighting systems, and leisure facilities such as pools, hot tubs and sauna rooms had also been added to increase the appeal of accommodation businesses. Some participants claimed that displaced demand was even a problem. Businesses had to absorb the cost of charging personal devices such as laptops, cameras, mobile phones, music players, personal games consoles and tablets. Only one business had been 'brave enough' (its own words) to adjust its pricing to reflect either increased customer demand for energy or rising wholesale prices. The accommodation comprised several recently-built lodges that were thermally-efficient and individually metered (Business 24, Table 4). Its strong consumption data was interpreted as a function of its charging customers for the energy they used during their stays. Every other business merely accepted that it would have to absorb the cost. In some cases the cost of energy per bednight was dismissed as

relatively trivial and 'not worth bothering about' in one participants' words (Table 4). This was somewhat surprising given that, as noted above, profitability was the primary business driver, and many SMTEs are marginal businesses (Thomas et al 2011). Moreover, the addition of new facilities clearly had significant implications for total energy demand. For the majority of businesses the energy consumption profile related mostly to space and water heating, followed by lighting. However, there was no evidence to suggest that additional energy requirements had been estimated, nor that their associated costs had been factored into business plans moving forward. Conversely, the ability to generate new revenue from new spaces and facilities had been estimated.

5. Discussion

Although energy is a significant cost of production, this research demonstrates that it is not managed in either an especially effective, thorough or pro-active manner. Standard approaches to business administration may not have anticipated this result; however, it is broadly consistent with the body of knowledge on SMTEs that suggests managers and employees in such businesses lack the time, skills and knowledge to introduce the latest management thinking and techniques (Thomas et al 2011). Moreover, they resonate with McKercher et al's (2014) findings of a lack of leadership promoting a greater response to climate change in the travel trade. Here this is manifest in the relegation of energy and environmental resource management down the list of priorities for business management.

Hence, these results contribute notable counterpoints to some of the existing views on energy-related issues in tourism businesses reviewed in Section Two. Research or policy approaching the issue of energy management in SMTEs from a

rational managerial perspective must be recast. It is insufficient to advocate the implementation of the latest technologies or management systems on their own in the expectation that positive environmental outcomes will automatically follow. As this research reveals, the implementation of pro-environmental measures does not necessarily result in lower consumption or reduced emissions. Countervailing trends in the business (changing visitor demand or expansion) are able to cancel out or diminish the effects of energy-saving technologies.

Instead, calls for action must be accompanied by greater encouragement of measurement and monitoring of energy use. Several studies have noted that motivation on the part of owners and/or managers can be a major obstacle barrier to more tourism businesses taking greater action on climate change (Tzschentke et al 2008; Sampaio et al 2012a, 2012b). As these studies correctly point out, lack of motivation precludes businesses' taking measures like investment in renewable technologies or radically changing their internal procedures. However, the evidence presented here suggests that an equally significant obstacle is a lack of interest (and leadership) among owners, managers and employees in energy-related matters in their businesses. Furthermore, there is a lack of motivation to enhance their basic knowledge and understanding of energy in the business. Hence, before investment in renewable energy solutions or the introduction of dedicated environmental management systems, most SMTEs must innovate in a much simpler way: namely, to compile, interpret and act on energy data as part of their routine management practices. Arguably, measurement and monitoring are a greater priority and should precede other business innovations. After all, it is impossible to judge the effects of change without *a priori* reference points.

Thus, even the quite modest managerial innovation of enhancing energy literacy has the potential to assist SMTEs in contributing emissions reductions while managing a key source of costs to business. Greater energy efficiency should follow from developing better core understandings of how energy is consumed –or indeed wasted- within

SMTEs. Put another way, it does not necessarily follow that the latest technological advances must be implemented for a large constituency of the tourism sector to contribute more to tackling climate change. They may be desirable; however, enhancing basic energy literacy is actually a more essential starting point for policy. Although it may appear relatively simple, there is a clear role for relatively straightforward interventions that educate businesses about how to make best use of their bills; in the subtle but important differences between consumption and costs; and in the benefits of measurement and monitoring. Energy literacy levels clearly vary among SMTEs but among the participants in this research they were frequently low, often lacking basic understandings of the current level of consumption.

