A survey of tourist operator attitudes to renewable energy supply in Queensland, Australia

G.J. Dalton*, D.A. Lockington, T.E. Balck

School of Engineering, University of Queensland, Brisbane, Queensland 4072, Australia

Received 8 February 2006; accepted 17 February 2006
Available online 17 April 2006

Abstract

The results of a survey describing the attitude to renewable energy supply (RES) amongst tourism accommodation providers in Queensland, Australia, are presented. A 65% response rate was achieved. Results showed that 9.2% of respondents had some form of RES, and that the majority of operators were interested in RES but mixed in opinions as to its marketing value for their operation. Tourist operators believed their industry is resistant to RES implementation due to reservations regarding RES power supply limitations, reliability and economic viability. Possession of a RES by the respondent did not affect this attitude. Analysis of variation in response with geographical position revealed a coastal versus interior difference. Likewise, a breakdown of responses according to accommodation type indicated that accommodation size had a significant bearing on operator opinion. Higher proportions of respondents from large operations such as large hotels and self-catering accommodation returned affirmative responses regarding RES marketing capabilities and confidence in RES than the smaller operations, which included small hotels, stations and villas/cabins.

© 2006 Elsevier Ltd. All rights reserved.

Keywords: Renewable energy supply; Survey; Tourist hotel accommodation; Uptake; Attitudes; Barriers

1. Introduction

In Australia, there is increasing pressure from both the political arena, e.g. Agenda 21 [1] and the Australian Greenhouse Challenge [2], as well as consumer opinion [3], to address energy consumption within industry and its consequent effect on greenhouse gas (GHG)
emissions [4]. The tourism industry’s percentage contribution to national energy consumption in Australia is low compared to heavy industry [5]. However the industry is forecast for strong growth and is believed to be sensitive to its environmental image. Furthermore, many tourism destinations are situated in environmentally sensitive locations [6] and often aligned with local sustainability agendas.

Reduction in fossil fuel consumption and GHG emissions can be achieved by either (1) implementation of energy efficiency measures or (2) use of Renewable Energy Supply (RES). The former is a relatively well studied area [5,7–9]. However, the present state of renewable energy use and attitudes to its implementation in the Australian tourism industry have not been thoroughly examined to date and will be the focus of this paper. Knowledge gained may assist future strategies designed to encourage increased use of the technology.

Studies investigating RES use within the tourism industry in a number of countries report uptake rates between 6% and 25% (i.e. the proportion of operations surveyed using some form of RES as part of their power supply) [10–12]. While there are few studies of tourist operator interest in RES, there are a number of studies examining accommodation providers’ attitudes to environmental initiatives more generally. The results of these studies may reflect attitudes to RES indirectly and are thus worth considering in the present context. The majority indicate favourable interest by operators towards sustainable initiatives for their operations [11,13–15]. Bohdanski [16] reported that European operators consider the environment to be an important factor in the development of the tourist industry. However, Hobson’s study of tourist operators [17] concluded that lack of interest and time were some of the many reasons why operators were not keen on adoption of sustainable management practices. Studies in Australia of the tourist sector’s interest in RES are very limited. Lloyd [18] surveyed a number of tourism operations in central Australia, however the number of operators interviewed was insufficient to draw any general conclusions. A non-tourism small to medium size enterprise (SME) survey in Australia [19] showed that 66% of the respondents viewed environmental sustainability as important or vital to their business.

Another factor which will influence operators’ attitude to RES, is their perception of its value in marketing their operation. Buckley [14] asserts that it is advantageous for a tourist operation to market its environmental initiatives, and Massau [3] states that tourist operations that market their environmental initiatives experienced an increase in visitor numbers. The Australian government paper ‘Marketing Renewable Energy’ [20] states that certain types of renewable energy technologies appear to have a strong tourist attraction potential (wind and hydro schemes quoted as examples). However, studies indicate that tourist operators are failing to exploit this potential: Knowles [11] reports that only 50% of operators marketed their environmental initiatives and Kirk [15], Bohdanski [7] and Reddy [21] in three further studies conclude that marketing of environmental initiatives was not as important as other factors in the surveyed operations. Reluctance to market environmental initiatives may be due to the operator’s fear of its negative impact on tourist perception of the comfort of the destination. A survey by Forsyth [22] indicates that many large hotel groups believe some ‘sustainable’ practices, such as water and energy conservation, to be in conflict with their provision of ‘luxury accommodation’ and might adversely affect the enjoyment of a guest’s stay. However surveys of tourist attitudes to operations and destinations which emphasise environmental sustainability, or have RES, report that over 50% of tourists questioned favoured environmentally conscious destinations [3,23–26].
Naturally, attitudes to RES are also related to perceived limitations of the technology with one of these being its inability to satisfactorily supply power demand. There have been many studies examining the capability of RES in this respect. Bakos (in two case studies of Greek hotels) [27,28] reported successful PV installations. RES systems, including combinations of PV, wind, and mini-hydro have similarly been reported to satisfy power demand for non-tourist operations [29–31]. Hybrid RES systems, consisting of a fossil fuel supply in combination with RES is also a very efficient configuration, with successful installations in both tourism [32] and non-tourism operations [33–35]. However, studies examining user feedback regarding RES and satisfaction with power capability are few. In a study of indigenous householders in central Australia Lowe [36] reported that one-third of those in possession of a RES maintained that the power supplied was insufficient to satisfy their needs.

