LAND ENVIRONMENT & PEOPLE

Managing Energy Use in Tourism Businesses – Survey Results

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Chapter 1
Key Results at a Glance

- Energy is a substantial cost factor in tourism businesses (80% agreed strongly or agreed). This was particularly evident amongst accommodation providers and attraction/activity operators.
- Electricity is the most commonly energy source used by tourism businesses (93%); diesel, petrol and LPG are also important (38%, 38% and 37%, respectively).
- Seventy-five percent of respondents believed that they have a good understanding of energy use and efficiency.
- When asked if energy monitoring would help reduce energy consumption in their tourism business, 76% of respondents strongly agreed or agreed.
- Sixty percent of businesses already measure and monitor their energy use; the attraction/activity subsector was most likely to measure/monitor (67%).
- The preferred way to measure and monitor energy use is in dollar terms (64%); only 39% measure consumption in physical or energy units (e.g. kWh for electricity, litres for diesel). Measuring physical consumption enables businesses to monitor improvements independent of price increases.
- In total, 32% of businesses believed that they could reduce their energy consumption substantially; transport providers were least convinced that they could reduce energy use.
- Three quarter of all respondents have implemented measures to reduce energy use. Fourteen percent stated that they had not implemented any measure yet but had plans to do so.
- The most commonly implemented measures relate to lighting, switching off appliances, fuel switch (e.g. to gas or solar), purchase of energy efficient equipment and insulation. A wide range of measures is presented in the report.
- Most energy saving measures relate to buildings, but an impressive range of measures has also been implemented for reducing the need for transport and shortening travel distance.
- Many businesses were able to report concrete savings due to energy initiatives; these varied substantially but were often in the order of 10 to 20%. Detailed examples are provided in the report.
- Monitoring of improvements was found to not always be straight forward, for example because of a lack of benchmarks, insufficient data or complex interacting factors (e.g. weather, occupancy levels).
- Energy costs represent between 1% of gross operating revenue for Inbound Tour Operators and 13% for motels. Transport operates reported levels of 7% to 10%.
- About half of respondents reported that they have a good understanding of carbon footprinting. Thus, understanding of carbon emissions is lower compared with energy use. Attraction/Activity operators reported the highest level of understanding and transport operators the lowest.
- Hostels / holiday homes, Inbound Tour Operators, consultants and education providers, lodges, hotels and attractions were most likely to believe that tourists will increasingly demand low-carbon business practices.

Chapter 2
Introduction

As part of a three-year project on Tourism & Oil[1], the responses of tourism businesses to energy costs and carbon emissions were analysed. Results from this study will be relevant for energy reduction initiatives by the Tourism Industry Association and for carbon footprinting projects by the Ministry of Tourism. This energy survey will also inform other objectives in the wider Tourism & Oil project, for example the construction of a Tourism General Equilibrium Model and the development of adaptation measures for tourism businesses. This study will increase our understanding of the energy sources used by tourism businesses and measures that have already been implemented to reduce energy consumption.

1 For more information see http://www.leap.ac.nz/site/story.asp?bid=24&storyid=25248

Chapter 3
Method

In partnership with the Tourism Industry Association an online survey was sent via email to all members recorded in the TIA database. The online tool used for this survey is called Questionbuilder. Out of currently 1523 members[2], 417 replied to the survey. This is equivalent to a response rate of 27.4%. Not every respondent replied to every single question and sample sizes are provided in the Results section, where appropriate.

Since participation was voluntary it is possible that there is a bias towards those businesses or organisations for whom energy is an important issue and who already spent some time and thought on dealing with energy use in their management. Respondents who consider energy use as being of little importance are possibly less likely to be represented in this survey. The results should therefore be interpreted as the 'positive end' of a spectrum of business perspectives and practices.

Most respondents (243 out of 417) are accommodation providers (Table 1). Hosted accommodation (including Bed & Breakfast accommodation) and holiday parks are the largest accommodation categories represented in the survey.

Amongst the 76 attraction/activity[3] providers who responded to the survey, 19 businesses represented adventure activities. Sixteen operators identified themselves as some form of ecotour businesses, for example guided walks or cycling trips. Some of these businesses had classified themselves as transport providers, but for the purpose of this analysis were assigned to attractions/activities.

Of the 40 transport provides who responded, 19 offer various kinds of tours, often personalised tours or wine trail tours. Finally, 58 organisations or businesses fall in the category of "other". They represent Regional Tourism Organisations, Inbound Tour Operators, travel agents and other support services.

2 Not all tourism businesses (estimated to be up to 18,000) are members of TIA, and there is probably a tendency that the very small businesses are less likely to be a member than the bigger ones.
3 The sample sizes do not allow for a separation of attractions and activities, but it is acknowledged that they may differ quite substantially.

Table 1
Responses to the Survey by Category

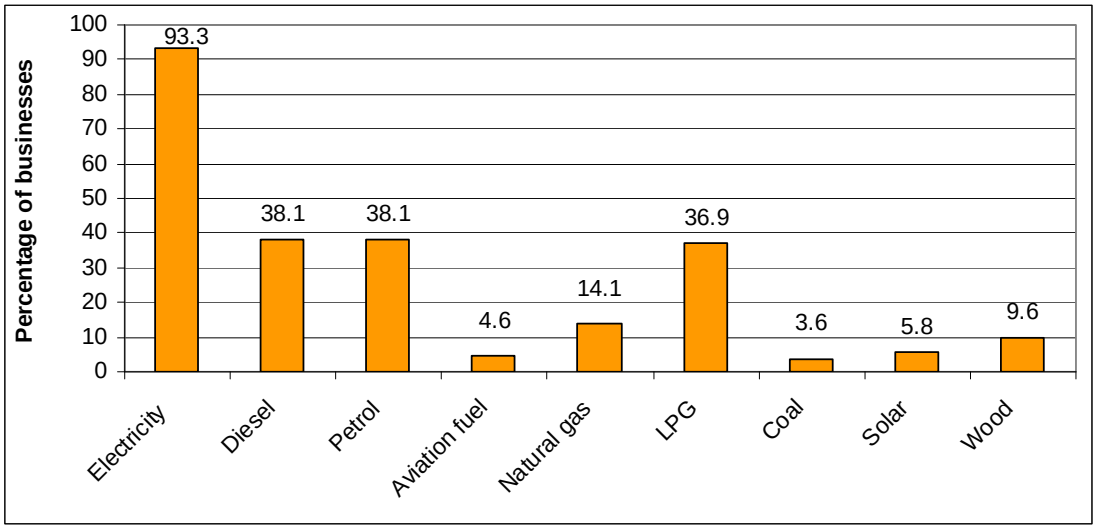
Category	Number of respondents (N)	Details
Accommodation		
B&B/Farmstay	56	(inc. home stays)
Holiday Park/Camping	56	
Unspecified	34	
Motel/Motor Inn	37	
Lodge/Retreat	30	(two with golf course)
Hotel	16	
Hostel/Holiday home/ Apartment	13	(inc. backpacker accommodation and self-contained apartments)
	243	
Attraction/Activity		
Adventure	19	(inc. jet boating, horse riding, yacht charter, sky diving etc)
Ecotour/guided walk	16	(inc. nature tours (also by bus), guided walks and cycle tours)
Stationary attraction	15	(inc. Cultural performances, museum, zoo, day spa, retail, restaurant etc)
Scenic air/boat	14	(6 boat cruises, 6 flight operators, two combined)
Unspecified	12	
	76	
Transport		
Tours/Coaches	19	(inc. wine tours, sightseeing, transfers etc.)
Unspecified	11	
Rental vehicles	10	(inc. cars and campervans)
	40	
Other		
Consultant/Education institutions	13	(5 consultants and 8 educational organisations)
Travel agent/visitors information	14	(inc. booking outlets and online services)
Regional Tourism Organisation	12	
Inbound Tour Operator	12	
Support Services	8	(inc. Local Government, Marketing, Event management etc.)
	58	
TOTAL	**417**	

Chapter 4
Results

4.1 Background Information on Energy Use in Tourism Businesses

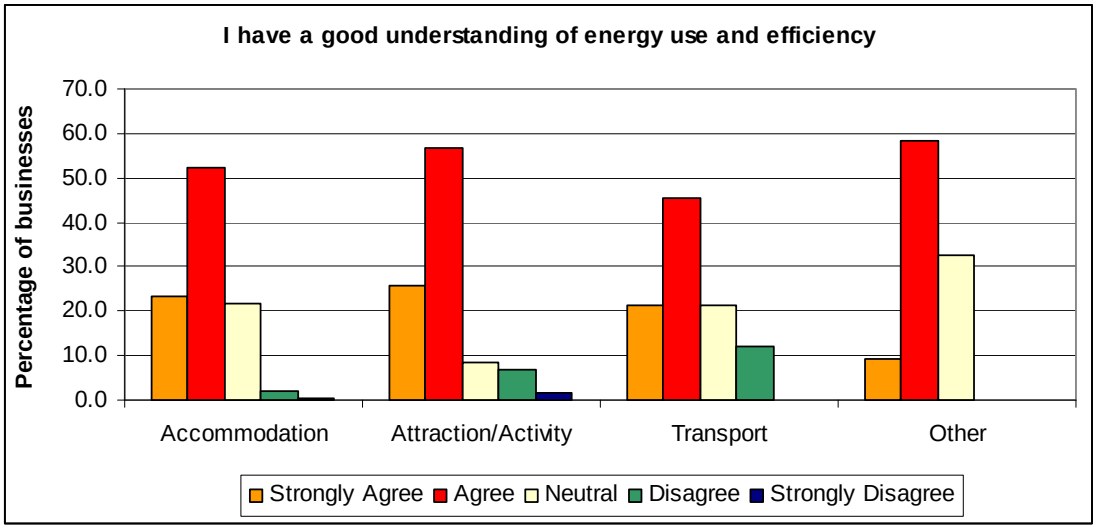
Almost all tourism businesses rely on electricity to some extent (93.3%). Other very important sources of energy are diesel, petrol and LPG, used by over one third of respondents. Almost 6% of respondents noted that they installed solar energy (largely for water heating) (Figure 1).

