This online textbook provides free access to a comprehensive education and training package that brings together the knowledge of how countries, specifically Australia, can achieve at least 60 percent cuts to greenhouse gas emissions by 2050. This resource has been developed in line with the activities of the CSIRO Energy Transformed Flagship research program, which is focused on research that will assist Australia to achieve this target. This training package provides industry, governments, business and households with the knowledge they need to realise at least 30 percent energy efficiency savings in the short term while providing a strong basis for further improvement. It also provides an updated overview of advances in low carbon technologies, renewable energy and sustainable transport to help achieve a sustainable energy future. While this education and training package has an Australian focus, it outlines sustainable energy strategies and provides links to numerous online reports which will assist climate change mitigation efforts globally.

CHAPTER 6: ENERGY EFFICIENCY OPPORTUNITIES IN LIGHT INDUSTRY/COMMERCIAL SECTORS

LECTURE 6.1: OPPORTUNITIES FOR ENERGY EFFICIENCY IN THE TOURISM AND HOSPITALITY SECTORS
The Natural Edge Project (TNEP) is an independent non-profit Sustainability Think-Tank based in Australia. TNEP operates as a partnership for education, research and policy development on innovation for sustainable development. TNEP’s mission is to contribute to, and succinctly communicate, leading research, case studies, tools, policies and strategies for achieving sustainable development across government, business and civil society. Driven by a team of early career Australians, the Project receives mentoring and support from a range of experts and leading organisations in Australia and internationally, through a generational exchange model.

Enquires should be directed to:
Mr Karlson ‘Charlie’ Hargroves
Co-Founder and Director
The Natural Edge Project
www.naturaledgeproject.net/Contact.aspx

Acknowledgements
The Work was produced by The Natural Edge Project using funds provided by CSIRO and the National Framework for Energy Efficiency. The development of this publication has been supported by the contribution of non-staff related on-costs and administrative support by the Centre for Environment and Systems Research (CESR) at Griffith University, under the supervision of Professor Bofu Yu, and both the Fenner School of Environment and Society and Engineering Department at the Australian National University, under the supervision of Professor Stephen Dovers. The lead expert reviewers for the overall Work were: Adjunct Professor Alan Pears, Royal Melbourne Institute of Technology; Geoff Andrews, Director, GenesisAuto; and Dr Mike Dennis, Australian National University.

Project Leader: Mr Karlson ‘Charlie’ Hargroves, TNEP Director
Principle Researcher: Mr Michael Smith, TNEP Research Director, ANU Research Fellow
TNEP Researchers: Mr Peter Stasinopoulos, Mrs Renee Stephens and Ms Cheryl Desha.
Copy Editor: Mrs Stacey Hargroves, TNEP Professional Editor

Peer Review
Principal reviewers for the overall work were Adjunct Professor Alan Pears – RMIT, Geoff Andrews – Director, Genesis Now Pty Ltd, Dr Mike Dennis – ANU, Engineering Department, Victoria Hart – Basset Engineering Consultants, Molly Olsen and Phillip Toyne - EcoFutures Pty Ltd, Glenn Platt – CSIRO, Energy Transformed Flagship, and Francis Barram – Bond University. The following persons provided peer review for specific lectures; Dr Barry Newell – Australian national University, Dr Chris Dunstan - Clean Energy Council, D van den Dool - Manager, Jamieson Foley Traffic & Transport Pty Ltd, Daniel Veryard - Sustainable Transport Expert, Dr David Lindley – Academic Principal, ACS Education, Frank Hubbard – International Hotels Group, Gavin Gilchrist – Director, BigSwitch Projects, Ian Dunlop - President, Australian Association for the Study of Peak Oil, Dr James McGregor – CSIRO, Energy Transformed Flagship, Jill Grant – Department of Industry Training and Resources, Commonwealth Government, Leonardo Ribon – RMIT Global Sustainability, Professor Mark Diesendorf – University of New South Wales, Melinda Watt - CRC for Sustainable Tourism, Dr Paul Compston - ANU AutoCRC, Dr Dominique Hes - University of Melbourne, Penny Prasad - Project Officer, UNEP Working Group for Cleaner Production, University of Queensland, Rob Gell – President, Greening Australia, Dr Tom Worthington - Director of the Professional Development Board, Australian Computer Society.

Prepared by The Natural Edge Project 2007 Page 2 of 23 Energy Transformed: Sustainable Energy Solutions
The International Energy Agency forecasts that if policies remain unchanged, world energy demand is set to increase by over 50 percent between now and 2030. In Australia, CSIRO has projected that demand for electricity will double by 2020. At the same time, The Intergovernmental Panel on Climate Change (IPCC) has warned since 1988 that nations need to stabilise their concentrations of CO₂ equivalent emissions, requiring significant reductions in the order of 60 percent or more by 2050. This portfolio has been developed in line with the activities of the CSIRO Energy Transformed Flagship research program; ‘the goal of Energy Transformed is to facilitate the development and implementation of stationary and transport technologies so as to halve greenhouse gas emissions, double the efficiency of the nation’s new energy generation, supply and end use, and to position Australia for a future hydrogen economy’. There is now unprecedented global interest in energy efficiency and low carbon technology approaches to achieve rapid reductions to greenhouse gas emissions while providing better energy services to meet industry and society’s needs. More and more companies and governments around the world are seeing the need to play their part in reducing greenhouse gas emissions and are now committing to progressive targets to reduce greenhouse gas emissions. This portfolio, The Sustainable Energy Solutions Portfolio, provides a base capacity-building training program that is supported by various findings from a number of leading publications and reports to prepare engineers/designers/technicians/facilities managers/architects etc. to assist industry and society rapidly mitigate climate change.

