

# RESPONDING TO CLIMATE CHANGE

TOURISM AND TRANSPORT SECTOR POSITION PAPER



A U S T R A L I A

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This paper is the result of input from the TTF Climate Change Roundtable involving representatives from Accor Asia Pacific, Air New Zealand, Baker & McKenzie, Boeing Australia, Carnival Australia, Great Barrier Reef Marine Park Authority, InterContinental Hotels Group, Melbourne Airport, NRMA, Qantas Airways, Rolls-Royce Australia Services, Tourism Queensland and Virgin Blue, and convened by TTF. Analysis and writing of the document was undertaken by Kinesis: a Sydney-based firm working with government and business on climate change and innovative ways to reduce emissions. David Eckstein, Nick Rowley and Matthew Sander, all contributed to this work.

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# INTRODUCTION

The Tourism and Transport Forum (TTF) is a national, member-funded CEO forum advocating the public policy interests of 200 leading Australian corporations and institutions in the transport, aviation, tourism and investment sectors.

Over the past three years public awareness of global warming and climate change has reached unprecedented levels. This has been driven by factors such as the worst Australian drought in more than 200 years, the popularity of Al Gore's film *An Inconvenient Truth*, climate events such as Cyclone Larry and the science of the problem becoming clearer. This awareness has led both government and business to develop new responses to the climate problem.

Over coming years Australia's tourism and transport sectors face considerable risk from the threat of climate change. A warmer, more unstable climate is likely to lead to an increase in the frequency and intensity of extreme events such as hurricanes, flooding and bushfires threatening the reputation of many of Australia's most important tourist destinations. Adequately addressing this risk will require a coordinated and concerted effort from Australia's tourism and transport sectors.

In light of this dynamic environment, TTF considers that the tourism and transport sectors both need to have a common understanding of the climate problem and a common industry position on how the sectors should respond that still allows for competition and individual action and innovation. TTF seeks, through this paper, to give voice to the tourism and transport sector's perspective and future intentions on climate change.

To achieve this, working closely with Kinesis through 2008, TTF established a climate change roundtable drawn from its membership. This position paper has been informed by the roundtable workshops and TTF's extended engagement with sector stakeholders.

The paper presents a clear and concise outline of the implications of climate change for Australia's tourism and transport sectors. The contributions these sectors make to Australian greenhouse emissions are reported, some examples of sector responses that have been taken to date are described, and finally a direction for how the sectors will respond to the issue in the future is charted.

# THE CLIMATE CHANGE PROBLEM

## It is now widely accepted that human induced global warming is real

TTF recognises and supports the now widely accepted position that human activity – primarily the burning of fossil fuels for energy and transport – is causing changes to the Earth’s climate that pose unprecedented challenges to the global environment, human wellbeing and economic and social systems. In his keynote speech to the 2020 Summit last year, Prime Minister Rudd called climate change “the overriding scientific, moral, environmental and economic challenge of our times.”<sup>1</sup>

This position is informed by the growing body of analysis across the disciplines of science, economics and policy. These include:

- *The 2006 Stern Review into the economics of climate change.* The Stern review presented the economic argument that rapid and affordable measures to reduce greenhouse emissions would prevent potentially huge future economic costs.
- *The 2007 Intergovernmental Panel on Climate Change’s Fourth Assessment Report.* The IPCC’s Fourth Assessment Report was produced by over 600 authors and reviewed by over 600 experts and governments. It concluded that warming of the Earth’s climate was unequivocal and very likely to be the result of increased emissions of greenhouse gasses caused by human activity.
- *The 2008 Garnaut Climate Change Review.* The Garnaut Review was an independent study commissioned by Australia’s State and Territory Government’s and the then Federal Opposition. The Review examined the likely impact of climate change on the Australian economy and recommended policies and a policy framework to promote sustainable development.