The reliability of RES has also been identified as one of the most important concerns for consumers [37]. Born [38] noted “that the intermittent nature of renewables and varying load profiles results in highly unpredictable power flows”. The Bushlight study in Western Australia [18] examined RES reliability in 32 tourist and non-tourist operations. Fifty per cent of the sites reported problems with the RES components. The failure rate for RES systems within tourist operations was lower than that found for indigenous communities and pastoral properties. Studies examining RES reliability report increasing reliability of RES as technology develops, e.g. photovoltaics (PV) [39], wind turbines (WECS) [40] and passive solar heating [41]. A Mexican study [42] of RES installations in remote villages in Mexico reported that all installations examined failed due to a wide range of reasons varying from inappropriate technology, lack of spare parts, inadequate maintenance, backup and funding. The attitudes of owners to domestic RES installations in Daintree, tropical North Queensland, Australia [43], illustrates the subtle relationship between perceived RES reliability and operator sympathy. Those householders who had a strong interest in RES also had ‘successful’ installations—despite problems, while others, unsympathetic to RES, were more prone to systems failing.

Researchers examining RES economic viability likewise report negative sentiment amongst candidates surveyed. Danielson [44] stated that economics was the main barrier for renewable energy implementation for Greek hotel owners, with other reports examining non-tourist operations conveying similar findings [45–50]. The Australian Bushlight study [18] stated that cost factor was one of the main weaknesses in considering RES. Future reduction in production and retail costs will follow advances in RES technology, making its adoption more economically viable [51].

The present paper reports the results of a survey examining tourist operator perceptions to RES, targeting a candidate pool from Queensland, Australia. This State contains the full spectrum of accommodation types and a varied geography and climate ranging from humid tropical and subtropical regions on the coast to arid tropical and subtropical regions in the interior. Analysis of replies also aims to determine if respondent response varies due to location and the nature of the accommodation. A successful survey depends largely on the percentage of completed responses returned by the candidates [52], and a high return rate ensures that the survey results were representative of the target population [53]. The survey used a number of dissemination and follow-up techniques in an attempt to maximise the response rate, and the success of these will be briefly summarised in the paper.
2. Methodology

2.1. Target respondents

The total pool of 167 tourist operator candidates was selected from Queensland with name and contact details obtained from both the official Queensland Tourism website as well as individual operator websites (Fig. 1).

Inspection of location within Queensland may reveal variations in responses from factors ranging from climatic influences, such as humidity, solar and wind, etc. in the area, to possible variations in attitude to tourism within a region due to the nature of the majority of the surrounding industry. Investigation of remoteness may reveal a higher incidence of SPS installations, which might stimulate operators to consider RES as an alternative. Therefore, the state area was split into three geographic regions:

1. Tropical Coastal Queensland (TCQ) (all areas north of Townsville and east to and including the Great Dividing Range). This region has a warm humid wet year round climate, and geographically consists of a coastal zone and mountainous hinterland, with rainforest vegetation. The area has a low population density. The main industry is agriculture, with tourism also playing an important contribution.

2. Subtropical Coastal Queensland (SCQ) (all areas south of Townsville to the NSW border and east to and including the Great Dividing Range). This region has warm wet summers, and mild dry winters, geographically similar to its northern neighbour except vegetation consisting of dry eucalypts interspersed with pockets of rainforest. The area has a high suburban population density. Tourism is concentrated in two areas: Gold Coast and Sunshine Coast, south and north of Brisbane, respectively.

3. Interior Queensland (IQ) (the remainder of Queensland west of the Great Dividing Range). This region has an arid tropical/subtropical climate, dry hot summers, with
occasional heavy rains, and mild dry winters. Geographically the area is relatively flat with scrub vegetation. The area has a very low population density depending almost entirely on agriculture and mining.