Figure 1
Energy sources used by tourism businesses represented in this survey (N= 417).



Of the 323 businesses that responded to the statement in Figure 2, most stated that they have a good understanding of energy use and efficiency (21.7% strongly agreed and 53.3% agreed) (Figure 2). Businesses in the attraction/activity sector reported the highest understanding, with transport businesses appearing to be slightly less likely to have a good understanding of energy efficiency. In the accommodation sector, less than 3% indicated that they have limited or no understanding of energy use.

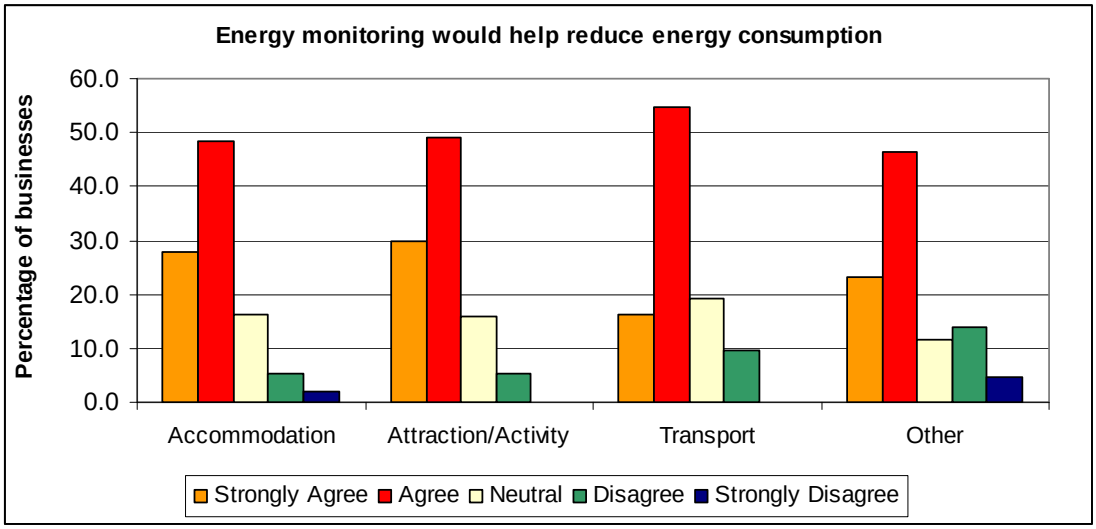
Figure 2
Businesses' Agreement with the Statement that they Have a Good Understanding of Energy Use and Efficiency (N= 323).



4.2 Measuring and Monitoring

When asked if energy monitoring would help reduce energy consumption in their tourism business, 27% of respondents strongly agreed and another 49% agreed. This means that a large majority of businesses recognise the benefit of monitoring. Interestingly, transport operators were less likely to strongly agree than all the other categories, although still over half (55%) agreed with the usefulness of monitoring.

Figure 3
Businesses' Agreement with Energy Monitoring as a Tool to Reduce Energy Consumption (N= 321).

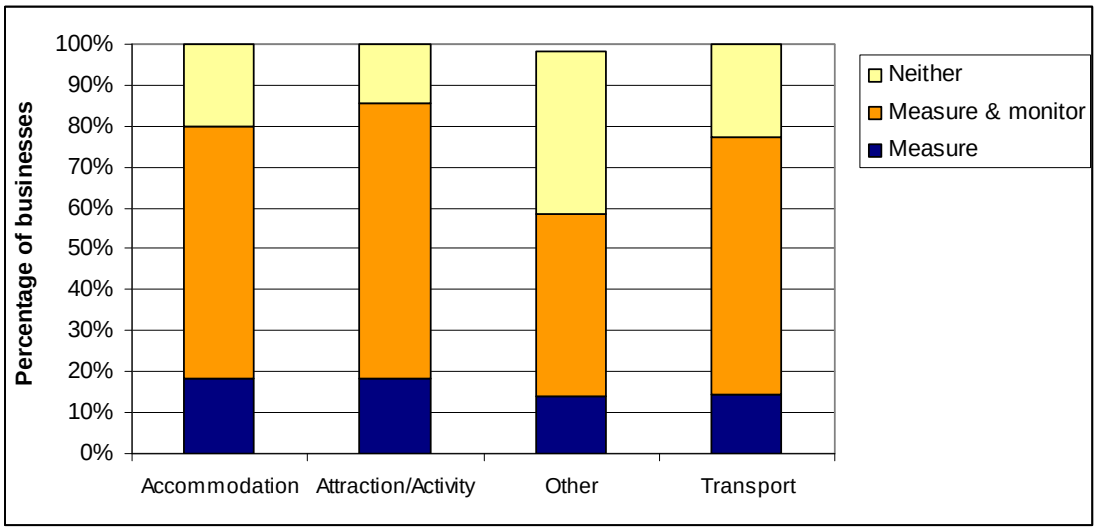


Businesses were also asked if they actually "measure" or "measure and monitor" their energy consumption. The proportion of those who measure and monitor was

substantial (60.0%). Businesses that do not measure nor monitor were in the minority (22.5%), but still represent over one fifth of respondents.

Respondents in the attraction/activity subsector were most likely to measure or measure/monitor (67%), whereas businesses in the 'other' category were least likely to monitor their energy consumption (45%) (Figure 3).

Figure 4
Respondents Who Measure or Monitor Their Energy Consumption by Category (N= 417)



The number of businesses which monitor energy use is lower than those which recognised its usefulness in principle as established above (a gap of about 16%). This indicates that there is potential for more businesses to implement systematic energy monitoring.

A finer breakdown into business categories shows that almost all attraction/activity (unspecified) providers monitor their energy use (91.7%), followed by scenic flight and boat cruise operators (85.7%) and lodges (76.7%). Three quarters of RTOs reported that they did not measure nor monitor their energy consumption (Table 2). Note that the sample sizes are small for some of the categories.

Table 2
Respondents Who Measure or Monitor Their Energy Consumption by Detailed Business Categories (in order of likelihood of monitoring)

Category	Measure	Measure & Monitor	Neither
Attraction/Activity	8.30%	91.70%	0%
Scenic air/boat	7.10%	85.70%	7.10%
Lodge	20.00%	76.70%	3.30%
Adventure	10.50%	73.70%	15.80%
Hostel/holiday home	23.10%	69.20%	7.70%
Hotel	12.50%	68.80%	18.80%
ITO	16.70%	66.70%	16.70%
Transport	18.20%	63.60%	18.20%
Tour	15.80%	63.20%	21.10%
Accommodation	14.70%	61.80%	23.50%
Consultant/Education	7.70%	61.50%	30.80%
Campground	19.60%	60.70%	19.60%
Stationary attraction	26.70%	60.00%	13.30%
Motel	16.20%	59.50%	24.30%
B&B	19.30%	50.90%	29.80%
Ecotour	25.00%	50.00%	25.00%
Rental vehicle	20.00%	40.00%	40.00%
Support services	12.50%	37.50%	50.00%
Travel Agent/ visitor information	30.80%	23.10%	46.20%
RTO	8.30%	16.70%	66.70%

The preferred way to measure and monitor energy use was in dollar terms (268 out of 417 respondents). However, over one third (38.6%) measured their consumption in actual physical or energy units (e.g. kWh for electricity, litres for diesel).

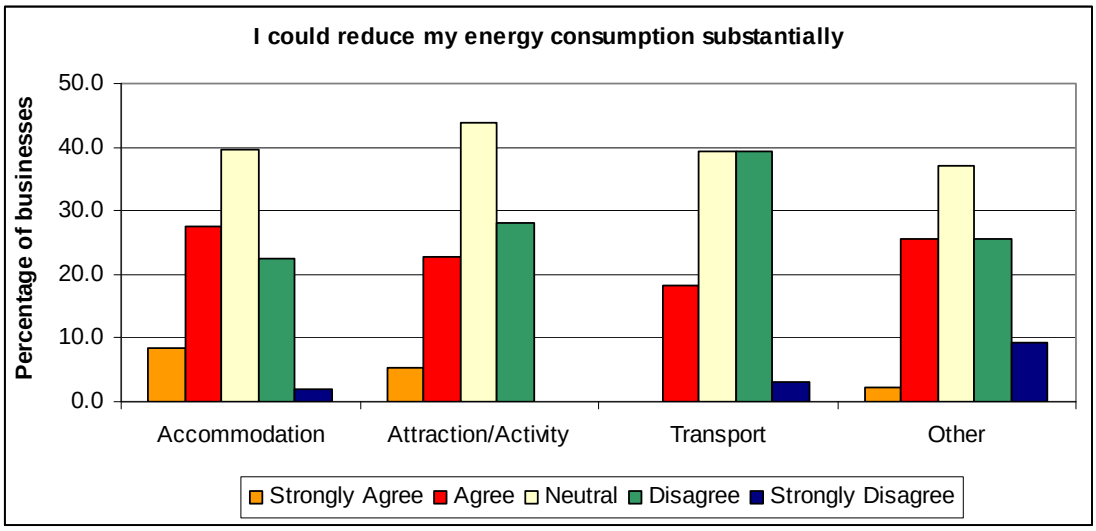
4.3 Implementation of Energy Savings Measures

4.3.1 Potential for Reducing Energy Use

In total, 32% of businesses believed that they could reduce their energy consumption substantially ('strongly agree' or 'agree', see Figure 5). The proportion of those who strongly believed in reductions was highest amongst accommodation businesses (8.3%) and lowest amongst transport providers (0%). One reason for this could be that transport businesses already seek to minimise fuel consumption and do not see further reduction potential (possibly unless major capital investments are made). The 'other' category was most likely to disagree with the suggestion that they could (further) reduce their energy use. However, tourism businesses in this category were also the

least likely to monitor their energy use, and it is possible that they are unaware of current consumption rates and reduction potentials.