## Concern about climate change has also been driven by climate events including:

- *The Australian drought* – The recent drought across the southern states of Australia is the driest and hottest multi-year drought on record.
- *Cyclone Larry* – The category 5 cyclone which made landfall in far North Queensland resulted in over \$1 billion in damage and one fatality.
- *Coral bleaching* – In the last decade mass global coral bleaching events have resulted in the destruction of 16% of the world’s reefs. Serious bleaching events in the Great Barrier Reef in 1998 and 2002 have caused lasting damage to 5% of our reefs.
- *Rising sea levels* – Rising sea levels are already affecting some Pacific islands. Tuvalu’s drinking water and ability to grow plants and vegetables is already being damaged by the intrusion of salt water.

## The impacts could be severe

There is considerable uncertainty about the possible physical changes to our environment that will result from emissions of greenhouse gases. While there is a broad consensus that these emissions are driving a rise in global temperatures the full impacts of this rise remain unclear.

This uncertainty is driven in part by uncertainty regarding how much greenhouse gas will continue to be emitted in future years (i.e. the predicted emissions trajectory). The rate of growth in emissions is likely to affect the rate of increase in global average temperatures. According to the Stern Review, the world is already locked in to additional warming of between 0.5°C – 1°C due to historical greenhouse gas emissions. The Stern Review also states that if emissions continue at today’s levels, temperatures could rise by 2°C - 5°C by the end of the century.

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<sup>1</sup> Kevin Rudd (2008), *Closing Address to the 2020 Summit*

## POSSIBLE IMPACTS IN AUSTRALIA OF EACH DEGREE RISE IN THE AVERAGE GLOBAL TEMPERATURE

INCREASE IN TEMPERATURE	PROJECTED IMPACT
<b>&lt;1°C</b>	<ul style="list-style-type: none"> <li>• 70% increase in droughts in New South Wales</li> <li>• 10-20% increase in the intensity of extreme daily rainfall in New South Wales</li> <li>• 25% increase in annual days above 35°C in Northern Territory               <ul style="list-style-type: none"> <li>- Kinesis analysis indicates that this would result in 2 additional days per year above 35°C in Darwin and 32 in Tennant Creek. Alice Springs would experience 22 extra days above 35°C</li> </ul> </li> <li>• 18% increase in annual days above 35°C in South Australia.               <ul style="list-style-type: none"> <li>- This would result in 3 additional days per year above 35°C in Adelaide and 9 in Woomera</li> </ul> </li> <li>• 6% decrease in extreme daily rainfall in Victoria</li> <li>• The sex ratio of marine turtle hatchlings become dominated by females</li> </ul>
<b>1-2°C</b>	<ul style="list-style-type: none"> <li>• 100 year storm surge height around Cairns increases 22%; area flooded by such events doubles</li> <li>• 25% increase in 100-year storm tides along Victoria's east coast</li> <li>• Great Barrier Reef experiences mass coral bleaching</li> <li>• Snow area in alpine regions decreases by up to 66%</li> <li>• Tropical rainforest in North Queensland is reduced by up to 50%</li> <li>• Sex ratio of reptiles with temperature-dependent sex determination become dominated by either males or females</li> <li>• Incubation temperatures for some reptiles exceeded increasing hatchling mortality</li> </ul>
<b>2-3°C</b>	<ul style="list-style-type: none"> <li>• 5–10% increase in tropical cyclone wind speeds</li> <li>• 20–30% increase in tropical cyclone rainfall</li> <li>• 12–16% increase in 100-year storm tides along Victoria's east coast</li> <li>• 10% increase in forest fire danger index in N, SW, and W Australia</li> <li>• More than 10% increase in forest fire danger index in S, central, and NE Australia</li> <li>• Great Barrier Reef becomes dominated by non-coral organisms</li> <li>• Significant impact on the health, condition and performance of marine turtle hatchlings, with significant consequences for future generations</li> <li>• Likely impact to seagrass beds and other habitats in which green turtles and dugongs feed</li> </ul>
<b>&gt;5°C</b>	<ul style="list-style-type: none"> <li>• 30% increase in 100-year storm tides along eastern Victoria coast</li> <li>• 25% increase in extreme rainfall in Victoria</li> <li>• 173% increase in annual days above 35°C in Northern Territory.               <ul style="list-style-type: none"> <li>- This would result in 15 additional days per year above 35°C in Darwin and 218 in Tennant Creek. The temperature would be above 35°C for 344 days per year in Tennant Creek. Alice Springs would experience 153 extra days above 35°C and the temperature would be above 35°C for 241 days per year.</li> </ul> </li> <li>• 150% increase in annual days above 35°C in South Australia.               <ul style="list-style-type: none"> <li>- This would result in 28 additional days per year above 35°C in Adelaide and 75 in Woomera.</li> </ul> </li> <li>• Major decrease in marine turtle hatchling rates and those who survive will have abnormalities that will significantly reduce their fitness</li> <li>• Major impact on intertidal seagrass beds which are important fish nurseries</li> <li>• Significant rise in sea levels with major ramifications for transport and tourism infrastructure</li> <li>• Reef structures functionally extinct</li> </ul>