Coastal Tropical and Subtropical Queensland are occasionally grouped together forming Coastal Queensland (CQ). While an even distribution of candidates across the three regions is desirable, the majority of tourism enterprises are located in CQ and this is ultimately reflected in the distribution of the selected candidates (Table 7). The accommodation sector was split into the following accommodation types:

1. Large hotels (accommodation hotels with more than 100 beds).
2. Small hotels/motels (accommodation with less than 100 beds). (referred to as small hotels from here on).
3. Lodges (cabin or villa type accommodation with reception and leisure facilities. No limit to the number of beds).
4. Self-catering accommodation (individually owned apartments sublet)
5. Stations (farming premises that have accommodation facilities). All stations contacted in the survey were located in IQ.
6. Villas/Cabins (no reception or leisure facilities).

As for the regional distribution, an even pool of operators from each accommodation category is desirable. However, Table 8 shows that the majority of accommodation enterprises consisted of Large hotels and Lodges. Managers or maintenance managers/chief engineers were the respondents targeted to participate in the survey. Further background details acquired were operations’ specific location (i.e. whether island, beach/coastal, coastal hinterland, mountain, interior) and operators’ perception of their level of remoteness (operations were deemed remote in this survey if they were 5 km distant from their closest large urban centre, population over 5000).

2.2. Survey questions

Tables 1 and 2 describe the 6 survey questions to be discussed in this paper based on the knowledge gaps and objectives identified in Section 1. Questions 1–3 ask for operators’ personal opinions, whereas questions 4–6 ask for the operator’s perception of the ‘industry’ attitude.

2.3. Survey format

The survey was sent to candidates by two methods; 50% by post and the other 50% by e-mail attachment. Both formats were used as it is of interest to find out what form of dispatch would result in the highest response rate.

2.4. Dissemination method and response

A preliminary phone call was made to all candidates—managers and engineers/maintenance staff. This was to introduce the candidate to the concept and purpose of the survey, secondly, to obtain correct e-mail and postal details of the recipient and thirdly, to ask which dispatch method would suit them best. Up to 3 further phone calls were made,
spaced one month apart, to all candidates that did not reply after the initial survey dissemination.

The survey achieved a 65% response rate (Table 3)—a high response rate when compared to other surveys in the tourism sector that did not use phone call follow-up (Table 4). The downside of this exercise was the considerable time and cost involved.

2.5. Analysis of survey dispatch method

The high number of returns enabled us to make some assessment of the success, or attitude of candidates, to different dispatch methods of the survey:

1. Sixty-six per cent of those contacted by e-mail responded whereas only 42% of postal candidates did (Table 5). The higher percentage of respondents failing to reply by the
postal method suggests that postal dissemination could be an inefficient and expensive method of contact. However it must be remembered that the high return rate was due mostly to phone call follow-up. Most other surveys that do not have phone call follow-up report that postal dispatch achieves the highest success rate [57,58].

2. Sixty-five per cent of e-mailed candidates replied by e-mail, the remainder replying by fax. No e-mailed candidates replied by post. Fifty-four per cent of candidates sent surveys by post, replied by post, the remainder replying either by e-mail or fax (Table 6).

Thus it can be seen that e-mail dissemination produced the highest number of responses and was the most popular return response method. Fax return was used extensively as an alternative response method by both ‘postal’ and ‘e-mail’ candidates, and was only offered as an alternative after a number of operators requested it. Postal dissemination did not encourage candidates to respond as much as e-mail, and when they did respond, they were more likely to choose an alternative form of reply, namely e-mail or fax. Postal replies still consisted of a significant proportion of the total replies and to not include it as an alternative dispatch (if budget and time is not an issue) may introduce a bias in the results.

