

Energy consumption of tourist attractions and activities in New Zealand

Summary report of a survey

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Summary report of a project undertaken by Landcare Research and Tourism Research and Education Centre (TREC), Lincoln University.

Why “save energy”? Some good reasons to make your business more energy-wise.

- You save money on energy bills
- Environmental awareness is good for marketing
- Tourists are more and more aware of environmental issues and prefer businesses with sound practices
- An energy plan can make your building more comfortable – cooler in summer and warmer in winter
- You are doing the planet a favour, you decrease your impact on the environment

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Background

In 1999, the New Zealand Tourism Board (NZTB) recorded more than 1.6 million international visitors and 16.6 million domestic tourist trips. Tourism is a growing industry and the attraction and activity sector is a vital part of it. It is a great challenge that this sector, which influences tourists' experiences most, achieves a standard that complies with the "clean and green" image of New Zealand in the world. In this sense, sustainable tourism becomes a main goal of the industry.

Sustainable tourism means tourism in which the environmental, social, and economic aspects and impacts are considered equally. It draws from the current stock and resources without damaging options for further use.

A major environmental impact is the emission of greenhouse gases (for example carbon dioxide) as a result of energy use, mainly through the combustion of fuels. New Zealand is a signatory of the Kyoto Protocol (1997) (International convention to protect the climate) and therefore obliged to reduce emissions to year 1990 levels by the year 2010. The present data suggest that New Zealand will not be able to comply with its commitment.

Tourist attractions and activities consume a considerable amount of energy at various stages. The tourist experience itself is only one component of energy demand and there are many direct business activities that may be relevant to a full understanding of energy use in the sector. These include, for example, running an office, marketing the product, and transport.

What is a tourist attraction or activity?

Tourist attractions and activities are diverse. The following table shows the framework for analysing attractions and activities as employed in this study.

Generic category	Sub-categories	Types of operators/establishments
ATTRACTION	Building	Art gallery, Historic building, Museum, Visitor centre
	Park	Aquarium, Botanical garden, Wildlife park, Zoo
	Amusement	Experience centre, Gondola, Sporting complex, Theme park
	Industry	Brewery, Farm show, Wine trail and tasting
	Natural attraction	Geothermal attractions (hot pools), Glow worm caves
ENTERTAINMENT	Performance	Cinema, Live theatre or concert, Maori cultural performance,
	Other	Bar/night club, Casino, Shopping
ACTIVITY	Air activity	Scenic flight, Air sports (skydiving, ballooning, parapenting), Whale watching by air, Heliskiing
	Sea activity	Diving, Dolphins/ Whale watching, Jet boating, Sailing, Scenic boat cruise, Sea/coastal fishing
	Adventure recreation	Adventure (bungy and others), Kayaking, Mountain biking, Mountain, rock climbing/caving, Rafting, Skiing, Surfing,
	Nature recreation	Cycling, Golf, Horseriding, Lake/river fishing, Tramping , Viewing wildlife in natural setting, Walking (guided)

To measure energy inputs into the sector a survey was sent out to 276 businesses, of which 94 valid responses were received. These were combined with 13 businesses from a previous study. Of these 107 businesses, 42 per cent were of the attraction category, 10 per cent were entertainment establishments, and 48 per cent were of the activity category.

Results of the survey

Visitor numbers ranged from a minimum of 100 (one fishing operator) to a maximum of 6.8 million visitors (one shopping mall) for the year 1999. A majority of operators attract relatively low visitor volumes and only a few exceptions (e.g. experience centres, theme parks, and entertainment establishments) have large visitor volumes.

The total energy use of businesses varied considerably from a minimum energy use of 9 gigajoules (one horseriding operator) to the maximum of 77,020 gigajoules (one popular bar and entertainment venue). The average, minima and maxima are presented in the following Table.