Source: CSIRO<sup>2</sup>; IPCC<sup>3</sup>; Australian Greenhouse Office<sup>4</sup>; Johnson, J. E., and Marshall, P. A<sup>5</sup> – See footnote below for full reference details.

Organisations including the CSIRO, Commonwealth Department of Climate Change and the IPCC have produced analysis that details the possible impacts in Australia of each degree rise in the average global temperature. Some of these impacts are outlined in the above table.

<sup>2</sup> Preston, B. & Jones, R. (2006), *Climate Change Impacts on Australia and the Benefits of Early Action to Reduce Global Greenhouse Gas Emissions*

<sup>3</sup> IPCC (2007), *Working Group Two Report, "Impacts, Adaptation and Vulnerability," Australia and New Zealand*

<sup>4</sup> Australian Greenhouse Office (2005), *Climate Change Risk and Vulnerability*

<sup>5</sup> Johnson, J. E., and Marshall, P.A. [Eds.] (2007), *Climate Change and the Great Barrier Reef: A Vulnerability Assessment*, Great Barrier Reef Marine Park Authority and the Australian Greenhouse Office

## Public concern is high

Contemporary polling has indicated that the Australian public are recognising that climate change is not only real but that it is an increasingly pressing priority that must be addressed.

Polling undertaken in April 2008 for the Climate Institute shows nine of 10 Australians are concerned about climate change, half (49 per cent) being either 'extremely concerned' or 'very concerned'.<sup>6</sup>

A survey conducted by Newspoll in July 2008 found that 84% of respondents believed that climate change is real and of those respondents who believed that climate change is real, 96% stated that climate change was either totally or partially the result of human activity.<sup>7</sup>

In Australia over the past 18 months the debate has moved from accepting the broad dynamics of the problem to focusing on the measures required to tackle it.

Of all the issues under consideration at the Prime Minister's 2020 Summit, the Climate Change and Sustainability stream received more public submissions than any other.



<sup>6</sup> Climate Institute (2008), *Climate of the Nation*

<sup>7</sup> Newspoll (2008), Available:[http://newspoll.com.au/image\\_uploads/0708%20Climate%20Change%2029-07-08.pdf](http://newspoll.com.au/image_uploads/0708%20Climate%20Change%2029-07-08.pdf)



# WHAT CONTRIBUTION DO AVIATION, TRANSPORT AND TOURISM MAKE TO THE PROBLEM?

The Tourism and Transport Forum recognises that climate change is not only a serious issue that has significant implications for the future growth and prosperity of the tourism and transport sectors, but that the emissions caused by our activities have contributed to this global problem. TTF recognises that Australia's tourism and transport sectors must contribute to efforts to reduce greenhouse gas emissions by both accurately accounting for their own emissions and through implementing effective abatement actions. Although the climate problem is enormously challenging, as a human induced problem there are actions that can make a difference to the emissions generated by the sector, be they in aviation, land transport or wider tourism services. The tourism and transport sector and the businesses within it do have the opportunity to demonstrate how to both increase efficiency and reduce the emissions associated with their activities.