Beyond this rudimentary but necessary starting point, further themes would present an obvious progression. Almost all lacked awareness of how and where energy was being used at a micro-level within their businesses, and they were unaware of industry (external) benchmarks. Most had no sense (from an internal benchmarking perspective) of how to assess their performance or their capacity for change. Despite this, several businesses were still able to achieve relatively high benchmarks for environmental performance. Of course this may be a function of the limitations of benchmarking systems; however, viewed in a more optimistic light these results raise the tantalising question of what some of the better-performing businesses could achieve with a modest increase in energy literacy.

Instead, currently the key success criterion for climate change mitigation policy is the number of measures taken (i.e. innovations introduced) by each business (GTBS 2008; Coles et al 2013). Problematically, this emphasis on taking action severs the link between energy consumption and emissions creation. If the desired outcome from policy and practice is reduced emissions, there has to be much greater consideration of both generation and the fuel mix among SMTEs. For instance, the amount of CO_2 per kWh is much higher for electricity than gas (Carbon Trust 2013). There are

opportunities to chose electricity tariffs from cleaner sources and the grid will gradually have a greener mix. Hence, the most important issue is not necessarily the number of pro-environmental measures taken by an SMTE but rather how energy consumption *and* generation are related within businesses and across the sector more widely.

Of course, there are limits to what may be achieved and when. At present many businesses are not prepared to pay a premium for a green tariff and greening the grid remains slow. Moreover, within the global tourism industry the dominant imperative is growth (Hall 2009; Peeters and Elkjgelaar 2014). This was also the case here with reported increases in visitor numbers to participating businesses and their per capita energy demands. However, if the tourism sector (through small- and medium-sized accommodation businesses) is to make a greater contribution towards emissions reduction, it must ensure reductions in the number of units of energy used and/or that the units of energy are 'cleaner'. The introduction of renewables is certainly attractive; however, they are not the sole route to cleaner production among SMTEs. Although further work is clearly required in this respect, this research very strongly suggests that current measures to encourage greater efficiency in SMTEs only serve at best to offset factors that stimulate additional demand. They do not singularly result in emissions reductions.

6. Conclusions

This paper has examined the energy practices of SMTEs in South West England. From an extensive programme of research, the main finding is that the levels of energy literacy among the participating businesses were low. This conclusion is drawn from an detailed analysis of rich empirical case-histories building on a large-scale survey of accommodation providers. Literacy is an abstract concept and this research points to the need to develop frameworks to measure it more precisely in this context.

Notwithstanding, energy illiteracy among SMTEs is a significant impediment to the tourism sector response to climate change. SMTEs dominate the sector numerically and accommodation providers are a major sub-sectoral source of emissions. SMTEs do not always view, consume or manage energy in a rational manner and energy is not viewed as a resource that warrants more proactive management.

Many small- and medium-sized accommodation businesses participating in this research did not take a strategic approach to energy management. They displayed low levels of knowledge and understanding about their own bills and consumption, the fuel mix they used, and how their energy was generated. There was limited awareness of the importance of basic monitoring and measurement of energy use, as well as the benefits –both environmental and economic- of modifying energy behaviours. More specifically, the virtues of using different energy sources were not recognized; energy was viewed in an aggregate sense, not by type or mix; and there was little differentiation among energy sources in a manner that would enable a more targeted approach to cleaner generation. Compounding this, the elevation of energy literacy levels was not considered as beneficial as increased revenue generation and visitor satisfaction. The result was that energy-related thinking and behaviours were frequently muddled and potentially self-contradictory.