Energy use per annum for the three categories

	Attraction	Entertainment	Activity
Average (GJ)	411	1,599	495
Min (GJ)	4	36	9
Max (GJ)	53,223	77,020	29,208

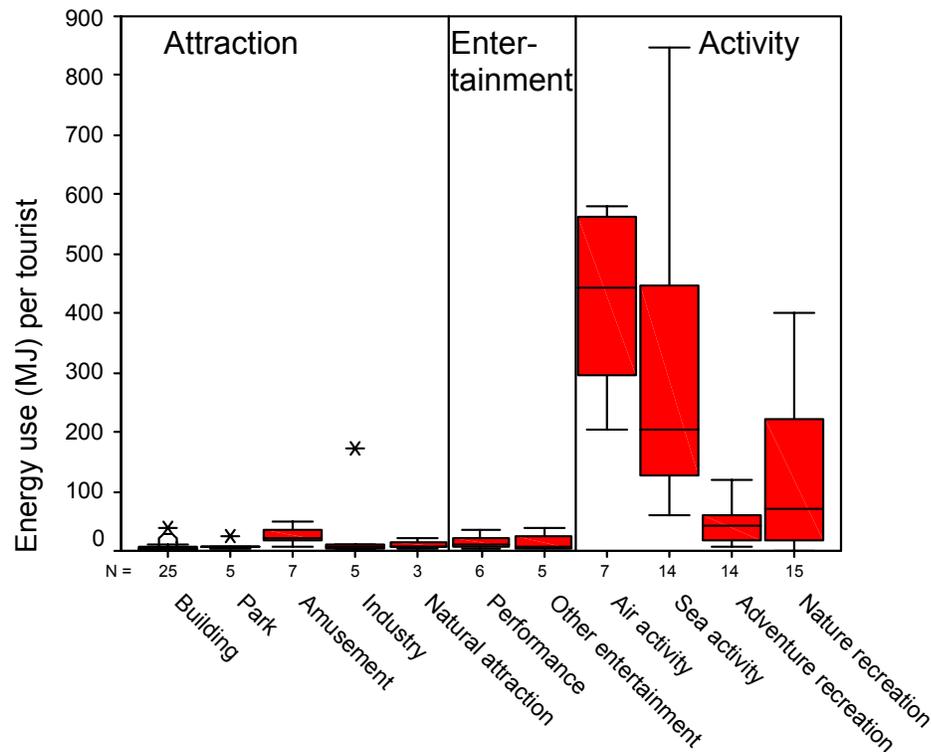
1 GJ= Gigajoule := 1000 Megajoules (MJ) = 1 000 000 000 Joules or 278 kWh

Because the total energy use depends on visitor numbers, as well as on the attraction or activity's specific energy demand, it is practical to define a 'per capita (tourist) energy consumption'. This new parameter is called 'energy use per tourist'.

Energy use per tourist for the three categories

	Attraction	Entertainment	Activity
Average (MJ/tourist)	6.2	9.4	95.6
Min (MJ/tourist)	0.6	0.8	0.6
Max (MJ/tourist)	174.0	38.5	2902.8

The three main categories (attraction, entertainment, and activity) comprise a diverse selection of sub-categories. A closer examination of the sub-categories shows that the attraction and entertainment category are similar in terms of energy use per tourist with a generally low consumption. The amusement sub-category and the two entertainment sub-categories consume slightly more energy per tourist. Activities are clearly more energy demanding than attractions, and are also characterised by a much larger variation between and within the different activities. For example, "air activities" consume on average 442 megajoules per tourist compared with adventure recreation activities (e.g. bungee jumping, rafting, zorbing), which consume only 35 megajoules.



Energy use per tourist for the sub-categories. The box represents 50% of all cases. The whiskers are lines that extend from the box to the highest and lowest values. Outliers (circles) and extremes (asterisks) are also presented.