The following sections give a breakdown of the emissions profile of the major components of the tourism and transport sectors and outline areas in which these sectors might address their current emissions.

## Aviation

From a global perspective, the quantification and accounting procedures in establishing the greenhouse gas emissions for the aviation sector are complex. Due to the vast flying distances over many different jurisdictions, aviation emissions are often difficult to quantify with precision in any one particular region or state. Further, emissions from international flights are not currently included under the accounting obligations under the Kyoto Protocol.

Overall, emissions from aircraft constitute only around 1 to 2% of global greenhouse gas emissions<sup>8</sup>. Emissions from domestic air travel which are accounted for in official reporting procedures make up only a small percentage of total transport emissions, accounting for 7.7% (6.1 mega tonnes of carbon dioxide equivalent emissions) of overall Australian transport sector emissions in 2006. However, they have risen significantly and were 107.1% (3.1 Mt) higher in 2006 than in 1990.<sup>9</sup>

Emissions from international flights can only be coarsely estimated. The Sustainable Tourism Cooperative Research Centre has estimated that emissions from international aviation attributable to tourism activity in Australia produce 9.9 Mt of CO<sub>2</sub>-e per annum.<sup>10</sup>

Increases in aviation sector emissions are the result of a significant rise in numbers of passengers and flights. The Sydney to Melbourne route is now the fourth busiest air route in the world.<sup>11</sup> Emissions increases have occurred despite improvements in the fuel efficiency of modern aircraft.

<sup>8</sup> In 1992 the IPCC concluded that aviation was responsible for 2% of carbon dioxide emissions due to the total burning of fossil fuel and 13% of that associated with transport.

<sup>9</sup> Department of Climate Change (2008), *National Greenhouse Gas Inventory 2006*.

<sup>10</sup> Sustainable Tourism Cooperative Research Centre (2008), *The Carbon Footprint of Australian Tourism*

<sup>11</sup> OAG (2007), *OAG Reveals Latest Intelligence on Busiest Routes*,

Available: <http://www.oag.com/oag/website/com/en/PopUps/Print/Press+Releases/OAG+reveals+latest+industry+intelligence+on+the+busiest+routes+2109072>

# AVIATION SECTOR EMISSIONS AND ABATEMENT POTENTIAL

## AVIATION

Although aviation emissions remain proportionally small compared to road transport, in Australia the aviation sector has the most rapid emissions growth rate of any transport activity.

The calculation of aviation emissions is complicated by the uptake of fuel overseas for use in part of the Australian air transport task.

Despite favourable recent developments that have led to successful trials of alternatives to traditional jet fuel, currently there is little supply chain infrastructure of any scale for sustainable alternative fuels. Currently alternatives provide limited options in reducing total emissions from the aviation sector over the short to medium term.

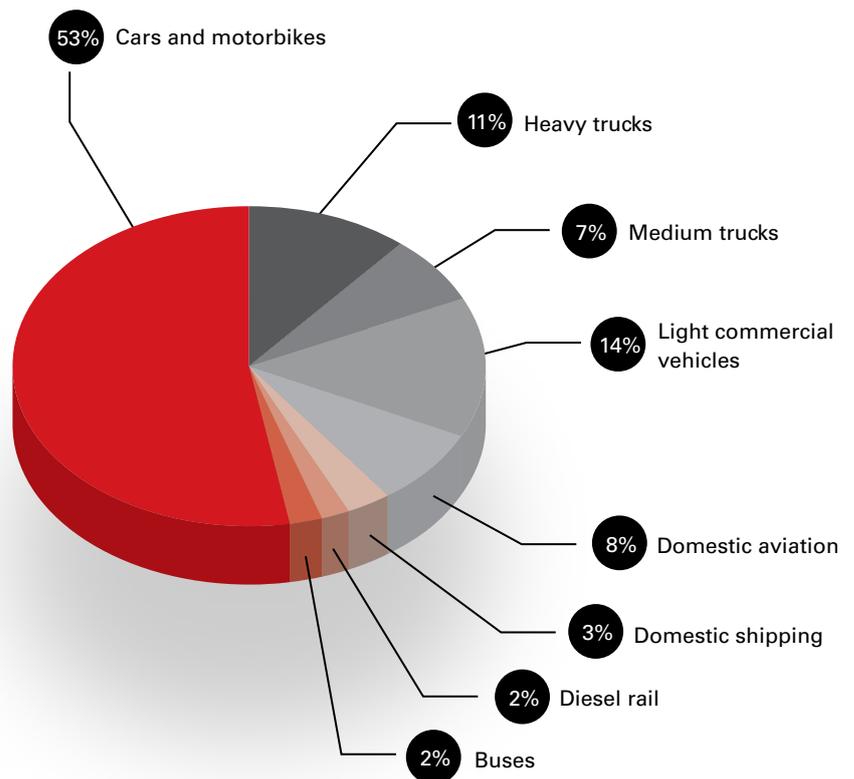
The major problem with current generation bio-fuels is the land required to produce enough fuel to service the aviation sector.