Discourse about sustainable tourism is currently dominated by the issue of climate change. However, working towards the goal of its mitigation, this paper has demonstrated that a major shift in thinking is required. Current approaches in policy and practice emphasize action. They encourage businesses to innovate; that is, to introduce pro-environmental measures that should reduce consumption and in turn emissions. Such an imperative is to be expected in light of Stern's (2007) exhortations. However, success should not be measured solely in terms of the number of measures taken to combat climate change. Action is no substitute for encouraging greater energy literacy with measurement and monitoring as core skills. The implementation of pro-

environmental measures is no guarantee of emissions reductions in a sector where growth is the dominant imperative. The implementation of pro-environmental measures is one component in a complex nexus which also involves growing visitor numbers, burgeoning energy demands from customers, unsustainable behaviours on holiday, new technologies and changing energy markets. Future policy interventions have to acknowledge this complexity in their efforts to raise energy literacy. In other words, policy interventions have to foster more widespread skills, knowledge and understanding among owners, managers and employees that will allow as many small tourism businesses as possible to manage their energy profiles more actively and in smarter, more responsive ways. While consumption has been the dominant focus so far, the sector cannot continue to overlook its sourcing practices and the link between generation and emissions.

Acknowledgements

Stage One of this research was conducted with the support of a grant from the Economic and Social Research Council (ESRC) in the United Kingdom, as part of its Business Engagement Scheme in conjunction with Southwest Tourism (Award Number: RES-185-31-0094). Stage Two of this research was conducted with the support of the European Regional Development Fund (2007-2013) as part of its support for the Centre for Business and Climate Solutions based at the University of Exeter.

References

Barbour, R. (2008) *Introducing Qualitative Research: a Student's Guide to the Craft of Designing Qualitative Research.* London: Sage.

Barr, S.W., Shaw, G. and Coles, T.E. (2011) Times for (un)sustainability? Challenges and opportunities for developing behaviour change policy, *Global Environmental Change* 21, pp.1234-1244.

Beccali, M., La Gennusa, M., Lo Coco, L. and Rizzo, G. (2009) An empirical approach for ranking environmental and energy saving measures in the hotel sector. *Renewable Energy*, 34: 82-90.

Becken, S. (2013) A review of tourism and climate change. *Tourism Management Perspectives*, 6: 53-62.

Becken, S. and Hay, J. (2012) *Climate Change and Tourism. From Policy to Practice.* Earthscan: Abingdon.

BIS – Department of Business, Innovation and Skills (2013) Business population estimates for the UK and regions 2013. Online document. Available from: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/254552/13-92-business-population-estimates-2013-stats-release-4.pdf [Last accessed: 31/05/2014]

Bode, S., Hapke, J. and Zisler, S. (2003) Need and options for a regenerative energy supply in holiday facilities. *Tourism Management*, 24: 257-266.

Bohdanowicz, P. and Martinac, I. (2007) Determinants and benchmarking of resource consumption in hotels – case study of Hilton International and Scandic in Europe. *Energy and Buildings*, 39: 82-95.

Bohdanowicz, P. and Zientara, P. (2012) CSR-inspired environmental initiatives in top hotel chains, in: Leslie, D. (Ed.) *Tourism Enterprises and the Sustainability Agenda across Europe.* Ashgate, Farnham, pp.93-121.

Butler, R.W. (1999) Sustainable tourism: A state-of-the-art review. *Tourism Geographies*, 1(1): 7-25.

Carbon Trust (2013) Conversion Factors. Energy and Carbon Conversions. 2013 Update. Online document. Available from: http://www.carbontrust.com/media/18223/ctl153_conversion_factors.pdf [Last accessed: 27/01/14].

Chan, E.S.W. (2011) 'Implementing environmental management systems in small- and medium-sized hotels: obstacles', *Journal of Hospitality and Tourism Research*, 35(1): 3-23.

Chan, W., Mak, L., Chen, Y., Wang, R., Xie, H., Hou, G. and Li, D. (2008) Energy saving and tourism sustainability: solar control window film in hotel rooms. *Journal of Sustainable Tourism*, 16(5): 563-574.