<table>
<thead>
<tr>
<th>Table 3</th>
<th>Number of successful respondents survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target candidate pool</td>
<td>167</td>
</tr>
<tr>
<td>Candidates who did not respond</td>
<td>59</td>
</tr>
<tr>
<td>Candidates who did respond</td>
<td>108</td>
</tr>
<tr>
<td>Response rate (%)</td>
<td>65</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 4</th>
<th>Response rate of international hotel surveys</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hotel survey location</td>
<td>Reference</td>
</tr>
<tr>
<td>New Zealand</td>
<td>[5]</td>
</tr>
<tr>
<td>Southern European</td>
<td>[54]</td>
</tr>
<tr>
<td>UK</td>
<td>[55]</td>
</tr>
<tr>
<td>Australian phone survey</td>
<td>[56]</td>
</tr>
<tr>
<td>Australian small/medium tourist operators</td>
<td>[19]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 5</th>
<th>Total surveys sent and number of failed replies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial dispatch method</td>
<td>Total sent</td>
</tr>
<tr>
<td>E-mail</td>
<td>79</td>
</tr>
<tr>
<td>Post (plus 3 faxed)</td>
<td>78</td>
</tr>
<tr>
<td>Closed</td>
<td>3</td>
</tr>
<tr>
<td>Phone call replies</td>
<td>7</td>
</tr>
<tr>
<td>Total</td>
<td>167</td>
</tr>
</tbody>
</table>
Non-responding candidates were contacted up to three times by phone if they did not reply by a certain target date. Results showed that each successive phone call convinced around 50% of remaining non-respondents to reply.

3. Returned response analysis

Table 7 shows that 65% of the total Queensland candidate pool completed the survey. The response rate for TCQ and SCQ was higher by 10% than IQ. Most accommodation sector types had a response rate of 60–70%, except for Small hotels, where only 30% of targeted candidates replied (Table 8). Hundred per cent of Self-catering operators responded, which was not expected due to the decentralised nature of such operations [59].

Contacting the maintenance manager or chief engineer, produced the highest return rate in comparison to contacting the managers, with 85% return rate in the case of the former and 62% the latter case (Table 9).

4. Results/discussion

The following section is a summary of the responses to each of the six questions. The responses to each question are analysed as an aggregate as well as according to ‘region’ and ‘accommodation type’ to identify any associated trends. A brief cross-comparison is also attempted to check on consistency between responses to the different questions. It should be noted that since respondents did not always answer every question the total respondent number varies from question to question.

4.1. Proportion of respondents with a RES installation (Q1)

Overall result: 9.2% of tourist operators surveyed have some form of RES installation (Table 10). The Queensland tourism sector uptake rate is thus similar to that reported in

European studies [10,11], although less than the 25% rate reported in the southern European HOTRES study [12]. The RES identified in the latter survey consisted mostly of passive solar heaters.

**Regional variation:** The results showed no variation in the uptake of RES between the regions of Queensland, with all three regions having approximately 10% uptake (Fig. 2). The RES installation uptake for IQ is similar to that of IQ indigenous communities reported by Lloyd [18]. Lloyd’s report also comments that the percentage uptake rate in Queensland was lower than for other communities surveyed in other States.

**Influence of accommodation type:** The accommodation providers with the highest number of RES installations were Lodges and Villas/cabins with 16% installation rates (Fig. 4). Large hotels followed at 7%. Only one Station out a total of six (16%) had an installed RES (all the Stations in this survey were located in IQ). Small hotels surveyed had no RES installed. There was no notable variation with region in RES uptake for each accommodation type.

<table>
<thead>
<tr>
<th>Survey accommodation type in Queensland survey no 2</th>
<th>No reply</th>
<th>Yes reply</th>
<th>Total pool</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small hotels</td>
<td>17</td>
<td>7</td>
<td>24</td>
</tr>
<tr>
<td>Large hotels</td>
<td>15</td>
<td>29</td>
<td>44</td>
</tr>
<tr>
<td>Lodge</td>
<td>10</td>
<td>29</td>
<td>39</td>
</tr>
<tr>
<td>Self catering accommodation</td>
<td>0</td>
<td>22</td>
<td>22</td>
</tr>
<tr>
<td>Station</td>
<td>4</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>Villas/cabins</td>
<td>11</td>
<td>13</td>
<td>24</td>
</tr>
<tr>
<td>Total</td>
<td>57</td>
<td>106</td>
<td>163</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 9 Respondent type and % successfully replying</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title</td>
</tr>
<tr>
<td>Maintenance manager</td>
</tr>
<tr>
<td>Manager</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 10 Responses to Questions 1–6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Questions</td>
</tr>
<tr>
<td>Q1</td>
</tr>
<tr>
<td>Q2</td>
</tr>
<tr>
<td>Q3</td>
</tr>
<tr>
<td>Q4</td>
</tr>
<tr>
<td>Q5</td>
</tr>
<tr>
<td>Q6</td>
</tr>
</tbody>
</table>

*Note:* Respondents did not reply to all questions, thus not all totals are the same.
4.2. Proportion expressing interest in installation of a RES (Q2)

This question aims to assess a tourist operator’s interest in future RES installations for their operation. In the absence of regulatory incentives, success in improving uptake of RES within the tourism sector is expected to depend on whether tourist operators have a fundamentally positive attitude towards the use of RES.