The above table summarises the emissions growth trend and constraints on abatement options faced by the aviation sector.

## Transport

In 2006 the Australian transport sector, excluding domestic aviation, was responsible for emissions of 73 Mt of CO<sub>2</sub>-e. These emissions accounted for 12.6% of total national emissions.<sup>12</sup>

The greenhouse gas emissions contribution made by the various transport sectors to overall transport emissions in Australia is shown in Figure 1.



**Figure 1** Australian domestic transport greenhouse gas emissions by transport type<sup>13</sup>

<sup>12</sup> Department of Climate Change (2008), *National Greenhouse Gas Inventory 2006*

<sup>13</sup> Garnaut, R. (2008), *The Garnaut Climate Change Review*

There are a number of key considerations to note in relation to the transport sector's emissions:

- Emissions estimates for the rail sector focus on diesel emissions and do not include emissions from electricity consumed to provide power for electric rail systems.
- Emissions from shipping are for coastal freight and passenger ferry activities. They exclude emissions from fuel used for importing or exporting bulk raw materials, manufactured products and other cargo to and from Australia, as well as fuel uplifted by international cruise ships overseas but used for voyages which include Australia in the itinerary.

These quantification procedures are in line with international accounting standards. However, were they to be included, they indicate that real world emissions from Australia's transport sector would be higher than the official figure of 73 Mt of CO<sub>2</sub>-e.

Emissions from the transport sector have risen over the last 18 years. Total transport emissions (including domestic aviation) have risen by 27.4% since 1990. Road transport emissions have also increased, rising by 31% since 1990. Passenger car emissions have increased 25%.<sup>14</sup>

TRANSPORT SECTOR EMISSIONS AND ABATEMENT POTENTIAL	
ROAD TRANSPORT	<p>The road transport sector is easily the largest contributor to overall transport emissions in Australia, accounting for 87.1% of emissions from the transport sector and 12% of Australia's total emissions.<sup>15</sup> This sector is experiencing strong greenhouse emissions growth. The light commercial vehicle sector has a particularly strong emissions growth projection.</p> <p>Multiple alternative fuel initiatives are currently being developed that could achieve various levels of abatement across the road transport sector. These include electric and hybrid propulsion and use of bio-fuels such as ethanol and bio-diesel.</p> <p>However, penetration of these at scale across the road transport sector is unlikely to be achieved in the near future.</p>
RAIL TRANSPORT	<p>Rail transport is a small contributor to overall national emissions accounting for 2.4% of national transport emissions. However, this figure does not include electric rail as these emissions are accounted for at the source of electricity generation (power stations) defined as 'stationary emissions' under standard GHG protocols.</p> <p>There is a potential abatement role for the rail transport sector through take up of a proportion of road passenger and road freight traffic.</p> <p>However, the scale of contribution to abatement that can be achieved depends upon improving existing rail infrastructure and developing new infrastructure, at speed, including new heavy rail and inter-modal facilities that enable efficient transfer of goods and /or passengers between road and rail modes.</p> <p>Rail transport is also limited in its ability to reduce transport greenhouse gas emissions due to its reliance on diesel fuel and electricity which in Australia is currently largely sourced from coal fired power plants.</p> <p>The ability of the rail sector to reduce emissions for the transport sector will be improved as more renewable energy is supplied to the national electricity grid.</p>
MARINE AND OTHER WATER TRANSPORT	<p>Marine and other water transport makes a small contribution (0.4%) to overall national (i.e. domestic) emissions.</p> <p>The calculation of maritime emissions is complicated by the wide variety of activities within the sector, the various sources of fuel used and the uptake of fuel overseas for use in part of the domestic marine transport task.</p> <p>Nonetheless the emissions from this sector have declined in real terms over the past two decades. Marine and water transport produced 3 Mt of greenhouse gas emissions in 1990 and 2.2 Mt in 2006.</p> <p>International shipping emissions including tourist cruise ships, cargo, bulk carriers, tankers and car carriers are not accounted for by official Kyoto emissions tracking protocols. Original analysis conducted by Kinesis based on figures from Apelbaum Australia Transport Facts indicates that Australia's international shipping produces around 35 Mt of greenhouse gas emissions per year.</p> <p>There are, however, further gains to be made by the replacement of older shipping stock with more efficient fleet and the potential take up of some road freight by the marine transport sector.</p>