The Portfolio is developed in three modules;

**Module A: Understanding, Identifying and Implementing Energy Efficiency Opportunities for Industrial/Commercial Users – By Technology**

Chapter 1: Climate Change Mitigation in Australia’s Energy Sector

Lecture 1.1: Achieving a 60 percent Reduction in Greenhouse Gas Emissions by 2050

Lecture 1.2: Carbon Down, Profits Up – Multiple Benefits for Australia of Energy Efficiency

Lecture 1.3: Integrated Approaches to Energy Efficiency and Low Carbon Technologies

Lecture 1.4: A Whole Systems Approach to Energy Efficiency in New and Existing Systems

Chapter 2: Energy Efficiency Opportunities for Commercial Users

Lecture 2.1: The Importance and Benefits of a Front-Loaded Design Process

Lecture 2.2: Opportunities for Energy Efficiency in Commercial Buildings

Lecture 2.3: Opportunities for Improving the Efficiency of HVAC Systems

Chapter 3: Energy Efficiency Opportunities for Industrial Users

Lecture 3.1: Opportunities for Improving the Efficiency of Motor Systems

Lecture 3.2: Opportunities for Improving the Efficiency of Boiler and Steam Distribution Systems

Lecture 3.3: Energy Efficiency Improvements available through Co-Generation

---

Module B: Understanding, Identifying and Implementing Energy Efficiency Opportunities for Industrial/Commercial Users – By Sector

Chapter 4: Responding to Increasing Demand for Electricity
Lecture 4.1: What Factors are Causing Rising Peak and Base Load Electricity Demand in Australia?
Lecture 4.2: Demand Management Approaches to Reduce Rising ‘Peak Load’ Electricity Demand
Lecture 4.3: Demand Management Approaches to Reduce Rising ‘Base Load’ Electricity Demand
Lecture 4.4: Making Energy Efficiency Opportunities a Win-Win for Customers and the Utility: Decoupling Energy Utility Profits from Electricity Sales

Chapter 5: Energy Efficiency Opportunities in Large Energy Using Industry Sectors
Lecture 5.1: Opportunities for Energy Efficiency in the Aluminium, Steel and Cement Sectors
Lecture 5.2: Opportunities for Energy Efficiency in Manufacturing Industries
Lecture 5.3: Opportunities for Energy Efficiency in the IT Industry and Services Sector

Chapter 6: Energy Efficiency Opportunities in Light Industry/Commercial Sectors
Lecture 6.1: Opportunities for Energy Efficiency in the Tourism and Hospitality Sectors
Lecture 6.2: Opportunities for Energy Efficiency in the Food Processing and Retail Sector
Lecture 6.3: Opportunities for Energy Efficiency in the Fast Food Industry

Module C: Integrated Approaches to Energy Efficiency and Low Emissions Electricity, Transport and Distributed Energy

Chapter 7: Integrated Approaches to Energy Efficiency and Low Emissions Electricity
Lecture 7.1: Opportunities and Technologies to Produce Low Emission Electricity from Fossil Fuels
Lecture 7.2: Can Renewable Energy Supply Peak Electricity Demand?
Lecture 7.3: Can Renewable Energy Supply Base Electricity Demand?
Lecture 7.4: Hidden Benefits of Distributed Generation to Supply Base Electricity Demand

Chapter 8: Integrated Approaches to Energy Efficiency and Transport
Lecture 8.1: Designing a Sustainable Transport Future
Lecture 8.2: Integrated Approaches to Energy Efficiency and Alternative Transport Fuels – Passenger Vehicles
Lecture 8.3: Integrated Approaches to Energy Efficiency and Alternative Transport Fuels - Trucking

Chapter 9: Integrated Approaches to Energy Efficiency and Distributed Energy
Lecture 9.3: Beyond Energy Efficiency and Distributed Energy: Options to Offset Emissions
Lecture 6.1: Opportunities for Energy Efficiency in the Tourism and Hospitality Sectors

Educational Aim
The aim of this lecture is to explain why reducing greenhouse gas emissions is in the best interests of the Tourism and Hospitality Industry. This lecture will highlight the many opportunities for tourism and hospitality businesses to simultaneously reduce their impact on the environment, increase profit margins, create a stronger marketing image, and offer a more attractive workplace for staff and a better service to customers. These outcomes may be achieved by improving the energy efficiency of a business, particularly by ensuring the appropriate management and use of hot water, air-conditioning, lighting, catering facilities, leisure facilities, and by ensuring an appropriate building design.

Essential Reading

<table>
<thead>
<tr>
<th>Reference</th>
<th>Page</th>
</tr>
</thead>
</table>

---

5 Peer review by Jill Grant – DITR, Frank Hubbard – International Hotels Group, and Melinda Watt - CRC for Sustainable Tourism.
Learning Points

The InterContinental Hotels Group (IHG), with over 3,700 hotels worldwide, understands its responsibility to respect the environment and manage its impacts for the benefit of the communities in which it operates. The IHG CEO, Andy Cosslett has acknowledged that ‘Climate change is one of the biggest challenges facing the world today and how we respond will shape the lives of future generations’. An essential component of implementing sound environmental practices is to provide relevant training and resources. The CSIRO Energy Transformed and National Framework for Energy Efficiency funded Sustainable Energy Solutions Portfolio by The Natural Edge Project provides a valuable resource for hotels owners and operators to better understand the climate change issues and how hotels can exhibit their commitment to achieving greater energy efficiency.

Frank Hubbard, Director, Sustainability, InterContinental Hotels Group Australia/New Zealand/South Pacific

1. The global tourism industry contributes significantly to greenhouse gas and other detrimental emissions through its own operations and holiday-associated travel. According to the United Nations Environmental Programme, ‘Global tourism is closely linked to climate change. Tourism involves the movement of people from their homes to other destinations and accounts for about 50% of air traffic movements; rapidly expanding air traffic contributes about 2.5% of the production of CO_{2}.’