Figure 5
Potential for Reducing Energy Consumption in Tourism Businesses (N= 325)



4.3.2 Measures Already Implemented

Three quarters of all respondents (75.3%) have implemented some measure to reduce the demand for energy. A remaining 14% stated that they had not implemented any measure yet but had plans to do so. Only 11% responded that they have not put any energy saving measure in place.

The survey asked for more information on the measures that were already implemented and a large number of businesses provided very detailed information on what they have done. The answers to this question are probably not exhaustive, as not every business would have reported *every* measure that they have put in place. The results should still provide a useful snapshot of the breadth and depth of energy saving measures in New Zealand tourism businesses.

As can be seen in Table 3, the most common measure reported was the installation of energy efficient lighting. This is followed by switching off appliances when not in use and switching to more energy efficient fuel sources, for example gas or solar energy for water heating.

Table 3
Summary of Measures Implemented by Respondents
(coded into high-level categories from original responses)

Measure	Number of businesses who reported this measure (N=417)	Percentage (%)
Light bulbs / lighting levels	128	30.7
Switch off appliances	100	24.0
Fuel switch	57	13.7
Energy efficient equipment	40	9.6
Insulation	34	8.2
Timer	34	8.2
Reduce travel distance	32	7.7
Sensors	23	5.5
Switch off units	21	5.0
Education (staff and tourists)	20	4.8
Energy efficient vehicles	19	4.6
Heat pump	17	4.1
Manage room temperature	16	3.8
Low flow shower heads	14	3.4
Driving behaviour	12	2.9
Vehicle tuning	9	2.2
Fleet management	8	1.9

4.3.3 Energy Consumption in Buildings

Energy use in buildings is largely electricity based, for example for lighting and appliances. Hot water is another major end use for energy in buildings, and businesses have put in place a range of measures to reduce the need for hot water or produce it more energy efficiently, e.g. by switching fuel sources (especially from electricity to gas).

In the following, key measures that were common amongst the businesses, as well as those that highlight slightly different or innovative approaches, are quoted directly from the survey's responses. The presented initiatives are only a very small selection of the measures that businesses have put in place and reported in this survey.

<u>Lighting</u>

- *"Long life energy saving bulbs are used throughout the hotel."*
- *"We use 'rough service' long life light bulbs, particularly in the sensor system. These lights have a long-life guarantee."*
- *"Common area lights are on time sensors."*
- *"The resort lighting is activated by movement or light/dark sensors."*
- *"We installed photo sensors in areas requiring 24 hour lighting."*
- *"We fitted daylight/timed switches to all night lighting and signs."*

- *"My office is very light so I do not have to switch any lights on during the day."*

Switching off appliances or parts of the business

- *"We are turning off any unused electronic equipment when not in use and overnight."*
- *"We have 5 electric water heaters. We turn them off when we have no guests."*
- *"The water feature is restricted to running in daylight hours only."*
- *"We unplug phone chargers, turn off computers and lights when not in use."*
- *"We took unnecessary heaters out of rooms; we also turn off the sauna in summer."*
- *"We cancelled one beer fridge."*
- *"We shut down some rooms in winter."*
- *"We are closing wings when not busy."*
- *"The hot water cylinders in motels are turned off unless people are staying in those units."*
- *"Turn off all refrigeration units (11) through the winter."*

Energy efficient equipment and maintenance

- *"We monitor the load of generators to ensure efficiencies; and reduce to one generator if and when possible."*
- *"All our equipment (fridges/driers/washing machines etc...) is energy efficient (using AAA rating)."*
- *"We installed gas fires with remote internet starting capabilities as rooms refurbished to reduce heating currently supplied by ceiling panels"*
- *"We upgraded the irrigation system. This saves on water wastage and power consumption."*
- *"We already had a marshall water heater in which all water is heated with wood, and this is now reticulated around the house for heating."*
- *"We installed ground water heat pump technology for terminal heating and cooling. This system has won two significant awards so far (one being an ECCA award)."*

Insulation and managing room temperature

- *"Thick curtains over large windows and doors"*
- *"All windows are double glazed and we have higher than required specifications for building insulation in the renovated rooms."*
- *"We put in heavy insulation in walls and ceiling, as well as under floor."*
- *"We make best use of natural ventilation."*
- *"The air-conditioning units and gas fires are turned off when room reaches desired temperature."*
- *"We have door returns on all common rooms to keep the heat in."*

Education

- *"We provide guest information regarding towel re-use or change."*
- *"Staff is trained for turning off electricity and heating."*
- *"A note is put out asking guests to conserve power by switching off."*
- *"We undertake staff training for wood/coal burner efficiency and general sensitisation on needs to conserve energy."*

- *"We are making sure to tell everyone who checks in to turn everything off when they are finished using facilities in a building. "*
- *"Lastly, I have gone into the kitchen building when customers were in there with the doors open and the heaters on and given them a blast. Inconsiderate customers cost us more money than they are worth to us."*
- *"We monitor and record all our solar energy/gas/water usage via a computerised system. This will be added to our web site as soon as we can find a web design company who can work with the information and turn it into a graphic and easy-to-understand picture."*

Hot water usage

- *"We installed low flow shower heads and flow restrictors on taps to reduce hot water usage."*
- *"We insulated the covers used on the 25m pool and spa pools to reduce heat loss."*
- *"We installed Solar Panel Water Heating for two 4000 litre water tanks."*
- *"We are putting timers on hot water pumps at night time."*
- *"We put a timer and coin boxes on all our showers and installed press taps."*
- *"We now have a separate solar system for heating the swimming pool."*
- *"Laundry is washed with cold water and when possible we use a reduced cycle."*
- *"We are now contracting out most laundry to commercial laundry, more efficient."*

Fuel switch

- *"We changed our water heating from electricity to gas so that the hot water for the units is not being heated when the units are not being used (only on demand)."*
- *"We removed the electric hot water cylinder and replaced it with a non-heat loss gas on demand system."*
- *"We changed our cooking to LPG."*
- *"Solar heating now supplements gas heating of pools."*
- *"We use an open fire instead of electric heat."*
- *"We no longer use diesel for under floor heating, but installed a heat pump & HRV."*
- *"We are about to install new heat pump technology to heat 25m swimming pool (currently use combination of gas and old technology heat pump which doesn't operate well at low temperatures)."*
- *"Electricity usage is reduced by heating water with the wood-burning stove."*
- *"We changed the amenity block (communal toilets and shower, and kitchen) hot water from electricity heating to now using a marshall heater. This is a multi fuel burner that can use wood but also burns rubbish such as paper and plastics. "*
- *"Heat pumps were used to replace oil heaters and the night store heater."*
- *"A wet-back system is used in combination with the wood-burning fireplace (for water heating during winter months)."*

4.3.4 Transport Energy Use

Most responses in the transport area related to ways for reducing travel distance or the need to travel. Measures have also been put in place to increase the fuel efficiency of vehicles, such as tuning or driver training.

Reducing travel distance

- *"We are planning journeys carefully to reduce mileage."*
- *"When possible we run the activity on a river section closer to the base, which cuts fuel consumption by 50%."*
- *"We moved our business closer to where the client base is (i.e. moved base from Wanaka to Queenstown). We also offer other tour options with less driving, i.e. altered the current tours to reduce driving."*
- *"Energy use is factored into transport decisions, e.g. regarding meetings via car or plane. We are using electronic solutions or cluster meetings where possible."*
- *"We have reduced vehicle trips to closest urban centre by combining with others and staying overnight in town, whenever possible."*
- *"We introduced video conferencing to reduce the amount of travel for shorter meetings."*
- *"We now use the courier instead of driving to town for supplies."*
- *"We are combining trips to maximise efficiency, for example instead of running two vans for different trips we now combine the trips."*

Energy efficient vehicles

- *"We have a small car for day to day use."*
- *"I purchased a scooter for our city marketing."*
- *"We ensure that all vehicles less than 6 years of age."*
- *"We just purchased more fuel efficient aircraft."*
- *"We changed the vehicles from petrol to diesel vehicles and are also using them less."*
- *"I renew my vehicle to take advantage of new technology; I also keep the vehicle highly tuned."*
- *"A range of vehicle sizes are available to suit group sizes."*

Driving behaviour

- *"We introduced an economical driving practise."*
- *"We do not leave the courtesy van running while waiting for pickups, etc. We also incorporated energy efficient driving techniques into staff training."*
- *"We have reduced revolutions per minute on certain vessels without degrading the quality of the trip."*
- *"We are allowing more time to get to meetings to reduce driving speeds to more sustainable levels."*

Encouraging alternative transport modes

- *"We are not using personal vehicles when we can use public transport."*
- *"I cycle to work."*
- *"We encourage walking where possible rather than driving."*
- *"We use shuttles or car pool where possible to get guides to tour location (63 km away)."*
- *"Staff are encouraged to car pool to work."*
- *"Pedal power – we offer cycle tours."*