**Overall result:** Seventy-one per cent of respondents expressed positive interest in considering RES installations (Table 10). There was consistency in response between Q1 and Q2, that is, those that had RES from Q1 also expressed an affirmative interest in RES in Q2. Although there is no direct research in the literature examining tourist operators’
interest in RES, the result can be compared to surveys which question tourist operators on their interest in general environmental initiatives. Thus, the 71% of operators in this present study who are interested in RES is a similar result to operator interest in the importance of environmental initiatives reported by Bohdanski [7], but is in conflict with Hobson’s conclusions [17].

**Regional variation:** Respondents from SCQ had the highest percentage of affirmative responses at 76%, followed by TCQ and IQ, 70% and 61%, respectively (Fig. 2). The higher interest in RES by tourist operators in SCQ region in comparison to TCQ may be explained as follows: the number of domestic tourists in SCQ outnumbers international tourists by 3:1, whereas they are of roughly even proportion in TCQ [60]. Bushell [61] reports that domestic tourists have a higher demand for environmentally conscious tourist operations than the international tourist. Thus the higher number of domestic tourists who are seeking environmentally aware destinations, may be encouraging increased operator interest in RES. The lower percentage of affirmative responses in IQ is more difficult to explain; although the ratio of domestic to international tourist numbers is even higher in IQ at approximately 8:1, the above observation of domestic tourists driving increased tourist operator interest in RES does not appear to hold true. Considering IQ region has more remote areas than the coast, use of SPS diesel systems would be more common in the area [62], and should lead to operators being familiar with the concept of RES as an alternative. The region also has the most favourable number of sunshine hours conducive to successful PV installations. However, this possible familiarity with SPS or advantage in environmental supply is not leading to an increased interest in RES. The influence of accommodation type analysed in next section also indicates how the small size of accommodation types also has an important bearing on operator opinion in IQ.

**Influence of accommodation type:** Seventy-five per cent of operators responding for Villas/cabins and both Small and Large hotels returned a positive response regarding interest in RES installations (Fig. 4). This similarity in opinion towards RES between

![Fig. 4. Accommodation response to Question 1, 2 and 3.](image-url)
different hotel sizes contrasts with Hobson’s conclusions which stated that small hotels were less concerned with environmental initiatives than larger hotels [17]. Lodges had the highest percentage of interested operators at 82%, substantiating other studies which imply that Lodges are more likely to be environmentally conscious [63]. The lowest response was from Stations, all of which are located in IQ and represent one-third of the respondent pool for that region. Thus the large number of negative responses from this accommodation type was the major factor contributing to IQ region having the lowest percentage of affirmative responses to Q2.

4.3. Perceived marketing potential of RES for tourist operations (Q3)

Studies conducted on the marketing effectiveness of RES for tourist operations have indicated that certain types of RES have tourist attraction potential [20] and that marketing of an operation’s RES leads to an increase in occupancy [3]. Question 3 in the survey queried Queensland accommodation providers’ opinion on the effectiveness of including RES in their marketing strategy.

**Overall result:** Fifty-four per cent of operators agreed with the statement that RES could be of benefit for their operation (Table 10). The remaining 46% replied that RES marketing would have negligible impact. Importantly, no operators commented that marketing of RES would be a ‘drawback’. The rate of response was not higher for operators who already had RES, indicating that possession of a RES did not affect attitude to RES marketing potential. There was a positive relation between responses to Q2 and Q3; that is all operators that responded affirmatively that RES is a beneficial marketing tool, also expressed interest in installing a RES.

If we equate interest in the marketing potential of ‘environmental initiatives’ to that of interest in the marketing potential of RES, the result is similar to that reported by Knowles [11]. It is a weaker response than that found in a broader study of Australian small-medium enterprise (SME) study [19], implying that the tourism industry may have less confidence in the marketing potential of environmental initiatives than SMEs as a whole. Kirk [15] noted that operators considered the environmental initiatives of the hotel more successful in the area of “community relations” than “marketing advantage”. Forsyth [22] suggests that operators could fear tourists may not be keen on environmental initiatives adopted by a tourist resort since they may equate sustainability with discomfort, noise and visual pollution. However, the result from the survey showing that no operators consider marketing of RES a ‘drawback’ implies that operators would not expect their business to suffer if they did market RES, or feel that tourists would view an operation negatively as a result of RES marketing. This is backed up by further surveys examining tourist attitudes to destinations which emphasise environmental sustainability policies, or have RES, with over 50% of tourists questioned favouring environmentally sensitive destinations [3,23,25].