Cohen, S., Higham, J. and Cavaliere, C. (2011) Binge flying: behavioural addiction and climate change. *Annals of Tourism Research*, 38(3): 1070-1089.

Cohen, S., Higham, J. and Reis, A. (2013) Sociological barriers to developing discretionary air travel. *Journal of Sustainable Tourism*, 21(7): 982-998.

Coles, T.E. and Zschiegner, A-K. (2011) Climate change mitigation among accommodation providers in the South West of England: comparisons between members and non-members of networks. *Tourism and Hospitality Research*, 11(2): 117-32.

Coles, T.E., Zschiegner, A-K. and Dinan, C.R. (2013) Climate change mitigation policy and the tourism sector: perspectives from the South West of England. *Journal of Policy Research in Tourism, Leisure and Events*, 5(1): 1-27.

Coles, T.E., Zschiegner, A-K. and Dinan, C.R. (2014). A cluster analysis of climate change mitigation behaviours among SMTEs. *Tourism Geographies* (in press, published online). DOI: 10.1080/14616688.2013.851270

Claver-Cortes, E., Molina-Azorin, J.F., Pereira-Moliner, J. and Lopez-Gamero, M.D. (2007) Environmental strategies and their impact on hotel performance. *Journal of Sustainable Tourism*, 15(6): 663-679.

Dalton, G., Lockington, D. and Baldock, T. (2007) A survey of tourist operator attitudes to renewable energy supply in Queensland, Australia. *Renewable Energy*, 32: 567-587.

Dalton, G., Lockington, D. and Baldock, T. (2008) Feasibility analysis of stand-alone renewable energy supply options for a large hotel. *Renewable Energy*, 33: 1475-1490.

Dalton, G., Lockington, D. and Baldock, T. (2009) Case study feasibility analysis of renewable energy supply options for small to medium-sized tourist accommodations. *Renewable Energy*, 34: 1134-1144.

Deng, S. (2003) Energy and water uses and their performance explanatory indicators in hotels in Hong Kong. *Energy and Buildings*, 35: 775-784.

Deng, S. and Burnett, J. (2000) A study of energy performance of hotel buildings in Hong Kong. *Energy and Buildings*, 31: 7-12.

Doward, J. (2013) Energy bills rise by 37% in three years. Gas and electricity prices are rising at up to eight times the rate of earnings, warns Citizens Advice. The Guardian Newspaper 16/11/2013. Online Document. Available from: http://www.theguardian.com/money/2013/nov/16/energy-prices-rise [Last accessed: 27/01/14]

European Commission (2014) What is an SME? Online document. Available from: http://ec.europa.eu/enterprise/policies/sme/facts-figures-analysis/sme-definition/ [Last accessed: 31/05/14]

Filimonau, V., Dickinson, J., Robbins, D. and Huijbregts, M. (2011) Reviewing the carbon footprint analysis of hotels: Life Cycle Energy Analysis (LCEA) as a holistic method for carbon impact appraisal of tourist accommodation. *Journal of Cleaner Production*, 19: 1917-1930.

Giddens, A. (2009) *The Politics of Climate Change* (Cambridge: Polity Press).

Gössling, S. (2011) *Carbon Management in Tourism. Mitigating the Impacts on Climate Change.* (London: Routledge).

Gösslng, S. (2013) National emissions from tourism: an overlooked policy challenge? *Energy Policy*, 59: 433-442.

Gössling, S. and Hall, C.M. (2006) *Tourism and Global Environmental Change* (London: Routledge).

Gössling, S., Hall, C.M., Peeters, P. and Scott, D. (2010) The future of tourism: can tourism growth and climate policy be reconciled? A mitigation perspective. *Tourism Recreation Research* 35(2): 119-130.

Gössling, S., Scott, D., Hall, C.M., Ceron, J-P. and Dubois, G. (2012) Consumer behaviour and demand response of tourists to climate change. *Annals of Tourism Research*, 39(1): 36-58.