Vehicle tuning and maintenance

- *"Tyre pressures is monitoring frequently."*
- *"We maintain aircraft to manufacturers' specifications, and fuel filter changes and calibration are carried out on a regular basis."*

- *"We are currently servicing our vehicles at twice the manufacturers recommended service time to see if this makes a change to our fuel consumption."*
- *"The oil and filters are changed every 7,000 kms"*

4.3.5 Other

A number of other initiatives were implemented by various businesses that are worth mentioning:

- *"We have put in place a hotel meter and a load shedding programme."*
- *"We are currently using the new depot, which is designed to maximise natural resources (e.g. sun light); it also retains water for gear cleaning."*
- *"Under-floor heating in office and meeting space will be provided by recycled boat oil."*
- *"Put up clothes lines around the holiday park in more places to make them more convenient to use."*
- *"We are drying the towels on the line and then finish as 'light dry' in dryer."*
- *"We provide unlimited supply of blankets/hot water bottles to clients."*
- *"A responsible Staff Member has been put in charge of the control and procedures in Energy Management."*
- *"We are growing most of our own food and also buy in bulk. "*
- *"We are now charging long term customers for electricity."*
- *"I did a controlled experiment using all the different fuel additives (nine of them) which claimed to lessen fuel consumption and fumes emissions etc. None of them did what they claim to do."*
- *"Solar panels have been installed on the coach - therefore there is no need to plug in during overnight stops. The driver and host live on board during tours."*
- *"In addition to our energy saving efforts we planted a forest in the early 1990's to offset our carbon creation. This 11ha forest now sequesters approximately 5 times more carbon than we create."*

4.4 Cost Savings as a Result of Energy Use Reduction Measures

When asked if the implemented measures achieved any measurable cost savings, about 30% of respondents provided comments. Many were able to report exact figures, for example in percentage or in dollar terms, and others estimated their energy savings. The savings varied substantially but were often in the order of 10 to 20%, depending on the range of measures implemented.

A number of businesses were unable to provide an estimate of how much their energy reduction measures had saved them. The main reasons they provided were:

- Respondents were new to the business (e.g. Guided walking tours: "*Only had business for one year (since Oct 07). So no previous detailed records available for comparison. Spreadsheet done up so this coming year will be able to compare months*").
- Respondents did not have previous benchmarks against which to measure the current consumption.
- Respondents did not monitor systematically (e.g. Holiday Park: "*Although not really measurable, our extensive use of solar hot water heating and heat recovery along with timers etc. must mean a reduction in energy use*…" and Guided nature tours: "*Probably yes but data not yet collected*".)

- The measures had been implemented from the start of the business (e.g. Holiday Park: "*All of these measure have been in place from the beginning so measurement against previous use is not available*")
- Interpretation of monitoring data is difficult as many different factors influence energy consumption (e.g. Hotel: "*It is difficult to directly link any change made to changes in our energy consumption as there are so many other factors - occupancy (which we do incorporate in our monitoring, e.g. kWh per room night) but also factors like weather/temperature which we don't track*".)

A few respondents explicitly stated that despite implementing energy savings measures they had noticed little or no improvements (e.g. B&B: "*Converted 3 electric Hot water systems to LPG and installed new wood burning fireplace. Disappointing as power bills much the same and now have gas bill to pay as well*!").

In some cases, savings went unnoticed because energy prices have increased and outweighed the savings made (e.g. Motel and backpacker: "*Every time we seem to make headway...the price of power goes up...but I feel better having done that*"). One respondent commented that it might be more useful to monitor in actual energy units rather than dollar terms for this reason.

While some businesses made comments that their energy reduction measures saved them money without compromising service or trip quality, one respondent noted "*Yes we did achieve saving, however we may have lost some customers as a result of our product not being up to the highest standard, i.e. limited snow grooming*…"

The following Tables 4 and 5 provide a range of examples of how much savings businesses achieved in the accommodation sector and in other tourism sectors.

Table 4
Examples of Energy Savings Achieved in Accommodation Businesses

Type of Business	Measures Implemented	Savings Made
B&B	Not using vehicles when we can; use public transport.	The vehicle usage is measurable, cutting down a tank full of petrol per month.
Holiday Park	Replaced hot water cylinder with wet back system	Reduced average monthly bill for hot water from $600 per month to nil, although I will have to purchase fire wood at cost of about $150.00 per month.
Backpackers	Re-wiring of heating controls, under-floor insulation and energy efficient bulbs.	Reduced our power costs by 10%.
Hotel and restaurant	Eco bulbs, guest sheet and towel programme, LCD televisions and computer screens, staff education	Reduced electricity use by 22,289 kWh over a 12 month period. Savings: 3%
Motel	Double Glazing, Energy Saving Light Bulbs, turning off units and appliances in the quiet periods. Also converted units to gas from electricity.	Cut Gas bill by 1/3rd. Keeping electricity bill at last years level.
Ecolodge	Passive solar construction. Use fans rather than air conditioning. On demand gas and solar water heating. Outdoor lighting on daylight / proximity switches. Ecobulbs.	Reduced the KwH per guest night from 95.6 in 2003/4 to 32.7 in 2007/8. Increased guest nights per 45kg LPG bottle from 34.3 in 2004/5 to 42.3 in 2007/8.
Backpackers	A wide range of measures in the building (e.g. insulation etc.)	Reduced coal tonnage by 40% and wood needs by 20%. Electricity costs have risen slower than occupancy/kwh-cost

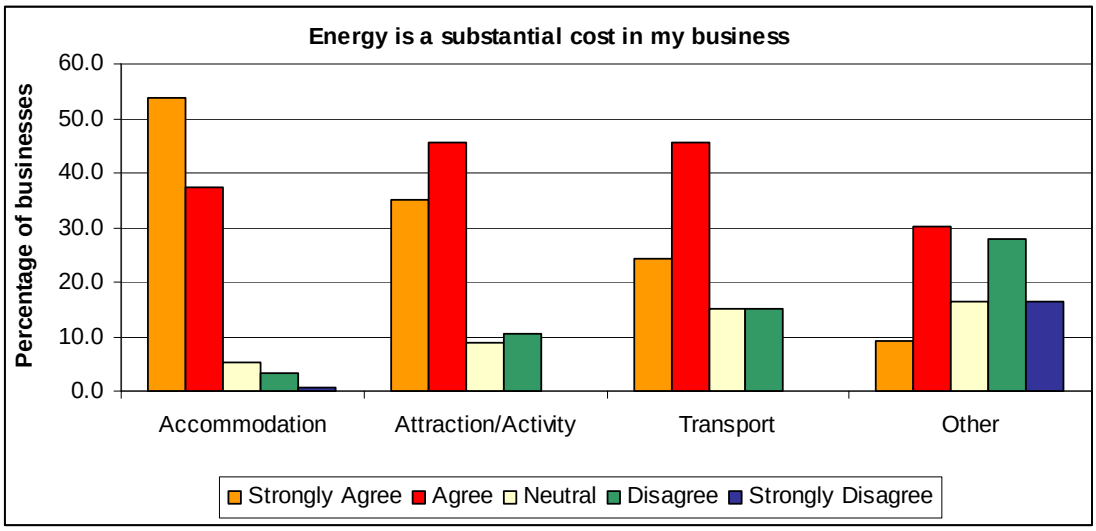
Table 5
Examples of Energy Savings Achieved in Non-Accommodation Tourism Businesses

Type of Business	Measures Implemented	Savings Made
Energy consultant	Decreasing the number of fluorescent tubes in fittings	20% electricity
	Changed from CRT to LCD monitors	30% electricity
Attraction/Activity	Moved business closer to client base; more economical driving practise, offered other tour options with less driving, altered current tours to reduce driving.	July 07: 645 litres of diesel, reduced to 309 litres in July 08. August 07: 522 litres reduced to 236 litres in August 2008. Savings: over 50%
Jet boat operator	New motor technology with fuel injected engines	Reduction in fuel use of approx. 15%
Booking and information service	Changed light bulbs, reviewed computer and accessory items, introduced video conferencing to reduce the amount of travel.	Electricity usage dropped by 10% Travel - reduced travel per person by 12% on last year
Transport	Ensuring tyre pressures maintained at top end of manufacturers recommendations.	Fuel efficiency improved by 10%
Horse trekking	Turning off all appliances that are not used over night and in winter. Don't use vehicles unless absolutely necessary: walk instead of using quad; use quad instead of tractor, use horses etc.	Power bill is cut and so is our diesel bill by up to 20%
Glacier tours	Replaced old vehicles with new ones	Average fuel consumption from 6km per litre to closer to 10 km/l and one vehicle (petrol) to 12.75 km/l.
Wildlife cruise operator	Modified engine in boat. Extra weed inhibition on boat.	Improved fuel efficiency of boat by 20%
Attraction/Activity	New electronic diesel engines; changed from 2 stroke outboards to 4 stroke	Consume 35% less petrol on outboards and also slight improvement on diesel.
Boat and scenic flight operator	Reducing revs for boats; Changing antifouls	15% savings 5% savings
Transport (tours)	Use thinner oil; clean air filters regularly; oil and filter changes every 7,000 kms	Fuel savings of up to 30% and also less fumes emissions and oil usage
Marine mammal watching	Bought a new, energy efficient bus	As a result of the new bus we have saved around $67,720 on fuel, servicing and associated costs. Savings: 150%
Airport operator	Building Management System (BMS) controls environmental of our terminal building.	On a footprint basis (square metres) we have achieved a 40% saving compared to our old building.
Transport	Installed hot water heat pumps	Monthly fee to energy supplier was reduced by 30 %.