2. It is in the long term interests of the tourism sector to be pro-active on climate change, as this lucrative industry may be potentially devastated by the effects of climate change due to coral bleaching, sea level rise, decrease in snow falls and an increase in dramatic climate events. This is recognised by government and industry as shown by the fact that in April 2007, the Minister for Small Business and Tourism, Hon Fran Bailey MP, announced the development of a Tourism Action Plan on Climate Change. Industry submissions to this process already demonstrate how seriously the Australian tourism industry takes the risks of climate change.¹

3. The Australian tourism industry can demonstrate its commitment to minimising its contribution to Climate Change and related environmental damage by: encouraging Australians to travel more within Australia and less overseas; providing customers with carbon offset options for their travel; showing leadership in the area of energy efficiency and sustainable energy use on their own operations; and providing tourism customers with education on climate change. Taking sustainable business practice measures such as this will help to protect the financial viability of the industry over the long term.

4. Tourism and Hospitality businesses are increasingly offering carbon offset options to reduce the ‘carbon footprint’ of customers. The major airlines operating in Australia now offer climate neutral options for travellers. This is a burgeoning opportunity in the Tourism and hospitality industry that seems to be gaining momentum.

5. Tourism and hospitality businesses can reap substantial rewards by implementing an energy efficiency strategy for their own operations. Benefits of such a strategy include financial gains,  

---

Energy use by a tourism and hospitality business’s operations can be significantly improved by employing a well considered energy use strategy and encouraging the active participation of staff and patrons. A reduction in the quality of service is not necessary to achieve significant improvements in energy efficiency. It is important for tourism and hospitality businesses to particularly focus on reducing consumption of fossil-fuel electricity, because this form of energy has a high ‘greenhouse intensity’, accounting for approximately 90 percent of greenhouse gas emission outputs in hotels.  

Reducing the energy use of tourism and hospitality facilities results in compounded benefits such as reduced water use. This can occur because technologies that are energy efficient are also often water efficient. Additionally, energy efficient building features often reduce maintenance requirements, resulting in long term savings, such as those that can be gained from installing longer-lasting light bulbs or from installing insulation which reduces reliance on air-conditioning systems.

In order for tourism and hospitality businesses to successfully implement a sustainable energy use strategy they should: a) obtain a commitment from top level management; b) undertake an energy use audit; c) create and implement an energy use strategy; and d) monitor and report on energy use strategy results for further energy use planning. Following this process it is beneficial to communicate the outcomes of this process to clients and to the industry to gain recognition for the demonstration of commitment to reducing energy use, and to enhance the marketability of the business.

In order to achieve significant energy efficiency improvements, a tourism or hospitality facility may target the following areas of consideration: space heating, hot water heating, ventilation and air-conditioning, lighting, the built form, catering facilities, leisure and fitness facilities, and staff and client participation. It is standard for energy efficiency measures to result in a 20 percent reduction in energy use in tourism and hospitality facilities, though it is certainly feasible to achieve even greater reductions. This investment can be paid off through cost savings in just a few years. Note that the Department of Industry, Science and Resources has provided some detailed Australian case studies of tourism and hospitality establishments that have achieved significant energy and cost saving outcomes (see Essential Reading).

Achieving significant energy use reductions can allow a tourism or hospitality establishment to feasibly (depending on location and scale of enterprise) rely on renewable energy technologies such as solar hot water systems, photovoltaic solar cells, and micro-turbines to provide most or all of the businesses energy needs. The feasibility of using this technology increases because a smaller energy demand requires smaller infrastructure, and thus costs less. Hotel chains that make these changes can benefit in multiple ways. These changes could help position any hotel chain or smaller tourism accommodation operator as an ecotourism enterprise, which is the fastest growing global tourism market.

---


Brief Background Information

The tourism and hospitality industry is a fast-growing sector in Australia, and nature-based or ‘eco’ tourism is thought to be among the fastest growing sub-sectors of the industry internationally. The industry is made up of a range of business types, including restaurants and cafes, resorts, hotels, clubs, attractions and event facilities, which are predominantly small businesses. In Australia 85 percent of all businesses in the industry employ less than 20 persons.

As the industry continues to grow in the (carbon constrained) future, pragmatic steps will need to be taken if the industry is to significantly reduce its fossil fuel-based energy use and associated greenhouse gas output. This lecture provides information that can be used by those in the tourism and hospitality industry to help reduce their facility’s energy consumption and carbon emission output.

Why Make a Change?

As with other industries, the tourism and hospitality industry can greatly benefit by adopting sustainable practices and in particular those related to energy. For example, by improving the energy efficiency of buildings and operations, tourism and hospitality businesses can save money and increase profit margins while greatly reducing the greenhouse gas emissions resulting from electricity generation. Improving the energy efficiency of facilities can additionally improve levels of staff and customer comfort and improve general morale.

Aside from enhancing user comfort levels and increasing profit margins, an energy efficient business can also benefit from a marketing advantage. This is because discerning customers are becoming increasingly aware of sustainability issues and are starting to look for more environmentally responsible products and experiences. Studies conducted in the US in the 1990s found that 75 percent of hotel customers identified themselves as environmentally minded consumers, while 54 percent responded that they wanted to stay in hotels showing concern for the environment. It is likely that Australian consumers would currently provide even higher levels of interest in the environmental management of tourism facilities given the recent increase in public awareness of sustainability issues, most notably following the 2006 release of the Al Gore film, An Inconvenient Truth.

As stated by Bill Healey, the Director for National Affairs from The Australian Hotels Association, ‘When it comes to sustainability and corporate social responsibility, we are moving from a position where hotels are at a competitive advantage if they do this to a position where it is a competitive disadvantage if they don’t.’

It is also in the long-term interests of the tourism and hospitality industry to lead the way in sustainable action. Statistics from the financial year of 1999 to 2000 indicated that tourism industry exports totalled AUD$13.1 billion, which equates to 2.1 percent of Australia’s gross domestic product.

---

9 Ibid.
product. The total value of the tourism industry to Australia’s economy is AUD$75 billion per annum. This lucrative industry may be potentially devastated by the effects of climate change due to coral bleaching, sea level rise, and dramatic climate events. Key impacts may include:

- The potential widespread bleaching of coral along Australia’s northern coasts which might devastate the Great Barrier Reef (where extensive coral bleaching has already been observed). In 2004 the Queensland Tourism Council and the World Wildlife Fund published an extensive report recognising and addressing this threat. The Great Barrier Reef Marine Park Authority in 2007 also published a Coral Bleaching Response Plan in recognition of this threat.