Green Tourism Business Scheme (GTBS, 2008) *The Green Tourism Business Scheme. Master Criteria. Quality in the Environment.* Perth: GTBS.

Hamele, H. And Eckhardt, S. (2006) *Environmental Initiatives by European Tourism Businesses. Instruments, Indicators and Practical Examples. A Contribution to the Development of Sustainable Tourism in Europe.* Saarbrucken: ECOTRANS.

Hall, C.M. (2011) Consumerism, tourism and voluntary simplicity: we all have to consume, but do we really have to travel so much to be happy? *Tourism Recreation Research* 36(3): 298-303.

Hall, C.M. (2013) Framing behavioural approaches to understanding and governing sustainable tourism consumption: beyond neoliberalism, 'nudging' and 'green grwoth'? *Journal of Sustainable Tourism*, 21(7): 1091-1109.

Hall, C.M. and Higham, J.S. (2005) (eds.) *Tourism, Recreation and Climate Change.* Clevedon: Channel View Publications.

Hares, A., Dickinson, J. and Wilkes, K. (2010) Climate change and the air travel decisions of UK tourists. *Journal of Transport Geography*, 18(3):455-473.

Higham, J., Cohen, S., Peeters, P. and Gossling, S. (2013) Psychological and behavioural approaches to understanding and governing sustainable mobility. Journal of Sustainable Tourism, 21(7): 949-967.

Hitchings, R. (2013) Sharing concentions: communities of practice and thermal comfort. In: Shove, E. and Spurling, N. (eds.) *Sustainable Practices: Social Theory and Climate Change*. Abingdon: Routledge, 103-114.

Hotel Energy Solutions (HES, 2011) *Energy Efficiency and Renewable Energy Applications in the Hotel Sector.* Madrid: UNWTO, 2nd Edition (2011).

Johnston, I. (2014) Some like it hot: survey shows that British homeowners bask in temperatures warmer than a summer's day. *The Independent*, 29/01/2104. Online document. Available from: http://www.independent.co.uk/news/uk/home-news/some-like-it-hot-survey-shows-that-british-homeowners-bask-in-temperatures-warmer-than-a-summers-day-9092000.html [Last accessed: 31/01/2014]

Kajan, E. and Saarinen, J. (2013) Tourism, climate change and adaptation: a review. *Current Issues in Tourism*, 16(2): 167-195.

Kariagiorgas, M., Tsoutos, T., Drosou, V., Puffray, S., Pagano, T., Lara, G. and Mendes, J. (2006) HOTRES: renewable energies in the hotels. An extensive technical tool for the hotel industry. *Renewable and Sustainable Energy Reviews*, 10: 198-224.

Leask, A., Fyall, A. and Garrod, B. (2013) Managing revenue in Scottish visitor attractions. *Current Issues in Tourism*, 16(3): 240-265.

Legoherel, P., Fyall, A. and Poutier, E. (2013) *Revenue Management for Hospitality and Tourism.* Oxford: Goodfellow.

Mair, J. and Laing, J. (2013) Encouraging pro-environmental behaviour: the role of sustainability-focused events. *Journal of Sustainable Tourism*, 21(8): 1113-1128.

McKercher, B., Mak, B. and Wong, S. (2014) Does climate change matter to the travel trade? *Journal of Sustainable Tourism*, 22(5): 685-704.

Michalena, E. and Tripanagnostopolous, Y. (2010) Contribution of the solar energy in the sustainable tourism development of the Mediterranean islands. *Renewable Energy*, 35: 667-673.

Michalena, E., Hills, J. and Amat, J-P. (2009) Developing sustainable tourism, using a multicriteria analysis on renewable energy in Mediterranean islands. *Energy for Sustainable Development*, 13: 129-36.

Onut, S. and Soner, S. (2006) Energy efficiency assessment for the Antalya Region hotels in Turkey. *Energy and Buildings*, 38: 964-971.

Oreja-Rodriguez, J. and Armas-Cruz, Y. (2012) Environmental performance in the hotel sector: the case of the Western Canary Islands. *Journal of Cleaner Production*, 29-30: 64-72.