4.5 Energy as a Cost Factor in the Business

Most businesses agreed that energy is a substantial cost factor in their business (41.5% agreed strongly and 38.7% agreed). This was particularly evident amongst accommodation providers (53.7% agreed strongly) and attraction/activity operators (35.1% agreed strongly). Transport operators also agreed with this statement, although less strongly than some other categories. 'Other' tourism businesses saw energy as a less important factor in their business cost structure (e.g. 16% strongly disagreed) (Figure 6).

Figure 6
Businesses' Agreement Whether Energy is a Substantial Cost Factor in Their Business (N= 323)



The cost of energy as a percentage of gross operating revenue differed widely for the individual businesses and also across categories. Only 253 businesses answered this question. When analysing an 'average' percentage, the arithmetic mean may be misleading as it is strongly influenced by extremely high values. For example, some businesses reported that energy would make up 50% of their operating revenue. These 'outliers' affect the mean by increasing it substantially. The median is suggested as a more appropriate measure, as it provides the 'middle value' of the sample. As can be seen in Tables 6 and 7, the median is generally somewhat smaller than the mean.

Accommodation businesses reported the highest percentage cost of energy (median of 8.3% and a mean of 11.2%). Surprisingly, transport operators reported similar costs to Attraction/Activity providers (both medians around 5%)(Table 6). This might be influenced by the number of rental vehicle businesses in the sample that generally report lower percentages compared with, for example, tour operators (see Table 7).

Table 6
Energy Cost as a Percentage of Gross Operating Revenue by Category

Category	Number of respondents (N)	Percentage of gross operating revenue: median (mean in brackets) (%)
Accommodation	147	8.3 (11.2)
Attraction/Activity	48	5.0 (7.6)
Transport	26	5.5 (10.1)
Other	32	1.3 (3.2)

Table 7 shows that motels spend most of their operating revenue on energy (median of 13%) compared with other sub-sectors. Similarly, lodges and campgrounds report high percentages. It is somewhat surprising that tour operators and scenic flight and boat cruise operators report lower relative energy costs than some accommodation providers and stationary attractions. This point deserves further attention and follow up research. It is possible that stationary attractions (e.g. some museums, theme parks etc.) are comparatively energy intensive, for example as a result of running technical equipment, monitoring room temperature and other energy demands.

It has to be noted that the sample sizes are small for most sub-sectors shown in Table 7, and the data provided are merely indicative. The spread between the minimum and maximum value also highlights the diversity of tourism businesses and the difficulty of deriving a meaningful benchmark.

Table 7
Energy Cost as a Percentage of Gross Operating Revenue for More Detailed Tourism Subsectors

	Number of Respondents (N)	Median (%)	Mean (%)	Min (%)	Max (%)
Motel	23	13.0	9.1	0.1	30.0
Lodge	19	10.5	11.6	2.0	40.0
Transport (unspec)	8	10.0	9.0	1.0	30.0
Campground	36	10.0	14.6	2.0	40.0
Stationary attraction	6	7.5	2.9	0.6	5.0
Tour	13	7.0	12.7	1.0	53.0
Scenic air /boat	8	7.0	11.6	2.0	22.0
Support services	4	7.0	4.9	0.0	15.0
B&B	31	6.0	10.2	2.0	50.0
Hostel/holiday home	9	6.6	9.4	1.0	27.5
Ecotour	11	6.5	4.8	0.6	23.0
Attraction/Activity	8	5.0	11.6	6.0	20.0
Accommodation (unspec)	20	5.0	10.6	2.2	25.0
Travel agent/ visitor information	7	3.3	2.3	0.2	10.0
Hotel[4]	9	3.0	8.3	2.2	30.0
RTO	6	2.5	4.4	0.8	10.0
Consultant/Education	7	2.3	4.6	0.1	10.0
Adventure	15	2.0	7.1	2.5	15.0
Rental vehicle	5	2.0	5.1	0.0	20.0
ITO	8	1.0	1.0	0.0	2.0

4.6 Carbon Footprinting

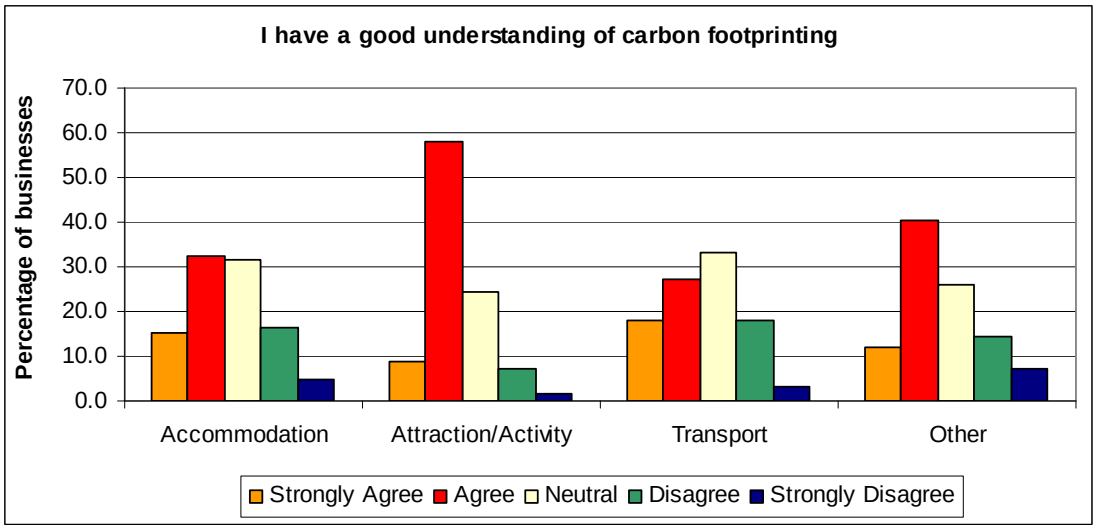
The consumption of energy is closely related to carbon emissions. Different energy sources have different emission factors, for example the combustion of one litre of diesel generates 2.675 grams of CO_2-equivalent (i.e. also considering the climate effect of non-CO_2 gases). Burning one litre of petrol produces 2.322 g CO_2-e and one litre of LPG generates 1.611 g CO_2-e (for mobile use). In addition to fuel source, the combustion technology influences the carbon efficiency of a process, for example diesel engines are more efficient that petrol engines. Electricity has a low emission factor due to the high share of renewable energy sources in the overall mix.

Around 10% (depending on category) of businesses strongly agree that they have a good understanding of carbon footprinting, and a very large proportion agree with this statement (Figure 7). Transport businesses were most likely to strongly agree, but less likely to agree compared with other categories. This means that a large number (almost one fifth) feel quite confident about carbon footprinting, but a reasonable

4 Data provided for 56 hotels by the New Zealand Hotel Council shows that the median proportion of energy costs as part of gross operating revenue is 4.8% and the mean is 5.1%. Because of the larger sample sizes it is suggested that these values are more representative of hotels in New Zealand.

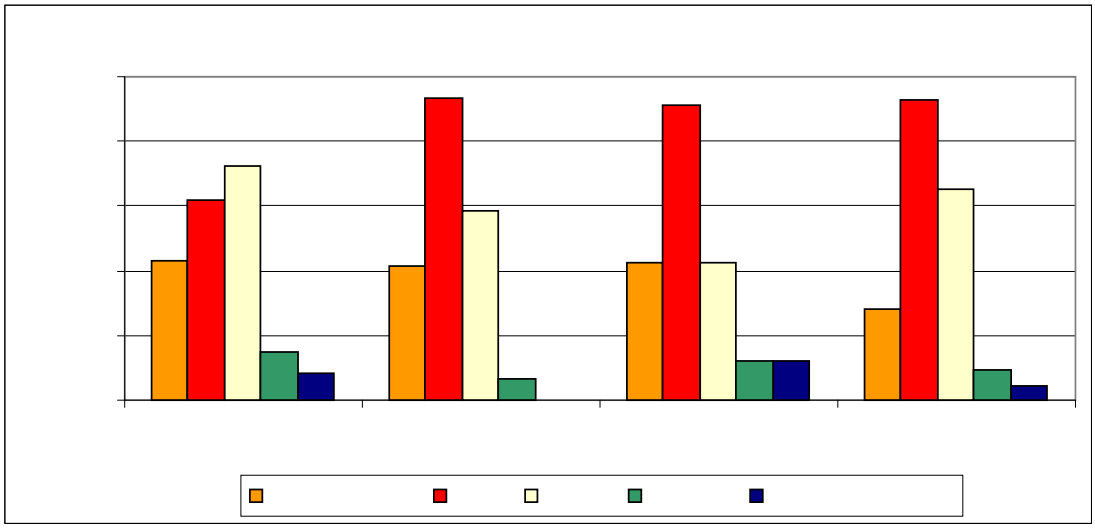
number are less certain about it (about one third are neutral and another fifth report to have limited understanding).
Within the more detailed sub-sectors, consultants and education businesses and lodge operators felt most inclined to state that they have a good understanding of carbon footprinting (38% and 28%, respectively).