The above table breaks down the greenhouse gas emissions from the transport sector, and indicates the opportunities in each sector to address greenhouse gas emissions.

<sup>14</sup> Department of Climate Change (2007), *National Greenhouse Gas Inventory 2005: Accounting for the 108% Target*

<sup>15</sup> Department of Climate Change (2008), *National Greenhouse Gas Inventory 2006*

## Tourism

Defining the boundaries of what constitutes 'tourism' for the purpose of assessing its contribution to the climate change problem is difficult, The World Tourism Organisation defines tourism as:

*"...persons travelling to and staying in places outside their usual environment for not more than one consecutive year for leisure, business and other purposes."*<sup>16</sup>

The Australian Bureau of Statistics uses

*"Tourism comprises the activities of persons travelling to and staying in places outside their usual environment for not more than one consecutive year for leisure, business and other purposes not related to the exercise of an activity remunerated from within the place visited."*<sup>17</sup>

The travel aspect of tourism means that the sector is inextricably linked to the transport sector. The tourism industry is also supported by a multitude of ancillary sectors and industries that are difficult to account for.

The 'accommodation' sector (allied with the food and beverage services it also provides) is the most clearly identifiable component of the tourism sector in Australia that has defined boundaries (e.g. the physical infrastructure of commercial accommodation itself is clearly defined).

The Sustainable Tourism Cooperative Research Centre (STCRC) has attempted to account for the emissions that the Australian tourism sector is directly responsible for. Their estimates cover a wider range of emissions sources that it attributes to tourism. These include:

- Greenhouse gas emissions which arise *directly* from tourism production—for example, from the fuel (i.e. not grid electricity) used by tour buses and aircraft, and in accommodation and catering facilities
- International aviation emissions attributable to Australian airlines
- *Indirect* greenhouse gas emissions, for example, from electricity used by resorts and restaurants
- Greenhouse gas emissions *from imports* which are provided to tourists or the sector and from the transport of those imports—these emissions do not come from Australian production.

The STCRC's work provides a voluntary estimation of the entire sector's emissions for 2003-04 and attempts to quantify emissions associated with the international aspects of Australia's tourism sector even though, as previously described, current international reporting obligations do not currently address international based transport emissions.