Palmer, J. and Cooper, I. (2013) *United Kingdom Housing Energy Fact File.* Cambridge: DECC.

Peeters, P. and Eljgelaar, E. (2014) Tourism's climate change mitigation dilemma: flying between rich and poor countries. *Tourism Management*, 40(10): 15-25.

Pinske, J. and Kolk, A. (2009) *International Business and Global Climate Change* (London: Routledge).

Priyardarsini, R., Xucao, W. and Eang, L.S. (2009) A study on energy performance of hotel buildings in Singapore. *Energy and Buildings*, 41: 1319-1324.

Rodriguez, F.J.G. and Cruz, Y. (2007) Relation between socio-environmental responsibility and performance in hotel firms. *Hospitality Management*, 26: 824-839.

Rossello-Batle, B., Moia, A., Cladera, A. and Martinez, V. (2010) Energy use, CO_2 emissions and waste throughout the life cycle of a sample of hotels in the Balaeric Islands. *Energy and Buildings*, 42: 547-558.

Scott, D., Peeters, P. and Gössling, S. (2010) Can tourism deliver its 'aspirational' greenhouse gas emission reduction targets? *Journal of Sustainable Tourism*, 18(3), pp.393-408.

Scott, D., Hall, C.M. and Gössling, S. (2012) *Tourism and Climate Change. Impacts, Adaptation and Mitigation.* Abingdon: Routledge.

Sampaio, A.R., Thomas, R. and Font, R. (2012a) Why are some engaged and not others? Explaining environmental engagement among small firms in tourism, *International Journal of Tourism Research*, 14, pp.235-249.

Sampaio, A.R., Thomas, R. and Font, X. (2012b) Small business management and environmental engagement, *Journal of Sustainable Tourism*, 20(2), pp.179-193.

Singal, M. (2014) The link between firm financial performance and investment in sustainability initiatives. *Cornell Hospitality Quarterly*, 55(1): 19-30.

Stern, N. (2007) *The Economics of Climate Change: the Stern Review*. Cambridge: Cambridge University Press.

Thomas, R., Shaw, G. and Page, S.J. (2011) Understanding small firms in tourism: a perspective on research trends and challenges. *Tourism Management*, 32(5): 963-976.

Tzschentke, N.A., Kirk, D. and Lynch, P.A. (2008) Going green: decisional factors in small hospitality operations, *International Journal of Hospitality Management*, 27, pp.126-133.

Wang, J.C. (2012) A study on the energy performance of hotel buildings in Taiwan. *Energy and Buildings* 49: 268-275.

Warnken, J., Bradley, M. and Guilding, C. (2005). Eco-resorts vs. mainstream accommodation providers: an investigation of the viability of benchmarking environmental performance. *Tourism Management*, 26: 367-379.

Wilson, C.M. and Waddams Price, C. (2010) Do consumers switch to the best supplier? *Oxford Economic Papers* 62(4): 647-668.

Yin, R.K. (2014) *Case Study Research. Design and Methods.* Thousand Oaks: Sage, 5th edition.

Table 1: The research programme at a glance

Stage	Period	Main features of the research
1	2009-2011	Mixed methods research strategy Questionnaire survey -31 questions, 417 usable returns, 8.9% response rate, 2.8% of population Semi-structured interviews -18 in total, range of business types, Up to an hour in length Funded by Economic and Social Research Council (ESRC)
2	2012-2014	Case-study approach Intensive in-business research over minimum of 2 days 29 participant businesses (to January 2014) Combination of primary data (observation, measurement) and secondary data (bills, meterage etc.) Over 150 parameters measured or calculated Funded by European Regional Development Fund (ERDF)

Source: authors

Table 2: Basic parameters of businesses participating in Stage 2.