Figure 7
Level of Agreement with the Statement "I have a good understanding of carbon footprinting" (N= 323)



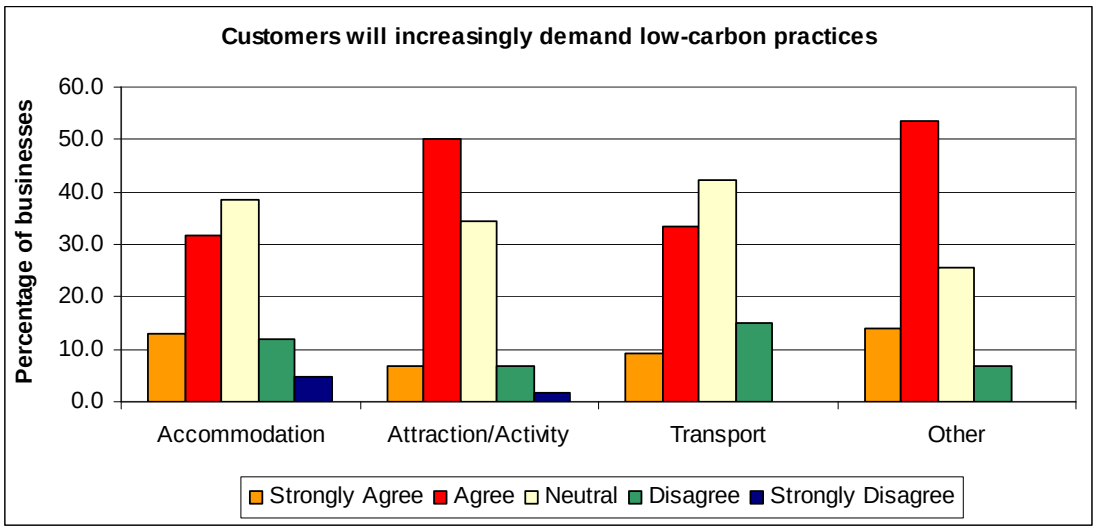
An overwhelming majority either strongly agree or agree that assessing their business' carbon footprint is important. Accommodation providers were more neutral on this aspect than other tourism businesses (Figure 8). Businesses from the 'other' category also saw the importance of carbon footprinting, although at present they were less likely to engage in systematic measuring and monitoring of energy use (a prerequisite of carbon footprinting) (see Table 2 earlier).

Figure 8
Level of Agreement with the Statement "I have a good understanding of carbon footprinting" (N= 325)



When asked if businesses believed that customers will become increasingly conscious of climate change and demand low-carbon practices, most businesses strongly agreed or agreed, although there was also a substantial number of respondents who remained neutral or disagreed with this statement. 'Other' tourism businesses and attraction/activity operators felt most strongly about this aspect.

Figure 9
Level of Agreement with the Statement "Customers will increasingly demand low-carbon practices" (N= 326)



Further analysis of the detailed tourism sub-sectors revealed that the level of agreement varies within each category. The following sub-sectors were most likely to believe that tourists request carbon efficient practices:

- Hostel/ holiday home: 25% agreed strongly
- Inbound Tour Operators: 25% agreed strongly
- Consultants/Education providers: 22.2% agreed strongly
- Lodges and Hotels: 20% agreed strongly, respectively
- Stationary attractions: 20% agreed strongly

Inbound Tour Operators might base their judgement on close contact with overseas wholesalers and possibly an increasing number of questions raised in relation to climate change.

Only 9% of ecotour operators agreed strongly with the statement, but an overwhelming 73% agreed that customers will become more demanding with respect to carbon efficient businesses.

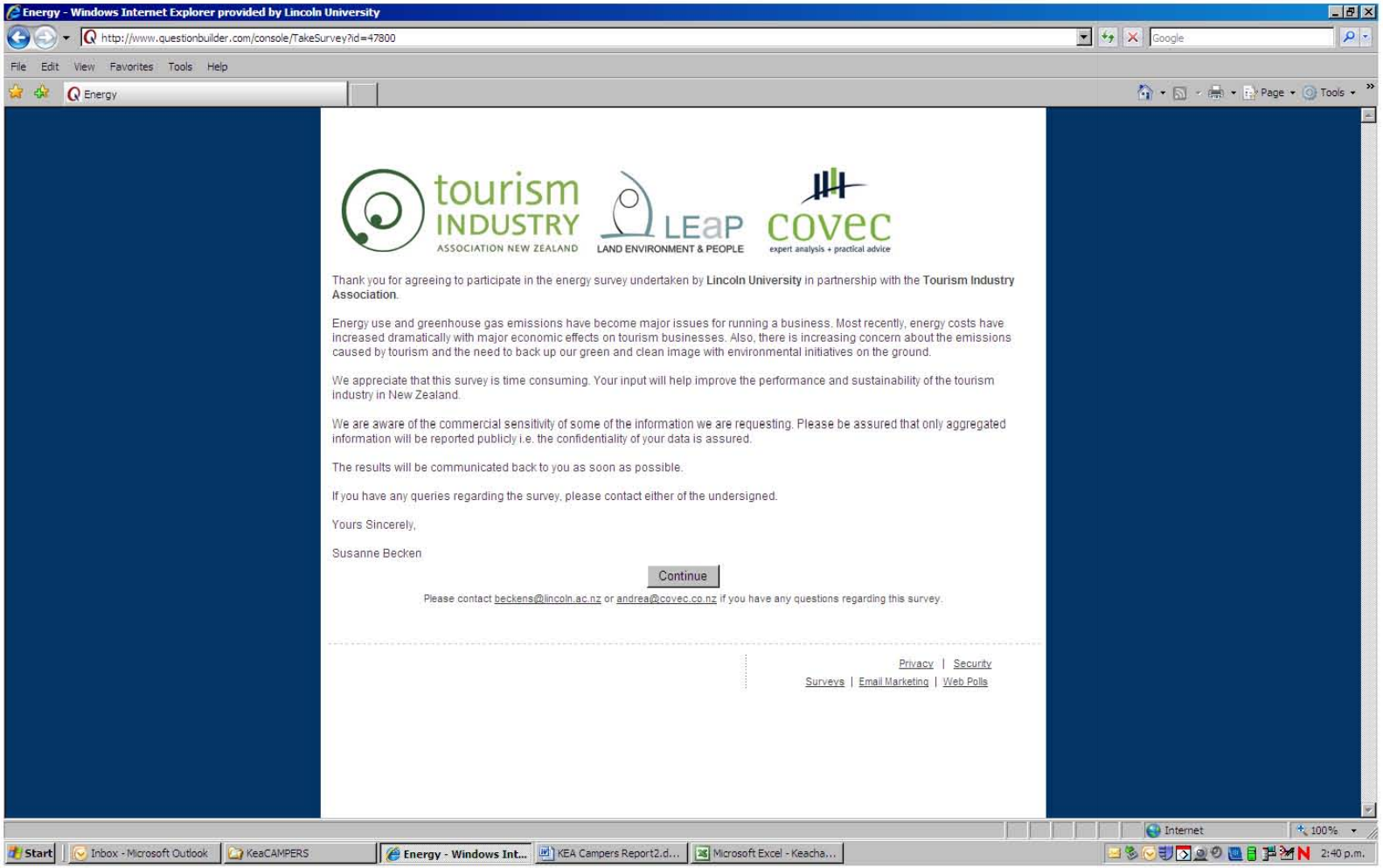
Chapter 5
Conclusion

A survey on energy use and energy saving initiatives has been undertaken in partnership with the Tourism Industry Association and their members. All together, 417 TIA members replied to the online survey. The results show that a majority of businesses perceive that they have a good understanding of energy use, energy efficiency and carbon footprinting. Most businesses consider energy monitoring (and also to a slightly lower degree carbon footprinting) as important and useful. Sixty percent of respondents already measure and monitor aspects of their energy use, and an even greater number believe that monitoring could lead to reductions in consumptions and therefore savings.

Three quarters of businesses have implemented some form of energy savings measure and a wide range of examples have been presented in this report. These range from simple measures, such as changing light bulbs and switching off appliances when not in use, to longer term measures, such as the installation of new equipment or purchase of capital (e.g. more efficient vehicles). A number of operators also made changes to their products (e.g. reduce travel distance) and their operations (e.g. car pooling for guides). The savings associated with some of the measures implemented were substantial, although in many cases businesses are unsure about exact figures. This may be related to a lack of monitoring, benchmarks or the complexity of the business where many factors influence energy demand.

The measurement of carbon emissions associated with a tourism business is seen as important by most businesses. While there are differences between categories and also sub-sectors, respondents generally believed that it is important to measure the footprint and respond to increasing demand by tourists to provide carbon-efficient products and services.