**Regional variation:** Regionalised results revealed substantial differences in opinion between CQ and IQ (Fig. 2). Sixty per cent of CQ operators expressed an affirmative opinion concerning the role of RES in their operations’ marketing strategy, compared with only 20% of IQ operators. This difference between CQ and IQ is in alignment with similar differences in response rates between the regions in Q2, although even more exaggerated. A study of tourist habits in Crete [64] concluded that inland destinations tended to attract tourists seeking natural environments while those visiting the coast are mainly interested in comfort and leisure destinations. The reasons why IQ operators are not confident in the
potential of marketing RES to cater for this market preference is unclear. The fact that there is only one eco-accredited tourist provider in IQ in the Eco-Tourism Australia database [65] indicates the low priority given to eco-marketing in the area.

Influence of accommodation type: Examination of response according to accommodation type also showed large variations in opinions (Fig. 4). Stations, which are the largest accommodation provider in IQ region in the survey, expressed no interest in the marketing potential of RES (zero affirmative responses). This aligns with their low percentage of affirmative responses for Q1 and Q2.

All the other accommodation providers returned a positive response rate between 50% and 65%, with the exception of Small hotels at 33%. It is interesting to note that Self-catering accommodation in SCQ had similar percentages of affirmative responses to most other accommodation types, and 20% more than Villas/cabins. This contrasts with the GCCC survey report [66] which indicated that Self–catering operations were the least interested and cooperative of all the accommodation types with respect to the adoption of environmental initiatives.

Kirk’s [15] study of Edinburgh hotels examines operation size and its effect on operator opinion regarding environmental policies and their benefit for marketing. He concludes that large operations perceived more of an advantage than smaller operations. Unfortunately he did not inspect accommodation type in more detail, therefore a direct comparison with this study cannot be made. Two separate studies [17,67] examining tourist operator attitude to environmental initiatives and hotel size concluded that small operations tend to be cost management focused and less interested in sustainability as a marketing tool than larger operations which have a more holistic orientation to marketing.

Examining Large hotels in SCQ in more detail, 66% of ‘non-remote’ operations returned a positive response compared with only 33% of ‘remote’ operations. Self-catering accommodation showed the opposite trend with location and ‘remoteness’. Hundred percent of operations in SCQ that were ‘remote’, returned affirmative responses, whereas only 40% of their ‘non-remote’ counterparts did so. Similar trends are observed with ‘remoteness’ in TCQ, with results showing only 30% of ‘non-remote’ operators returning an affirmative response. Closer inspection revealed that the majority of these were located directly on the coast with beach access. There were no ‘remote’ Self-catering accommodations in TCQ. These conflicting variations in results for large CQ accommodation providers will invite further survey studies to determine to what extent, and why, location and/or ‘remoteness’ are factors affecting operator opinion.

4.4. RES ability to supply enough power (Q4)

One of the main priorities of a tourist operation is to have a power supply capable of supplying demand. This includes sufficient reserve to cope with seasonal demand variations, power surges and peaks throughout a normal day. One of the major challenges for RES is to be able to satisfy this demand. Question 4 asks for operators’ perception of the tourist industry’s view regarding the ability of RES to supply the full power requirements of a resort of over 10 rooms. Note that Q 4, 5, 6 refers to tourist operator opinion of industry attitude to the said statements.

Overall result: Tourist operators in Queensland are almost unanimous in believing the industry considers that RES cannot meet the power demands of an operation, with only 14% disagreeing with the statement (Table 10). This result does not reflect whether
operators think RES can provide sufficient power in hybrid combination with a diesel generator or for smaller applications within their operation (e.g. water heating, water pumping). None of the operators who had RES (Q1), disagreed with the statement, implying that possession of RES, instead of increasing confidence in RES power capabilities, appears to have a negative effect. Despite the fact that there have been international case studies that demonstrate RES can supply all the power requirements for a tourist operation [27,28] or general operations [29–31,68,69], the results of this survey indicate that end-user opinion is not confident. Further studies are required to ascertain why this negative perception exists, and whether the alternative of RES hybrid systems might prove to be a more favourable option.