- Loss of critical habitat areas and an increased risk of the spread of exotic species within Kakadu National Park.

- Sea level rise and storm events pose erosion risks to Australia’s coastlines, including the iconic Bondi Beach and Gold Coast beaches.

- Less snowfall impacting on the viability of Australian ski resorts in Australia’s alpine regions.

- An increase in the frequency and severity of severe weather events, which can significantly threaten the success of tourism in affected areas.

It is important that the tourism and hospitality industry act promptly to demonstrate its commitment to protecting its key asset on which financial viability is based – the Australian environment.

**What are the Challenges?**

The tourism and hospitality industry faces a special dilemma when it comes to creating a more energy efficient service for its customers. This is because patrons generally expect to indulge during their holiday, which may involve the copious use of hot water, the daily supply of fresh laundered linen, and access to resource intensive swimming pools. Under these circumstances the frugal use of energy can be problematic, since it may involve either a perceived reduction in service provision, the participation of the patrons, or a very well considered energy use strategy. This lecture aims to explore the possibilities of the two latter options, since it is considered feasible for the energy efficiency of a tourism and hospitality business to improve substantially, while sustaining high levels of service and even going un-noticed by patrons unless pointed out.

Another challenge that the industry faces is its contribution to greenhouse gas and other detrimental emissions through holiday-associated travel. According to the United Nations Environmental Programme:

---


20 Ibid.

21 Ibid.
Global tourism is closely linked to climate change. Tourism involves the movement of people from their homes to other destinations and accounts for about 50% of traffic movements; rapidly expanding air traffic contributes about 2.5% of the production of CO2. Tourism is thus a significant contributor to the increasing concentrations of greenhouse gases in the atmosphere.

Air travel itself is a major contributor to the greenhouse effect. Passenger jets are the fastest growing source of greenhouse gas emissions. The number of international travelers is expected to increase from 594 million in 1996 to 1.6 billion by 2020, adding greatly to the problem unless steps are taken to reduce emissions.\(^\text{22}\)

Further to these threats, experts are concerned that by 2015 half of the annual depletion of the ozone will be caused by ozone depleting substances emitted by air travel.\(^\text{23}\) As the environmental impacts of the Tourism and Hospitality Industry continue to be better understood, it is likely that the industry will experience significant regulation pressure to increase the environmental responsibility of its practice. Companies that pre-empt the future direction of industry regulation will be likely to avoid the risk of fines and additionally benefit from competitive advantage.

**Industry Action**

In April 2007, the Minister for Small Business and Tourism, Hon Fran Bailey MP, announced the development of a *Tourism Action Plan on Climate Change*, which will be based on input from industry, researchers and the community. All key stakeholders in the tourism industry have provided submissions for the development of the Action Plan. A written submission for the Action Plan provided by the Australian Hotel Association’s Director of National Affairs, Bill Healey, communicates the significant changes the industry will face in the future.\(^\text{24}\)

> Over the last 12 months the environment and more particular climate change have become major issues in the community... Corporate clients are asking major accommodation hotels if they have environment plans, overseas conventions are promoting themselves as carbon neutral and Europeans are being encouraged to holiday closer to home to avoid the perceived ‘environmental cost’ of long haul jet flights.

> The tourism and hospitality sector always seek to respond to the changing needs of our customers. There is an increasing expectation that our businesses will be environmentally responsible and sustainable...

> All hotels will need to be environmentally sustainable if our industry is to effectively manage the economic, social and political challenges that lie ahead.

**Hotels and Energy Use**

Hotels form a significant component of the tourism and hospitality industry and therefore contribute to a large proportion of the industry’s greenhouse gas output. Energy use in hotels comprises approximately 0.5 percent of Australia’s total energy consumption.\(^\text{25}\) Though the tourism and

---


\(^\text{23}\) Ibid.


hospitality industry is not the most energy intensive industry in Australia, there is still a significant opportunity for improvement and the potential for the industry to demonstrate leadership in this area.

A study undertaken in 1999 found that electricity is the most commonly used energy source within Australian hotels, representing 66 percent of total consumption, while natural gas represents 27 percent of energy used. However, because of its high ‘greenhouse intensity’, electricity actually contributes to over 90 percent of Australian hotels’ greenhouse gas outputs (see Figure 6.1.1). This highlights the importance of reducing the amount of fossil fuel-based electricity used in tourism and hospitality operations.

![Energy Consumption and Greenhouse Emissions](image)

**Figure 6.1.1.** Total energy consumption and greenhouse gas emissions

*Source: Department of Industry, Tourism and Resources (2002)*

Not only can the reduction of energy use result in the significant reduction in greenhouse gas outputs, but it can also result in a reduction in water consumption. A study in Australia observed that significant energy efficiency improvements are often matched with similar improvements in water use. The interrelation between energy and water savings is attributed to many contributing factors. Firstly, it is helpful to understand that water provided at the tap contains a certain level of ‘embodied energy’ because energy was required to filter and deliver the water. This explains why an energy saving strategy may often include efforts to save water, including installing devices such as waterless urinals and water-saving shower roses. Additionally, it is often the case that new energy efficient devices such as dishwashers and washing machines are also water efficient. Another example is a new energy-efficient hot water system; which has an efficient and well insulated hot water heating infrastructure that also reduces the waiting time for hot water to arrive at the tap, thereby reducing water wastage. These dual-benefit outcomes are particularly important, considering the current water supply issues in Australia and the water restrictions that have been introduced to many of Australia’s suburban centres.