Appendix 1


Energy - Windows Internet Explorer provided by Lincoln University
http://www.questionbuilder.com/console/TakeSurvey?id=47800
File Edit View Favorites Tools Help
Energy
tourism INDUSTRY ASSOCIATION NEW ZEALAND
LEaP LAND ENVIRONMENT & PEOPLE
covec expert analysis + practical advice
Thank you for agreeing to participate in the energy survey undertaken by Lincoln University in partnership with the Tourism Industry Association.
Energy use and greenhouse gas emissions have become major issues for running a business. Most recently, energy costs have increased dramatically with major economic effects on tourism businesses. Also, there is increasing concern about the emissions caused by tourism and the need to back up our green and clean image with environmental initiatives on the ground.
We appreciate that this survey is time consuming. Your input will help improve the performance and sustainability of the tourism industry in New Zealand.
We are aware of the commercial sensitivity of some of the information we are requesting. Please be assured that only aggregated information will be reported publicly i.e. the confidentiality of your data is assured.
The results will be communicated back to you as soon as possible.
If you have any queries regarding the survey, please contact either of the undersigned.
Yours Sincerely,
Susanne Becken
Continue
Please contact beckens@lincoln.ac.nz or andrea@covec.co.nz if you have any questions regarding this survey.
Privacy | Security
Surveys | Email Marketing | Web Polls
Internet
100%
Start
Inbox - Microsoft Outlook
KeaCAMPERS
Energy - Windows Int...
KEA Campers Report2.d...
Microsoft Excel - Keacha...
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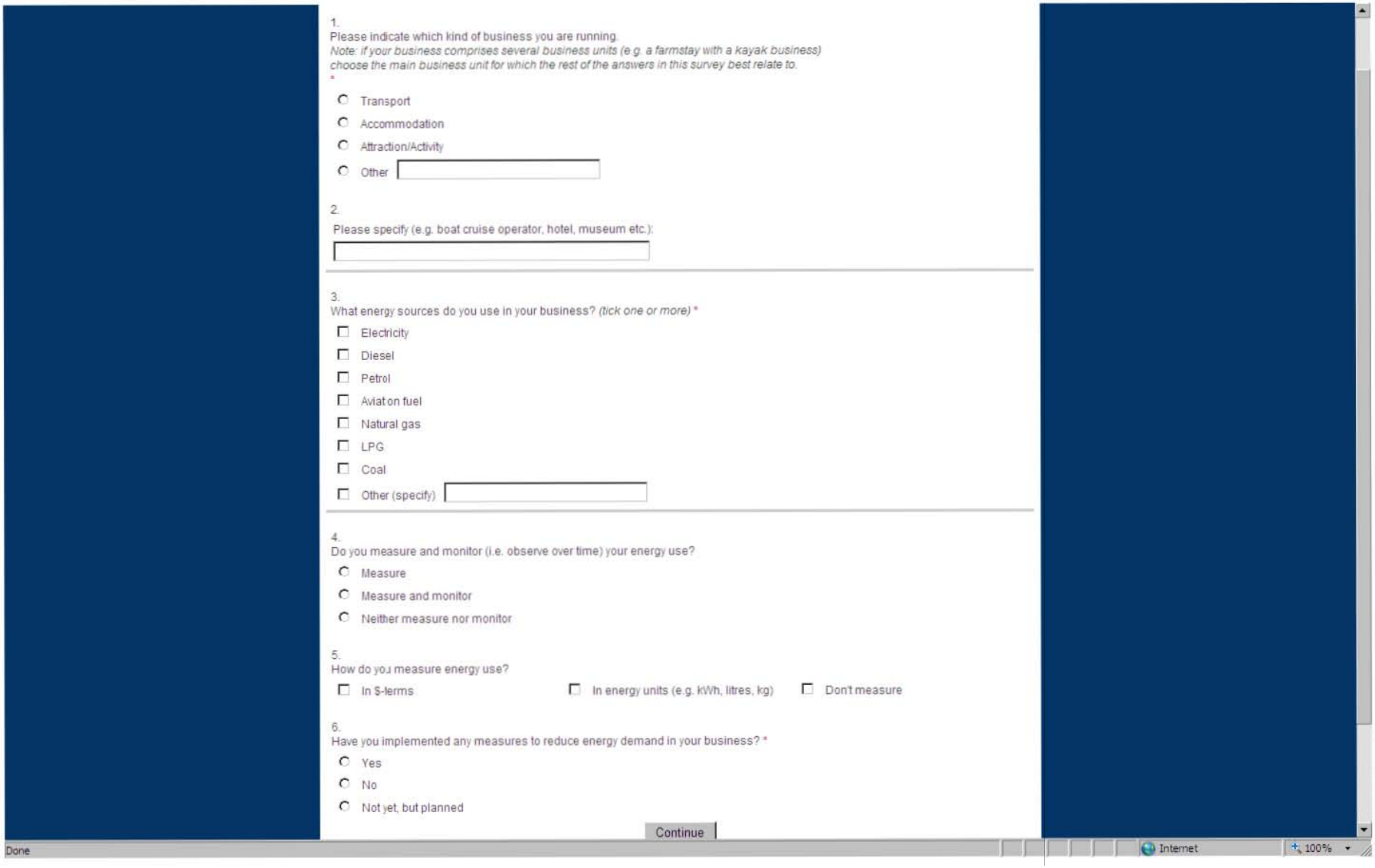
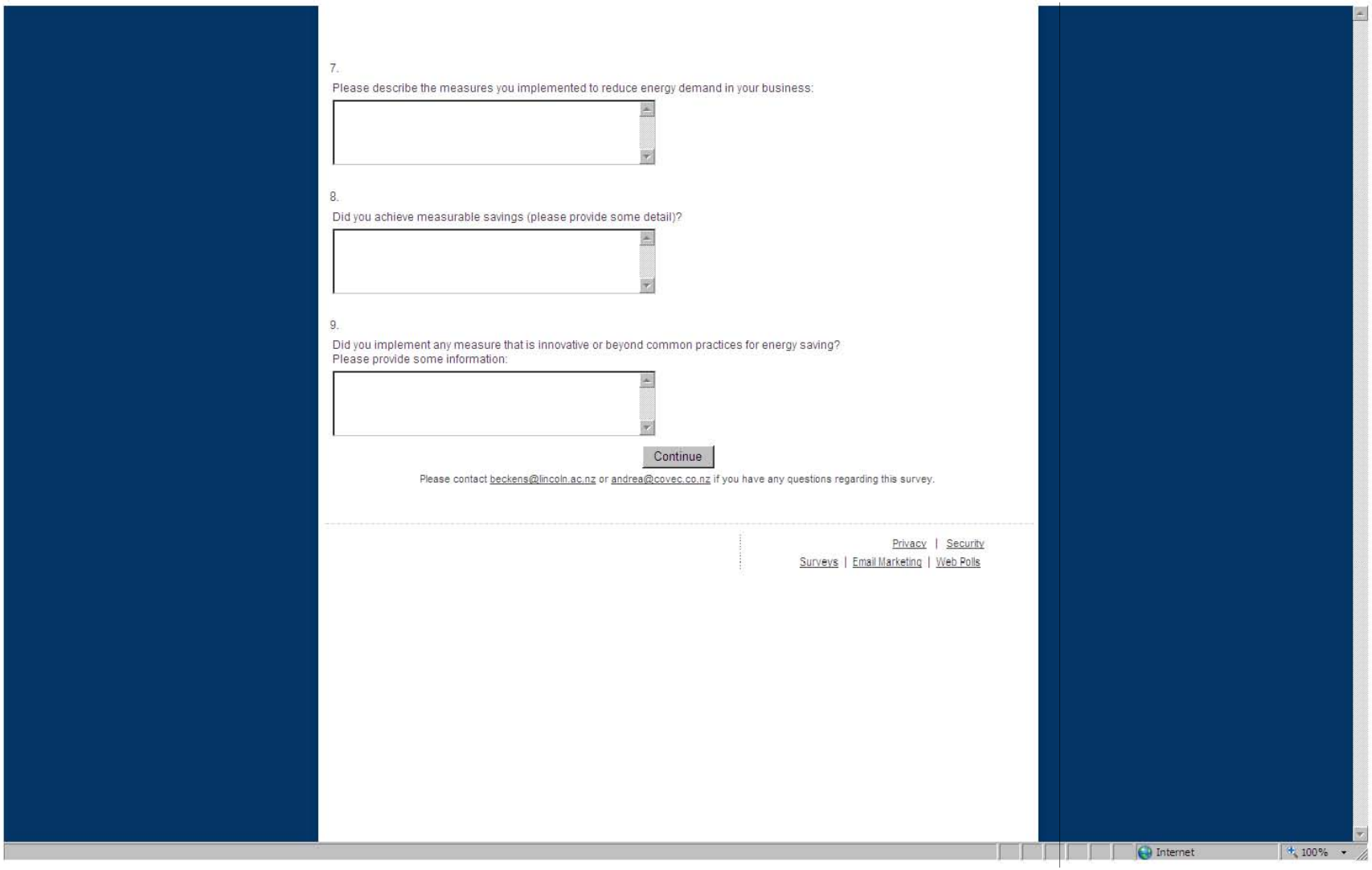

1.
Please indicate which kind of business you are running.
Note: if your business comprises several business units (e.g. a farmstay with a kayak business) choose the main business unit for which the rest of the answers in this survey best relate to.
*
Transport
Accommodation
Attraction/Activity
Other
2.
Please specify (e.g. boat cruise operator, hotel, museum etc.):
3.
What energy sources do you use in your business? (tick one or more) *
Electricity
Diesel
Petrol
Aviation fuel
Natural gas
LPG
Coal
Other (specify)
4.
Do you measure and monitor (i.e. observe over time) your energy use?
Measure
Measure and monitor
Neither measure nor monitor
5.
How do you measure energy use?
In $-terms
In energy units (e.g. kWh, litres, kg)
Don't measure
6.
Have you implemented any measures to reduce energy demand in your business? *
Yes
No
Not yet, but planned
Continue
Done
Internet
100%