**Regional variation:** Regional variation in operator response was minor (Fig. 3). Ten percent of CQ returned ‘disagree’ in response to the statement, decreasing to 0% for IQ. Lloyd’s [18] report on Wilpena Pound tourist operation in Central Australia demonstrated that a properly constructed RES hybrid set-up is capable of providing all the power that is required for a correctly sized operation. Another study by Lowe and Lloyd [36] pointed out that “unrealistic expectations of RES capabilities and lack of understanding of good power economising (e.g. power surging, peak demand and load shedding)” was a major reason why Central Australians have a negative view of RES.

**Influence of accommodation type:** Splitting the respondent pool into accommodation type revealed no major variation in response; no provider type exceeding a 20% ‘disagree’ response (Fig. 5). However if the accommodation types are further split into their regional location within Queensland, results reveal that 33% of Self-catering accommodation operators in SCQ disagreed with the statement, dropping to 0% in the TCQ. Contradicting this trend in TCQ versus SCQ are Large hotels, which in TCQ returned a 25% ‘disagree’ response but in the SCQ returned 5%. A possible explanation for the variation in results between the two regions may lie in the role of the operations respondent. The only respondents who disagreed with the statements were managers (graphs not shown in this...
paper). On the other hand, virtually no responses from engineers/maintenance staff were ‘disagree’. These staff formed the respondent majority in the case of Large hotels in the SCQ, and this is reflected in the result. It would be expected that professional engineers will have a more informed technical knowledge of RES than managers. It is interesting to note then their present negative view of RES capabilities.

4.5. Confidence in RES reliability (Q5)

Another major factor that is important for accommodation operators when considering power supply for their operation is reliability of supply. Reports have indicated that RES can be an unreliable supply [18,36,42]. Tourist operators may be well aware of this reputation and may fear that risk of intermittent power supply may negatively impact on a tourist’s experience of a quality holiday destination. The statement posed in Q5 aims to gauge operators’ perception of their industry’s opinion of RES ability to compete as a reliable source of alternative power.

Overall result: Results from the survey indicate a general perception of lack of confidence in the tourist industry regarding RES reliability—19% of respondents disagreed with the statement (Table 10). This aligns with other studies on non-tourist destinations, which examined opinions on RES reliability [18,37,44]. Furthermore, only one of the 10 operators who had a RES installation in Q1 also disagreed with the statement in Q5, implying that possession of a RES can negatively impact on an operator’s confidence in RES reliability. This is a similar trend to the negative relationship between RES ownership in Q1 and attitudes to RES power capabilities concluded from responses to Q4.

Regional variation: Regional variations in response illustrated the same trends as Q4, with almost no ‘disagree’ responses to the statement in IQ, and only 21% ‘disagree’ in CQ (Fig. 3). These results align with negative tourist operator attitude to RES reliability concluded from both Lloyd’s [18] and Burton’s [43] surveys, although the latter study did emphasise that RES reliability and operator confidence increased with operator interest in RES. Lowe [36] in his Central Australian study pointed out that RES reliability is a big issue for operators, stating that “this negative reputation of RES demonstrates that there is a need for the renewable energy industry to produce standardised, reliable, user-friendly designs”.

Influence of accommodation type: There was no major variation in response due to accommodation type (Fig. 5). Five of the six accommodation types had below 20% of respondents disagreeing with the statement, with no Villas/cabins responses disagreeing. The only accommodation type above 20% was Large hotels, with 30% of respondents disagreeing. It is interesting to observe that when the Large hotels group was split into the two coastal region locations, the percentage of operators disagreeing with the statement in TCQ increased to 37%, while their SCQ counterparts dropped to 26%. It remains to be determined in future studies why large hotels have a higher confidence in RES reliability, and confirm to what degree geographic location actually influences opinion.

All providers in IQ indicated little confidence in RES reliability, with almost no ‘disagree’ responses across accommodation types (an exception was one respondent from a Station. However, respondent number in IQ was small, thus conclusions are indefinite).
4.6. Economic viability of RES (Q6)

Perhaps the most important consideration for a tourist provider when considering RES is its economic viability. Grid connected electricity is still cheap, especially for large operations. Large subsidies still exist in Australia for diesel SPS schemes. Operators might consider RES if it could compete with conventional power sources within a 4–8 year financial plan, or ideally have a positive cash flow after that period.

Question 6 asked operators for their perception of the tourist industry’s opinion of the statement that RES is not economically viable for a small to medium sized business.