---

26 Ibid.
27 Ibid.
28 Ibid.
Sustainable Energy Use Strategy

In order for a tourism and hospitality business to successfully implement a sustainable energy use strategy, the top level of management must first state a commitment to achieving energy use improvements. Top management commitment to this cause will signify to employees that efforts will be supported and possibly rewarded. It is also very useful for the business to undertake an energy use audit to identify areas in need of most improvement and to reveal unnoticed energy ‘leakage’ (e.g. use of energy that occurs due to standby energy use of appliances or poor insulation of hot water heaters).

This energy audit may be performed as part of a broader Environmental Management System audit process, though the scope of this lecture is restricted to the issue of energy use only. Following an energy use audit, assessors may begin to plan ways of reducing energy consumption. The following sections may provide guidance in determining which measures will best suit individual tourism and hospitality facilities. After implementing energy efficiency measures it is important to: monitor and report on the results; identify energy savings and cost benefits; and identify areas still in need of improvement on which to base further improvement strategies.

Energy Use Trends

An assessment of existing energy use trends in a facility can indicate where the greatest improvements can be achieved and also where financial savings can be realised. Figure 6.1.2 demonstrates that hotels and pubs spend most of their energy in heating, lighting, hot water, and catering. Some simple efficiency measures in these areas may produce significant positive outcomes. It is standard for even simple energy efficiency measures to result in a 20 percent reduction in energy use.30 This is a financially viable option, considering the short payback period for these efficiency measures. For example, it may take only 1-2 years to pay back the investment made into efficiency measures that result in a 12-13 percent reduction in carbon emissions31 and a significant reduction in electricity expenditures.

Figure 6.1.2. Breakdown of energy use within an average hotel (left) and pub (right)

Source: Carbon Trust (2007)32

31 Ibid.
32 Ibid.
Efficient Energy Use Options

This section includes lists of actions that may be taken to increase the energy efficiency of a tourism or hospitality business. The lists have been divided into key areas where energy use can be improved, including: heating, hot water, ventilation and air-conditioning, lighting, building form, catering, leisure and fitness facilities, and staff and client participation. This list provides a practical, preliminary checklist to plan energy efficiency gains in tourism and hospitality establishments.

Heating

Up to 30 percent of heating costs can be saved by implementing some simple efficiency measures outlined below:

- Identify recommended room temperatures for various spaces (kitchen area, lounging areas, guest rooms etc.) and adjust heating and air-conditioning controls to suit.
- Insulate boilers, hot water heaters, pipes, and valves. The payback period for this measure is usually just a few months. Be sure that the insulation is well done – an un-insulated valve leaks the same amount of heat (and energy) as a meter of un-insulated pipe.34
- Ensure that rooms are being heated only during times when they are occupied. Programmable time switches can help ensure this is the case, along with a mechanism to cut off electricity when a key is not inserted.
- Discourage staff from turning up thermostats in order to heat rooms quickly, since this doesn’t necessarily increase the rate of heating but causes the heater to overheat the room.
- Install thermostatic radiator valves (TRVs). These simple devices control heat output automatically according to changes in air temperature, providing efficient and locally sensitive heat.
- Night setback controls can be used to reduce the level of heating provided to spaces that are not usually used at night, such as corridors and stairwells.
- In larger buildings, creating temperature zones will assist in the efficient provision of heating. Each zone can be programmed separately according to the required level and timing of temperatures. Considering that the average occupancy rates for Australian hotels are just over 60 percent,35 this strategy could be very effective at saving energy, particularly if building managers are able to turn off heating over entire floors of a building.
- Some of the warm air expelled through exhaust vents can be recirculated into the system, along with fresh air to reduce the amount of energy required to reheat the incoming air supply. This strategy should be based on an understanding of air quality standards.

33 This section is based on information that has been primarily attained from the following resource: Carbon Trust (2007) Hospitality: Saving Energy without Compromising Service, Carbon Trust, Sector Overview. Available at http://www.carbontrust.co.uk/Publications/publicationdetail.htm?productlid=CTV013&metaNoCache=1. Accessed 26 September 2007.
34 Ibid.
Hot Water
- Set water temperature to a maximum of 60°C. This temperature is hot enough to kill Legionella bacteria and warm enough to be comfortable and safe for guests.\(^{36}\)

- Because water requires energy to be filtered and transported, a saving in water results in a saving in the amount of energy that is required to be generated for this use. Though the energy savings achieved through water savings occur offsite, it is still a beneficial exercise because it reduces the greenhouse gas emission ‘footprint’ of a business, results in lower water bills, and can reduce wear and tear on equipment.

- To save energy install water saving devices, including water saving taps and shower roses, dual flush toilets, waterless urinals, and water efficient appliances. Installing rainwater tanks will provide a particular benefit if the rainwater is used to offset mains water consumption.

Ventilation and Air-Conditioning
- Seal gaps in windows, doors, and ceilings that permit draughts, and pull conditioned air out of the building.

- During the months of the year when the climate is pleasant, consider implementing natural ventilation strategies to heat and cool the building instead of using energy-intensive air-conditioning.

- Regularly maintain cooling equipment, including the cleaning of fans and air ducts. If not properly maintained, these components can use up to 60 percent more energy than they would in good working condition, increasing running costs and the risk of breakdown.\(^{37}\)

- Ensure that a building is not simultaneously heated and cooled due to poor management. This problem can be avoided by determining a suitable temperature gap (e.g. between 19°C and 24°C) where neither heating nor cooling equipment are activated.

- Fans used in buildings such as those used to circulate air can be fitted with variable speed drives (VSD) that enable the fan speeds to be adjusted to different speeds. This can result in noticeable energy savings.

Lighting
- When lighting is turned on and off by a timer, ensure that the timers are set to match trading hours and daylight patterns.

- Keep windows, skylights, and light fittings clean to maintain sufficient light levels. Adhering to a basic lighting maintenance regime can reduce lighting costs by up to 15 percent.\(^{38}\)

- Replace standard tungsten light fittings with efficient fittings such as compact fluorescent lamps (CFLs) or light emitting diodes (LEDs). CFLs use 75 percent less energy and last 8-10 times longer.\(^{39}\) This not only saves energy costs and reduces maintenance demands, but it also reduces the heat output within rooms, reducing cooling costs.\(^{40}\)


\(^{37}\) Ibid.