Business	Bedspaces	Bedrooms	Annual Occupancy	Sector	Last Quality Rating*	Location type:	Annual revenue (£k)
1	2	1	83%	Self catering	-	Rural	16
2	45	20	30%	Residential conference centre/ wedding venue	-	Rural	330
3	12	6	54%	Self catering	-	Rural	24
4	17	9	67%	B&B	3*	Urban	115
5	44	21	46%	Self catering	4*	Rural	175
6	6	3	59%	B&B	4*	Coastal	36
7	149	30	14%	Guest Accommodation, Venue, Touring Park	Mixed	Rural	1,760
8	16	8	39%	Self catering	4*	Rural	44
9	18	7	44%	B&B	4*	Coastal	85
10	42	21	63%	Guest House	4*	Urban	204
11	12	6	39%	Hotel	3*	Coastal	65
12	12	6	49%	Restaurant with rooms	5*	Urban	246
13	32	16	71%	Self catering	5*	Rural	240
14	14	7	30%	Self catering & B&B	4*	Rural	45
15	12	6	48%	Self Catering	4*	Rural	44
16	32	12	45%	Self catering	-	Rural	91
17	8	4	55%	Self catering	4*	Rural	46
18	4	2	16%	B&B	4*	Rural	7
19	378	92	22%	Holiday Park & self catering	4*	Rural	229
20	56	30	43%	Self Catering lodges	4*	Rural	147
21	86	44	41%	Hotel	3*	Rural	1,080

22	6	3	39%	B&B	4*	Coastal	30
23	41	18	43%	Self Catering	4*	Rural	53
24	20	10	30%	Group Accommodation & Venue	-	Rural	119
25	14	7	31%	B&B/ self catering	-	Coastal	63
26	12	6	39%	B&B	4*	Coastal	55
27	12	5	15%	B&B	-	Rural	50
28	14	7	65%	Guesthouse	-	Coastal	72
29	11	6	76%	Guesthouse	-	Coastal	55

* In some cases businesses had terminated their participation in grading schemes. – denotes had not subjected themselves to assessment

Source: authors' fieldwork (to January 2014)

Table 3: Energy mix and other selected characteristics of businesses participating in Stage 2

Business	Main heating fuel	On gas grid?	% Electricity		% Gas	% LPG	% Oil	% Wood chip	% Solar thermal generated	% wood logs	Laundary is:
			(bought)	(generated)							
1	Gas	Yes	84%		16%						Inhouse only
2	Wood chip/ electricity	No	43%			9%		46%	1%		Outsourced only
3	Oil	No	18%				72%			3%	Outsourced only
4	Gas	Yes	32%		68%						Inhouse only
5	Electricity	No	100%								Mix
6	Gas	Yes	26%		74%						Inhouse only
7	Wood chip	No	15%	19%		16%	1%	48%			Inhouse only
8	Oil	No	16%	5%			79%				Inhouse only
9	Oil	No	30%				70%				Inhouse only
10	Gas	Yes	18%		82%						Inhouse only
11	Gas	Yes	11%		89%						Outsourced only
12	Gas	Yes	38%		62%						Mix
13	Oil	No	30%				70%				Mix
14	Oil	No	11%				89%				Mix
15	Oil	No	12%				88%				Mix
16	Oil/LPG	No	29%			32%	40%				Inhouse only
17	Gas	Yes	24%		76%						Mix
18	Oil	No	3%				97%				Inhouse only
19	LPG	No	34%			66%					Outsourced only
20	Gas	Yes	21%		79%						Mix

21	Gas	Yes	34%		66%						Inhouse only
22	Gas	Yes	46%		54%						Inhouse only
23	Electricity	Yes	100%								Outsourced only
24	Wood chip	No	22%	1%		10%	15%	44%	8%		Mix
25	Oil	No	29%			71%					Mix
26	Oil	No	24%				53%			23%	Inhouse only
27	Oil	No	20%			3%	41%			36%	Mix
28	Oil	No	17%				83%				Inhouse only
29	Gas	Yes	19%		81%						Outsourced only

Source: authors' fieldwork (to January 2014),

Table 4: Energy-related operating parameters among SMTEs participating in Stage 2