Various fuel types are used to satisfy energy demand. Electricity constitutes the most important energy source for **attractions and entertainment**. While attractions generally account for only little diesel or petrol use, botanical gardens and zoos use these fuels more extensively, mainly for maintaining the attraction (mowing, digging, transporting material). Gas (mainly natural gas) in buildings is used for heating. Coal is an important fossil fuel for experience centres and theme parks, mainly for heating and demonstrating (historic) operations, such as coal fired ovens or steam trains. When looking at all attractions and entertainment, most petrol is used for road transport (70%), whereas diesel is rather used for other purposes, such as hot water or heating. Only 7 per cent of diesel is used for road transport.

Electricity plays a minor role for tourist **activities**, where fossil fuels are more prevalent. Petrol and diesel are the most important fuels, but are only partly used for road transport. On average, 68 per cent and 56 per cent of an individual activity operator's petrol and diesel consumption, respectively, are for road transport. However, calculated for all activity operators, only 20 per cent of the petrol and 18 per cent of the diesel consumption are used for road vehicles. This implies that operators who consume petrol or diesel in small quantities are more likely to use it for road transport and that large quantities of petroleum fuels are required for other purposes (e.g. diesel for boats). Clearly, air activities account for the largest share of aviation fuel. However, all other activity sub-categories also rely on aviation fuel in the order of 5 to 20 per cent. This is

due to the use of aviation fuel for some jet boats and the occasional demand for flight services, such as helicopter transport.

The following table presents average figures for the per tourist energy consumption of selected operator types. Due to the small sample size, these figures could be subject to considerable variation and should be interpreted as indicative only.

Operator type	Energy (MJ) / tourist
Farm show	7
Museum	10
Zoo/Wildlife park	16
Experience centre	29
Rafting	36
Guided walks (inc. transport to sites)	110
Scenic boat cruise	165
Scenic flight	340
Diving	800

Conclusions

On a per tourist basis, activities generally require more energy than attractions and entertainment attractions. This is partly due to the relatively low visitor volume and the individuated service, compared with (mass-tourism) attractions. Often, the activity product is complex and composite and requires energy at different stages. The tourist experience associated with activities results in approximately 10 times more energy use than the visitation of attractions or entertainment centres.

Generally, electricity is the main energy source for attractions and entertainment. In terms of greenhouse gas emissions, this is principally considered as positive, as 62 per cent of New Zealand's electricity stems from hydropower. However, the increasing electricity demand results in higher proportions of thermally produced electricity, which is characterised by increased carbon dioxide emissions.

Although road transport is an important part of the service product, only a proportion of the fuels are used for it. This has important implications for energy efficiency measures, as the emphasis shifts from vehicles to other technical equipment, for example heating systems. The use of aircraft and helicopters increases an operator's energy bill (and emissions) severely. Clearly, for all motorised activities, vehicle occupancy is a key factor for the energy use per person.

Based on IVS data (International Visitor Survey, undertaken by the New Zealand Tourism Board) an average international tourist participates in nine attractions/activities. Assuming an average energy use of 100 megajoules, the total energy use of a tourist's recreation amounts in 900 megajoules. This is equivalent to 300 kilometres in an average car, 26 visits to a restaurant, or the energy required to produce 16 kilograms of New Zealand lamb. However, these are relatively minor compared with energy requirements for internal and international travel.

To obtain a comprehensive examination of the energy (and dollar!) saving potential of a single operator an individual **energy audit** should be conducted. Apart from visitation levels, determining factors are likely to be the service level (e.g. shuttle transport), the vehicle usage, and occupancies of vehicles, the fuel mix, technical equipment, and the management style.

Useful web addresses

www.eeca.govt.nz: EECA & energy-Wise News magazine. Energy Efficiency and Conservation Authority.

www.branz.org.nz : Building Research Association of New Zealand.

www.energyideas.org/: On this Washington State University sponsored site, you can search the web for energy efficiency information, technical resources, data and tolls. You may also ask questions on-line, and they will find the answers for you.

www.epa.gov/climatewise/: The Climate Wise Program helps businesses turn energy efficiency and environmental performance into a corporate asset.