\(^{38}\) Ibid.

\(^{39}\) Ibid.

\(^{40}\) Ibid.
- Upgrade fluorescent tubes with 26 mm triphosphor-coated tubes that provide a more natural, brighter light and use less energy.

- Avoid using halogen lights, which are very inefficient and produce high levels of heat. These can be substituted with LEDs or ultra compact fluorescent lights (UCFLs) which produce a very similar visual effect. If halogen lights must be used, install infra-red coated halogen bulbs which use 30 percent less energy and emit 60 percent less heat than standard halogen bulbs.  

**Built Form**

As shown in Figure 6.1.3, approximately 65 percent of heat in a building is lost through the fabric of the building itself. In most areas of Australia the poor thermal properties of a building can result in significant discomfort and increased heating costs during winter and increased cooling costs in summer.

![Figure 6.1.3. Heat loss from a typical building](image)

**Source:** Carbon Trust (2007)

Generally, increasing the insulating properties of a building will enhance user comfort and reduce heating and air-conditioning costs. A thermally insulated building is particularly comfortable in terms of noise levels, since surfaces that absorb sound effectively also absorb heat effectively. This is a particularly desirable feature for a building occupied by many people. Measures taken to insulate a building may include:

- Installing insulation in ceiling cavities.

- Using curtains with good thermal qualities with pelmets. Close curtains to reduce the amount of warmth entering the room through the windows in summer, and to reduce the amount of warmth being lost through the windows in winter. Pelmets are important as they capture the heated air behind the curtain and stop it from circulating in the room, helping to insulate the indoor environment from external temperature changes.

- Sealing unused doors and windows.

---

41 Ibid.
42 Ibid.
- Improving glazing. This may include installing double glazed windows (or triple glazed windows in the more temperate locations) or using low emissivity glass that permits good levels of natural light, without high levels of heat.

- Utilising the lobby. Well designed lobbies can act as an intermediary transition space between the conditioned air in the building and the undesirably warm or cool air outside.

**Catering**

Catering energy use can be reduced by as much as 25 percent by following some simple energy efficiency guidelines.\(^{43}\)

- Turn off burners, grills, and other equipment when not in use.
- Seals and gaskets on oven doors should be checked regularly (as much as once a week) to ensure ovens are working efficiently.
- Regularly clean the grease filters in ventilation units and air extractors.
- Reduce the time spent opening fridge and freezer doors: installing refrigerators with glass doors that have good insulting properties can assist with achieving this aim by allowing staff to see the contents of the fridge before opening doors.
- Avoid overcooling food. Consult health and safety standards to assess the correct temperatures for keeping certain foods and adjust refrigeration levels accordingly.
- Purchase energy efficient equipment appliances and whitegoods, especially fridges and dishwashers.
- Up to 50 percent of heat created in and expelled from kitchens can be captured as a resource to reduce energy costs via an air to water recovery device which can be used to preheat hot water.

**Leisure and Fitness Facilities**

Leisure facilities can be significant energy consumers. The following list provides some suggestions that can assist tourism and hospitality businesses to reduce the energy consumption of their leisure facilities:

- Maintain pool and spa water at a temperature that is not above the recommended level, to ensure user comfort and minimum energy use.
- The air temperature of indoor pool halls should be kept at 1 degree above the water temperature to limit water evaporation.
- Install a cover over pool and spa water surfaces to reduce rates of evaporation and retain heat when the pool is not in use. If used properly, installation costs can be recovered within 1.5-3 years and can cut energy use from 10-30 percent.\(^{44}\)
- Always purchase the most energy efficient exercise equipment and turn off the power when not in use.
- Consider installing solar hot water heaters to heat swimming pools.

\(^{43}\) Ibid.

\(^{44}\) Ibid.
Staff and Client Participation

- Appoint an energy officer that is responsible for monitoring and reporting on energy use.
- Conduct staff meetings to provide information regarding the energy performance of the business and to educate the staff on how they can assist to enhance performance.
- Make a special effort to train cleaning staff about energy efficiency measures within the building, since they are able to determine the energy use of unoccupied rooms (e.g. by turning off lights and switching off power points).
- Staff and guests should be encouraged to report on any conditions that cause annoyance or discomfort such as areas that are too cold, hot, or draughty, as well as leaking taps and water that is too hot. Often these problems can be a sign of energy wastage.
- Promote a policy to staff and patrons of turning lights off when rooms are not in use by placing visual prompts in appropriate locations. In areas where strict health and safety guidelines may apply such as a fire well, consider providing dimmed night time lighting to reduce energy consumption.
- Promote the use of sustainable transport by posting bus and train timetables in lobbies and by providing bicycle parking and showers for staff. It may be feasible to also partner with a car hire company that provides energy efficient vehicle options (such as hybrids).
- Air travel - often associated with tourism activities – is a particularly greenhouse gas intensive activity. Tourism and hospitality businesses may choose to promote carbon offsetting of emissions to patrons as part of a ‘climate neutral’ or ‘low environmental impact’ holiday package. Additional information regarding this strategy is provided below in the Carbon Offset Developments and Low Carbon Travel Options sections.
- Develop a purchasing policy that requires all new electrical goods to be highly energy and water efficient, and train purchasing staff to be able to perform lifetime cost assessments of goods.

Building Management System (BMS)

A building management system can be used to increase the energy efficiency of a building by 10 percent or more.\(^{45}\) A BMS is essentially comprised of sensors that monitor the building’s energy use activities (e.g. heating, air-conditioning and lighting). A computer screen displays the information in real time, allowing a building manager to change settings to suit. A BMS can also be set up to automatically respond to conditions, for example, latest technology allows a BMS to sense lighting levels in a room, and adjust the artificial lighting levels accordingly, or turn lighting off completely if a room is vacated.