**Overall result:** Fifteen per cent of operators responded with ‘disagree’ to the statement that RES is not economically viable (Table 10). When examining the response of operators who have a RES (in Q1), the percentage of respondents disagreeing with the statement increased to 66%. This is in contrast to the much lower number of disagree replies for the same respondents who had RES and their replies to Q 4 and 5. It implies that acquiring a RES may increase operator confidence in its economic viability, but not in its power capabilities or reliability; which appears contradictory. The negative attitude to RES economic viability observed in this survey reflects similar sentiment identified in other studies [45–50]. However case studies examining RES economic viability in the tourist industry [28,32,70] demonstrate RES is economically viable or expected to be viable in the near future [51]. Thus consumer education and awareness about RES needs to be addressed in this area in order to correctly inform operator opinion.

**Regional variation:** An average of 15% of respondents in all regions disagreed with the statement, with little variation between regions (Fig. 3).

**Influence of accommodation type:** There was no major variation in response between the accommodation types (Fig. 5): all returning a ‘disagree’ response rate of 20% and below (the only exception to this was small hotels, where 2 of the 6 hotels disagreed with the statement.). No Stations responded to the question with ‘disagree’. Analysis of results for variation in response for a given accommodation type between the different regions produced only one appreciable increase in the average disagree percentage response rate. This was Lodges in the SCQ, with 33% disagreeing with the statement (further follow-up will be necessary to ascertain what factors contributed to this result).

5. Summary and conclusion

Sixty-five per cent of candidates responded to the survey with phone-call follow-up being the most important factor in yielding the high response rate.

The responses indicated an 9.2% uptake of RES by tourist operators in Queensland, which is similar to most other studies of tourist operations examining uptake rate (although uptake rate was only half that of one major European study).

The majority of operators were interested in the possibility of installing RES for their operation and this aligns with related studies examining tourism industry attitudes to environmental initiatives. A fundamental interest by tourist operators in RES is essential to the viability of future strategies for increasing RES uptake.

A mixed response was obtained when operators were asked for their opinion of the value of RES as a marketing tool, with 50% agreeing it was beneficial. The remaining 50% were of the opinion it would have negligible impact, with no respondents replying it would be a
‘drawback’. This compares with other studies examining operator attitudes to the marketing value of RES within the tourism industry.

Response to the final three questions on perceived industry attitudes to RES power capabilities, reliability and economic viability, indicates a negative sentiment. This presents a significant barrier to uptake and will have to be addressed before operators will be more inclined to consider RES. Importantly, the few operators possessing a RES responded even more negatively in comparison to operators that did not have a RES. Many other studies have also concluded that consumer confidence is low regarding RES capabilities and economic viability. These issues are likely to be resolved with improving technology and increased market demand.

Geographic analysis of results revealed that there was a noticeable difference in attitudes between Coastal and Interior Queensland. IQ returned proportionally fewer affirmative responses to all six questions, especially to Q3 regarding their attitude to the marketing potential of RES. The factors contributing to this negative sentiment by IQ respondents are unknown and were not expected in this survey.

Larger operations in general had a higher proportion of RES-affirmative responses to the survey questions than smaller operations. In particular, Large hotels had the highest percentage of affirmative responses regarding perceived RES marketing benefits and this aligns with Edgar’s [67] observation that large tourist operations are more likely to consider marketing of environmental initiative as an important component for overall business strategy. Lodges had the highest percentage of affirmative responses regarding interest in RES installation substantiating their reputation as being environmentally aware [63]. Self-catering accommodation, which is the fastest growing accommodation sector in Queensland [71] and often viewed as not being environmentally conscious due to its multiple owner investor structure [66], had similar proportions of operators interested in RES installations and marketing value as other accommodation sectors. In contrast, the small accommodation providers, Villas/cabins and Stations, had the lowest proportion of affirmative responses. This may be explained by the fact that small businesses may think that due to their size, they have little impact on the environment, and thus excuse themselves from any environmental obligation [67]. The high proportion of RES-affirmative responses for large hotels may be due to perceived market pressure to be ‘Green’ and are better informed on RES related issues due to intra hotel-chain energy management initiatives. Thus Large hotels at present may be the accommodation type most favourable to future adoption of RES.

In conclusion, responses from Queensland tourist operators indicate a positive interest in RES and a mixed response regarding its marketing potential for their operation. Most tourist operators perceive RES to have many inherent problems and disadvantages in comparison to fossil fuel based alternatives. Further research is needed to determine the specific origins of attitudinal barriers and how they may be addressed.

Acknowledgements

Funding from the Sustainable Tourism Cooperative Research Centre (CRC), Australia has supported this work (http://www.crctourism.com.au/).
References

[56] Energetics Ltd. Study of energy use and the potential for increased energy efficiency in the accommodation industry. Sydney, Australia: Commonwealth Department of Primary Industries and Energy; 1995.