7.
Please describe the measures you implemented to reduce energy demand in your business:
8.
Did you achieve measurable savings (please provide some detail)?
9.
Did you implement any measure that is innovative or beyond common practices for energy saving?
Please provide some information:
Continue
Please contact beckens@lincoln.ac.nz or andrea@covec.co.nz if you have any questions regarding this survey.
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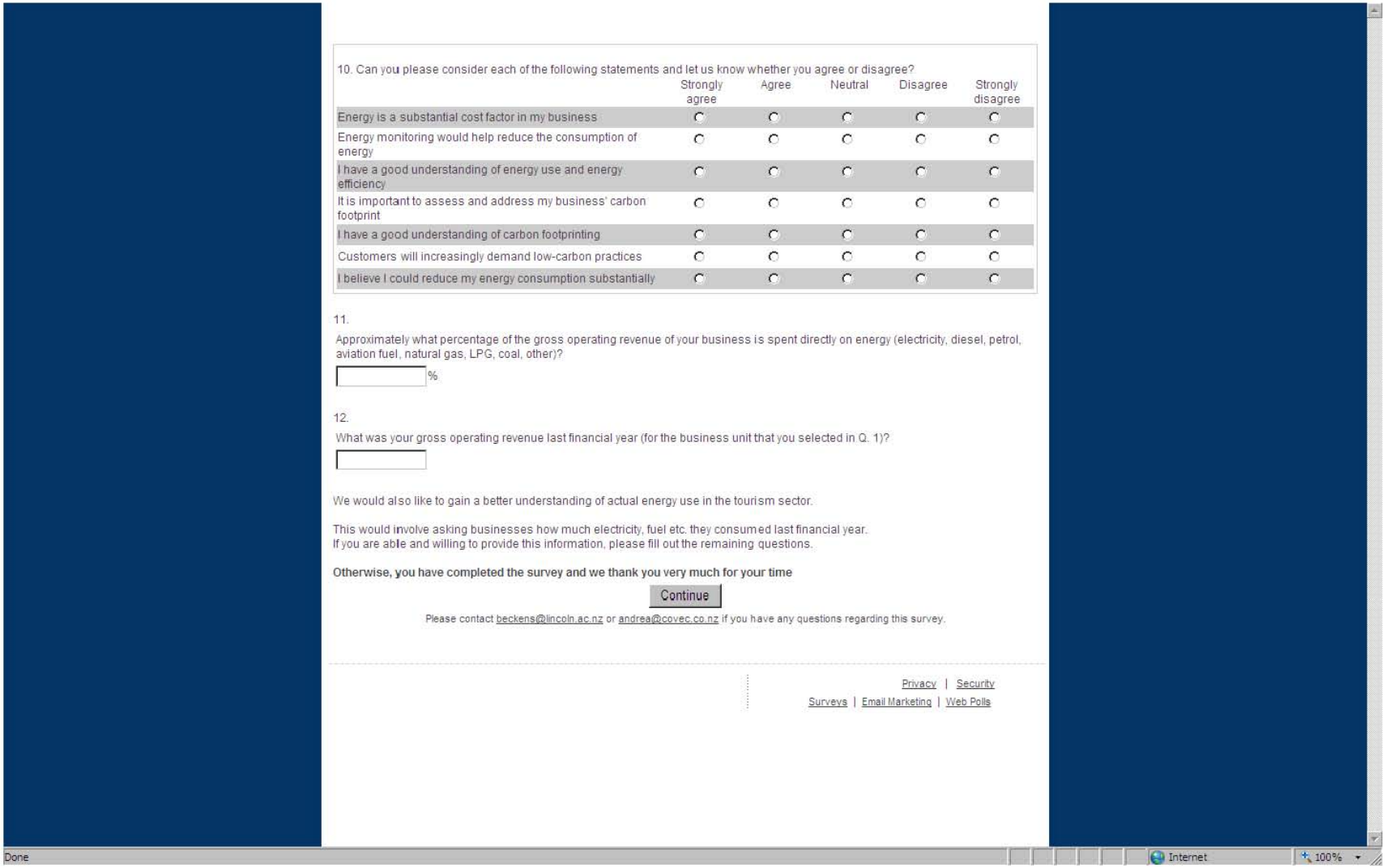

10. Can you please consider each of the following statements and let us know whether you agree or disagree?

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Energy is a substantial cost factor in my business	○	○	○	○	○
Energy monitoring would help reduce the consumption of energy	○	○	○	○	○
I have a good understanding of energy use and energy efficiency	○	○	○	○	○
It is important to assess and address my business' carbon footprint	○	○	○	○	○
I have a good understanding of carbon footprinting	○	○	○	○	○
Customers will increasingly demand low-carbon practices	○	○	○	○	○
I believe I could reduce my energy consumption substantially	○	○	○	○	○

11.

Approximately what percentage of the gross operating revenue of your business is spent directly on energy (electricity, diesel, petrol, aviation fuel, natural gas, LPG, coal, other)?

[ ] %

12.

What was your gross operating revenue last financial year (for the business unit that you selected in Q. 1)?

[ ]

We would also like to gain a better understanding of actual energy use in the tourism sector.

This would involve asking businesses how much electricity, fuel etc. they consumed last financial year.
If you are able and willing to provide this information, please fill out the remaining questions.

Otherwise, you have completed the survey and we thank you very much for your time

Continue

Please contact beckens@lincoln.ac.nz or andrea@covec.co.nz if you have any questions regarding this survey.

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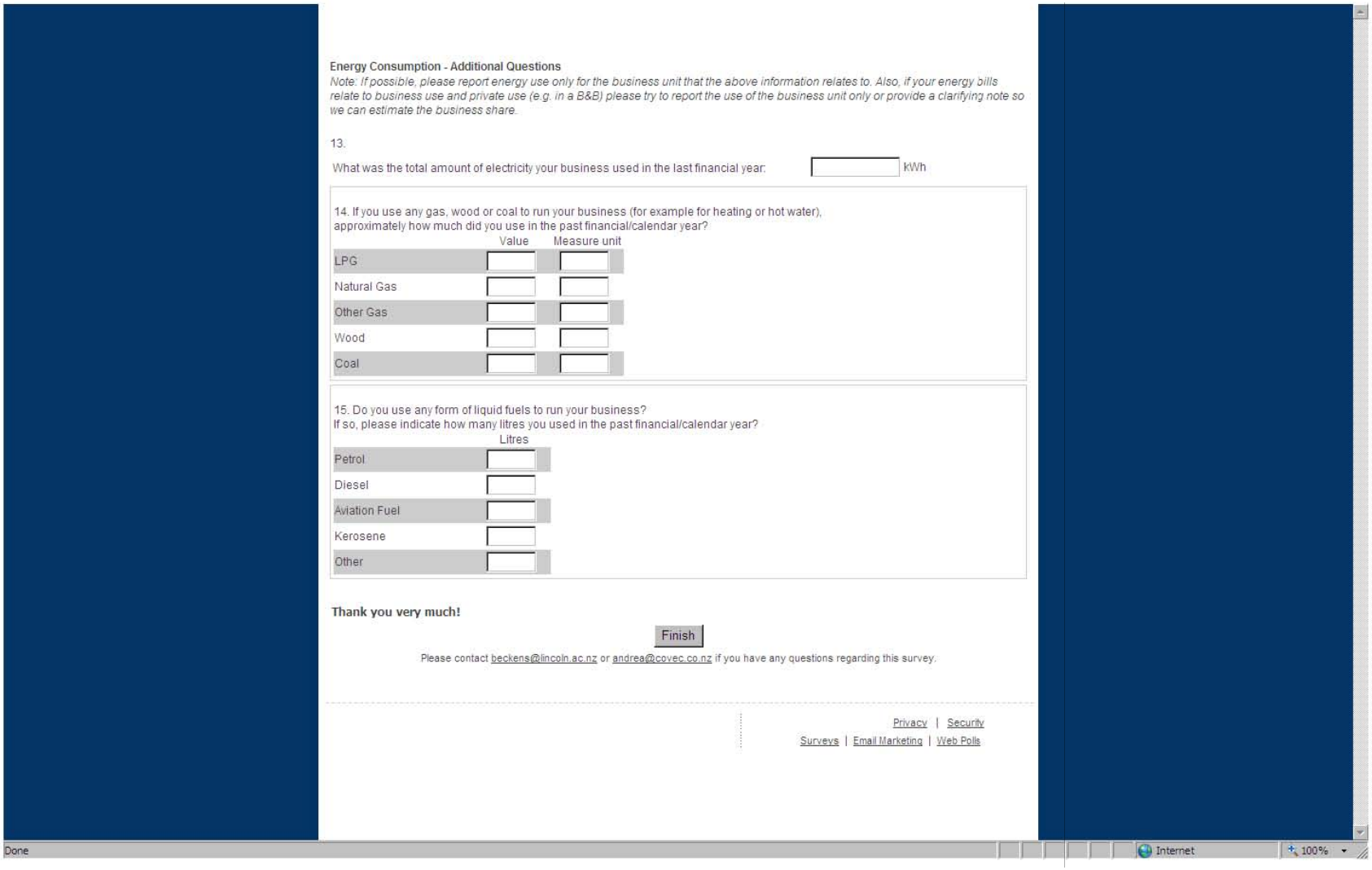

Energy Consumption - Additional Questions

Note: If possible, please report energy use only for the business unit that the above information relates to. Also, if your energy bills relate to business use and private use (e.g. in a B&B) please try to report the use of the business unit only or provide a clarifying note so we can estimate the business share.

13.

What was the total amount of electricity your business used in the last financial year: kWh

14. If you use any gas, wood or coal to run your business (for example for heating or hot water), approximately how much did you use in the past financial/calendar year?

	Value	Measure unit
LPG		
Natural Gas		
Other Gas		
Wood		
Coal		

15. Do you use any form of liquid fuels to run your business?
If so, please indicate how many litres you used in the past financial/calendar year?

	Litres
Petrol	
Diesel	
Aviation Fuel	
Kerosene	
Other	

Thank you very much!

Finish

Please contact beckens@lincoln.ac.nz or andrea@covec.co.nz if you have any questions regarding this survey.

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Done Internet 100%