Combined Heat and Power (CHP)

A combined heat and power facility may be a good energy-saving option for a large tourism and hospitality establishment. A CHP facility involves the onsite production of energy, usually using natural gas or diesel. The heat created in the process used to make energy is captured in water, resulting in the plentiful supply of hot water. This can be a particularly good option for facilities that include large swimming pools or for remote facilities that are not connected to an electricity grid.

may even be possible to set up a CHP facility based on renewable energy resources such as solar, wind or biofuels.

**Carbon Offset Developments**

Tourism and Hospitality businesses are increasingly offering avenues to reduce the ‘carbon footprint’ of travellers by funding offset initiatives:

- Virgin and QANTAS airlines offer carbon offsets for flights that are accredited by the Australian Greenhouse Office’s Greenhouse Friendly Climate Neutral scheme (see [www.greenhouse.gov.au/greenhousefriendly](http://www.greenhouse.gov.au/greenhousefriendly)).

- Having signed onto the Greenfleet carbon neutral program, SkyBus (one of the primary bus companies that provides transfers to and from Australian airports) is currently offering carbon neutral journeys (see [www.skybus.com.au](http://www.skybus.com.au)).

- Travel agencies are increasingly offering carbon neutral options for customers, such as Flight Centre (see [www.flightcentre.com.au/greenpolicy](http://www.flightcentre.com.au/greenpolicy)).

- Pubs are just one sector of the hospitality sector that have adopted emission offsetting services. In February 2007, the Agincourt Hotel in Sydney became Australia’s first carbon neutral pub (see [http://www.agincourthotel.com.au/web/pageid/567](http://www.agincourthotel.com.au/web/pageid/567)).

- The Esplanade Hotel in Fremantle was one of the first hotels in Australia to become carbon neutral, while also focussing on other methods of addressing energy consumption (see [http://www.esplanadehotelfremantle.com.au/data/deposit/site.document.113249.documents/AHA_article.pdf](http://www.esplanadehotelfremantle.com.au/data/deposit/site.document.113249.documents/AHA_article.pdf)).

The above examples demonstrate the applicability of carbon offsetting initiatives to a variety of Tourism and Hospitality business types. These kinds of efforts may become increasingly important in the future if a substantial proportion of businesses in the industry commit to offsetting emissions and the aggregated efforts of the industry may produce significant benefits. Refer to Lecture 9.3: ‘Beyond Energy Efficiency and Distributed Energy: Options to Offset Emissions’ for more information regarding the current carbon offsetting options.

**Low Carbon Travel Options**

Tourism and Hospitality customers are being provided with increasingly diverse options to reduce the environmental impact (and particularly emission impact) of their travel and holidays. While offsetting emissions is one strategy for doing this, there are other options as well:

- Australia is a nation of travellers: 3.5 million Australians, almost 20 percent of the population, travel overseas each year.46 If just 20 percent of these travellers chose to travel in Australia this would reduce greenhouse emissions from travel significantly and help the Australian tourism industry. If Australian’s choose to have holidays near where they live this can make a difference too.

- Australians are increasingly choosing ultra low carbon footprint holidays such as Group Cycling Tours in Australia. There are many organisers of these tours now in Australia (see

Most states have a major cycling tour for a week during the year, that attracts thousands of people (for example see www.bv.com.au).

**Best Practice Case Studies**

Case study: Holiday Inn on Flinders, Melbourne City - InterContinental Hotels Group Australia/New Zealand/South Pacific.47

Holiday Inn on Flinders has developed a comprehensive environmental policy to, *Ensure the hotel’s continued long-term environmental improvement and best practice*. There are seven key components of this policy which include the establishment of an Environmental Committee to Reduce, Reuse and Recycle wherever possible, ensure Water Conservation and Management is maintained, introduce an Energy Conservation and Management program, consider the benefits to the community at all times, be aware of the Impact and Influence of all hotel practices and finally, work to sustain the Future Commitment of the policy.48 The hotel was recently honoured with the 2007 ‘Best Environmental Initiative’ at the Australian Hotel Association awards ceremony held in Adelaide. The award recognised the hotel’s efforts in waste management that has resulted in significant water and energy savings, for example:

- **Lighting**: the hotel arranged an independent energy use audit. The hotel’s energy supplier conducted the audit and found that lighting made up 38.7 percent of the hotel’s total electricity consumption. To reduce this high lighting consumption, the hotel spent AUD $4,000 improving lighting types, and installing timers and sensors. Changes to lighting at the hotel will save AUD $15,000 a year in energy costs and AUD $7,500 in maintenance costs.

- **Hot Water System**: the hotel also installed a gas instantaneous hot water system to replace the 9,000 litre tank, effectively making the 9,000 litre hot water system redundant. This also saved 15 percent of gas usage over the year.

- **Laundry**: The hotel will be installing an ozone laundry system in late 2007 at a cost of approximately AUD$30,000, with a payback period of 1.2 years. These cost savings come from reductions in electricity, gas, water and labour associated with laundry activities.

Greenhouse gas emissions have also been reduced from efficiencies in other areas such as materials usage and recycling which reduce waste to landfill. Two years of systematic waste reduction has paid off for Holiday Inn on Flinders - what had initially started as ‘Savings in the City’, a Melbourne City Council campaign, has now become a way of life for the hotel, and general manager Jason Burnet has a large part to play in this success.