Business	Energy - kWh annual total	Energy annual total bill	Cost of Energy - £/kWh	Energy cost as % of revenue	Energy£ per guestnight sold	Energy kWh per guestnight	Energy - kWh per m^2 (year)	HES Benchmark	CO_2 per m^2	Green Accredited
1	12,657	£578	£0.046	3.6	£0.95	21	316	Average	79	-
2	244,762	£18,236	£0.075	5.5	£4.42	60	462	Very poor	196	Silver
3	37,212	£2,988	£0.080	12.5	£1.35	16	124	Excellent	40	-
4	66,321	£5,404	£0.081	4.8	£1.38	17	172	Excellent	51	-
5	120,829	£15,225	£0.126	8.7	£2.06	32	177	Excellent	170	Bronze
6	32,049	£2,691	£0.084	7.5	£2.09	24	143	Excellent	41	-
7	1,181,622	£42,559	£0.036	2.4	£0.85	24	37	Excellent	138	-
8	58,056	£4,261	£0.073	9.8	£2.01	27	241	Good	68	Silver
9	66,735	£4,712	£0.071	5.6	£1.64	30	182	Excellent	63	-
10	220,139	£8,212	£0.037	4	£0.86	22	301	Average	77	-
11	77,990	£3,685	£0.047	5.7	£2.25	48	233	Good	54	-
12	116,825	£7,471	£0.064	3	£3.94	61	289	Average	92	Silver
13	176,330	£14,783	£0.084	6.2	£1.79	21	260	Good	93	Gold
14	118,527	£8,222	£0.069	18.4	£5.29	72	444	Poor	134	-
15	59,464	£3,894	£0.065	8.9	£1.86	30	24	Excellent	74	GA
16	88,092	£7,759	£0.088	8.5	£1.75	20	118	Excellent	31	-
17	29,433	£1,530	£0.052	3.3	£0.95	18	267	Good	74	Silver
18	22,865	£1,438	£0.063	21.8	£6.25	99	207	Good	63	Gold
19	117,894	£10,720	£0.091	4.7	£0.55	6	26	Excellent	1.8	Silver
20	151,868	£7,344	£0.048	5	£0.85	18	178	Excell	45	Bronze

21	833,659	£45,986	£0.055	4.3	£3.77	68	202	Good	61	-
22	16,831	£719	£0.043	2.4	£0.85	7.5	43	Excellent	14	-
23	20,952	£2,633	£0.126	5	£0.50	3.9	27	Excellent	15	-
24	166,598	£8,131	£0.049	6.9	£3.45	67	243	Good	14	(Gold)
25	53,138	£4,341	£0.082	6.9	£3.45	42	221	Good	78	-
26	30,923	£2,039	£0.066	3.7	£1.20	18	121	Excellent	49	(Silver)
27	28,657	£1,877	£0.065	3.8	£2.94	45	171	Excellent	27	-
28	36,523	£2,400	£0.066	3.3	£1.08	16	190	Excellent	40	-
29	28,232	£1,578	£0.056	2.9	£0.69	12	115	Excellent	30	-

Source: authors' fieldwork. HES Benchmarks from HES (2011: 17)

Notes: HES (2011) benchmarks for kWh per m^2 per year: Excellent (<195), Good (195-280), Average (280-355), Poor (355-450) and Very Poor (>450). These are based on quintiles i.e. a frequency distribution from a meta-analysis.

Green Accreditation: Bronze / Silver / Gold – had attained respective grading for Green Tourism Business Scheme (GTBS). Those in brackets had subsequently left the scheme at the time of the research. GA – Green Acorns

Table 5: Monitoring behaviours of energy bills among SMTEs in Stages 1 and 2

Review of energy bills....	Stage 1	Stage 2
Not at all	10.6%	3.4%
As bills arrive	43.9%	51.7%
Six monthly	20.9%	10.3%
Quarterly	11.3%	6.9%
Monthly or more frequently	13.4%	27.6%

Source: authors' fieldwork