> *We believe it’s the little things that can create the biggest impact. This started as a commitment to try and lower the hotel’s waste by 44 percent and instead, we’ve achieved a whopping 77 per cent reduction – thanks to my hotel team. Our staff have really pushed to develop Holiday Inn on Flinders as a green and clean oasis within the central business district… We can all do something – this isn’t rocket science. Luckily, the team at the hotel think so too, which is the main reason for our success. It’s a team-driven effort and that’s why we’ve been able to implement our green programme so effectively.*

> **Jason Burnet, General Manager, Holiday Inn on Flinders**49

---

47 Frank Hubbard Director, Sustainability. InterContinental Hotels Group Australia/New Zealand/South Pacific. Private Correspondence.
48 Ibid.
49 Frank Hubbard Director, Sustainability. InterContinental Hotels Group Australia/New Zealand/South Pacific. Private Correspondence
Jason has been able to demonstrate that by lowering the hotel’s greenhouse emissions, reducing landfill and water use, and using less energy, the hotel has made real savings. An example of the hotel’s green policy is the new hotel supplier standards. All large-scale plastic chemical containers and food packaging are re-collected, cleaned and re-used – a practical way to saving waste and packaging costs concurrently. The green policy also means that printing is done on both sides of the paper, documents are mainly emailed, and cardboard boxes are re-used as recycle bins. ‘We only buy recycled paper, and scrap paper are used as note pads – no post-it notes for us! We also donate items such as old bed linen and towels, as well as half-used toiletries like shampoos, body gels and moisturisers to various charities helping the homeless,’ explains Jason.

Three additional case study examples are provided below to demonstrate the practical energy use improvement strategies that can be achieved within various types of tourism and hospitality businesses. Additional case studies can be found at the Australian Department of Industry and Tourism website (see http://www.qualitytourism.com.au/default.aspx?page_id=205).

Table 6.1.1: Case Study: Skyrail – Cairns, Australia

<table>
<thead>
<tr>
<th>Project Description:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spanning 7.5 kilometres the Skyrail allows tourists to experience Australia’s World Heritage listed Tropical Rainforest just metres above the forest canopy. Skyrail is the first tourist operation in the world to be benchmarked and certified under the upgraded Green Globe program. The company has adopted many policies that aim at reducing the energy intensity of the operation.</td>
</tr>
</tbody>
</table>

**General energy efficiency measures:**
- Skyrail’s policy is to minimise the use of energy wherever possible, through the implementation of energy saving guiding principles.
- Through Skyrail’s Green Family training program, all staff are provided with information regarding Skyrail’s best practice guiding principles for energy minimisation.
- All Skyrail staff are encouraged by Skyrail management to be conscious of efficient use of energy and of recyclable or reusable items in order to minimise wastage.
- Skyrail annually benchmarks its energy usage against the number of passenger kilometres for Green Globe 21 accreditation.

**Energy minimisation measures:**
- Over 90 percent of infrastructure lighting is fluorescent, rather than incandescent.
- Air-conditioning is installed only in administration areas and areas housing sensitive electronic equipment, with the option of natural ventilation.
- Maximum use of natural light in buildings during daylight hours is encouraged.
- The design of Skyrail buildings considers insulation, building aspect, colour, form, and texture.
- Minimal stores are being kept in refrigeration.
- Key tag switches, automatic controls (e.g. timers, movement sensors) and other energy efficient equipment are used.
- External heat-flow through windows is minimised, using tinted windows as well as blinds.
- Staff are encouraged to carpool.
- All company vehicles are regularly serviced and maintained.
- A solar powered communication system services all cableway gondolas.
- Fuel efficient options are used when selecting and/or purchasing vehicles.
- Power generation from the moving cableway uses 12 volt batteries and sine wave inverters.

**Source:** Tourism Australia\textsuperscript{50}

**Table 6.1.2: Case Study: Binna Burra Mountain Lodge – Queensland, Australia**

**Project Description:**

Binna Burra Mountain Lodge is located in the sub-tropical rainforest hinterland of South East Queensland. One of Australia’s first nature-based resorts, Binna Burra is an accredited Green Globe Certified operation that is committed to environmentally sustainable practices.

**General energy efficiency measures:**

- Power is conserved with the use of energy efficient lights, which use 85 percent less power than normal incandescent bulbs. This has resulted in a 20 percent reduction in electricity usage.
- Water supply is entirely energy-free, using gravity to deliver the fresh mountain water form high up in the mountains to the Lodge buildings.
- Further weather proofing of the buildings will reduce energy consumption by 15,000 kWh p.a.
- Binna Burra is the first company in Queensland to become a partner of the initiative between the Queensland Government and the Environmental Protection Agency (EPA) in the Cleaner Production Partnership Program.
- A move from a diesel fired water heater to one powered by gas has resulted in an 88 percent reduction in diesel consumption, and an overall reduction in energy, with the added benefit of cleaner discharges to the atmosphere.
- Future energy use improvements are planned, including the installation of timers and sensors that will control lighting and heating of spaces.

**Source:** Tourism Australia\textsuperscript{51}


### Table 6.1.3: Case Study: The Courtyard by Marriott, Surfers Paradise, Queensland, Australia

<table>
<thead>
<tr>
<th>Project Description:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Located in sub-tropical South East Queensland, The Courtyard by Marriott Surfers Paradise Resort is a 35–storey hotel with 403 rooms and a floor area of 46 920m². The hotel has undergone incremental upgrades over the last ten years in order to achieve best practice energy and water consumption.</td>
</tr>
</tbody>
</table>

### General energy efficiency measures:
- Key tag switches are installed in each guest room to control air-conditioning and lighting.
- Fluorescent lamps are installed for external general security lighting.
- Bollards with compact fluorescent lamps are installed in poolside areas.
- Metal halide and high-pressure sodium lamps are installed for external lighting.
- Fluorescent fittings are installed in the reception area, shops, offices, conference room, kitchen, workshops, stores and laundry.
- Timers are installed in the hallways to turn off the lights.
- Efficient fluorescent lights are installed in guest rooms.
- Efficient fluorescent lights are installed in hotel common areas.

### Additional Goals:
- To undertake a cost benefit analysis of gas as the hotel’s primary energy source for water heating.
- To upgrade the main chiller controls to ensure the plant operates at maximum efficiency.
- To install, monitor and finish the programming of the air-conditioning systems.

**Source:** Energy and Environment Division, Department of Industry, Science and Resources

---

## Optional Reading


### Key Words for Searching Online

Sustainable Tourism, Tourism and Energy Use, Hospitality and Energy Use