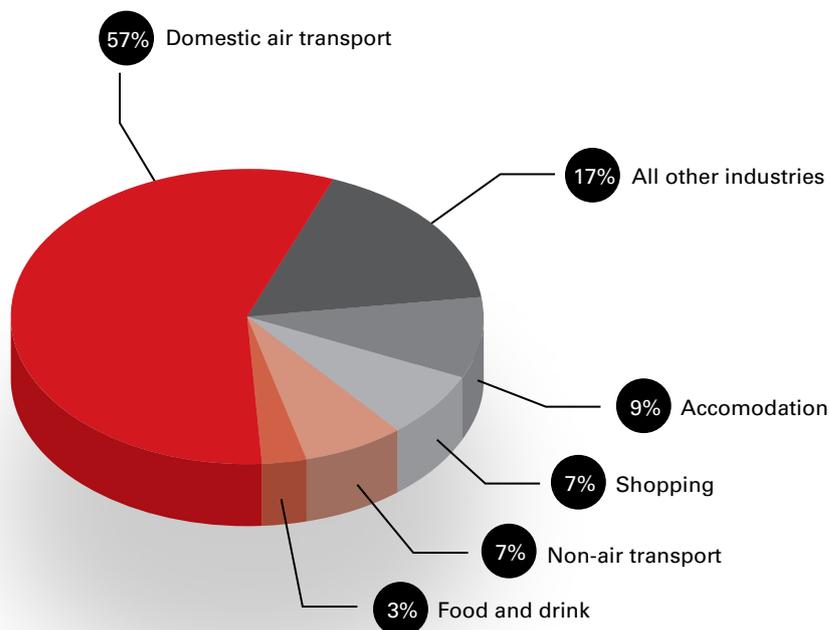
The STCRC conclude that in 2003-04 emissions attributable to Australia's tourism sector totalled 54.4 Mt of CO<sub>2</sub>-e. Australia's domestic tourism (i.e. excludes international aviation and shipping) emissions represent approximately 7.2% of Australia's total emissions. There is some overlap between this figure and the emissions attributable to the transport sector as it takes into account transport emissions that service the tourism sector. Significantly, this estimate also takes into account the Australian operators' share of international emissions (currently excluded from Kyoto accounting methods) and internationally-based emissions that service the Australian tourism sector – that is, emissions resulting from the creation of products and services that are, in the end, used specifically within Australian tourism activity.

<sup>16</sup> World Tourism Organisation (1994), *Recommendations on Tourism Statistics*

<sup>17</sup> Australian Bureau of Statistics (2008)

A breakdown of the tourism sector's *direct domestic* emissions (i.e. excluding grid-sourced electricity) is shown in Figure 2:

### TOURISM SECTOR'S DIRECT EMISSIONS



**Figure 2** Shares of direct greenhouse gas emissions by tourism industry, 2003 - 04.<sup>18</sup>

Note – excludes emissions from international aviation and private motor vehicles used for tourism purposes

## TOURISM SECTOR EMISSIONS AND ABATEMENT POTENTIAL

### BUILDING ENERGY USE –ACCOMMODATION, RESTAURANTS, CATERING

Beyond transport emissions, a major component of the tourism sector's greenhouse gas emissions comes from the use of electricity in buildings such as hotels, resorts and restaurants. Under international greenhouse gas accounting protocols these emissions are referred to as Scope 2 emissions as the greenhouse gas is produced at the site of electricity generation, not at the point of end use.

Large hotels are generally ahead of many building owners/operators with regard to energy (and water) efficiency measures because savings accrue directly to the operator (i.e. there is less of the 'split incentives' market failure trait that the building sector commonly faces). However, despite many proactive efforts to implement energy efficiency measures, larger hotels are typically more emissions intensive, per-guest, than smaller scale accommodation operators.

The diverse range in the size of businesses within the accommodation sector results in a correspondingly diverse capacity to respond by effective implementation of abatement actions.

Restaurants and cafes also make a small contribution to overall national emissions

There is scope for improvement from this sector where technically proven energy efficiency measures exist for energy intensive activities (notably water heating, refrigeration and lighting) but are inconsistently applied.

Many operators occupy rented premises and therefore have reduced motivation to invest in improving building energy efficiency, choosing to accept the short-term utility cost impacts rather than take on the capital cost of installing more efficient equipment or retro-fitting premises

The above table summarises the emissions trends and constraints on abatement options within key components of the tourism sector.

<sup>18</sup> Sustainable Tourism Cooperative Research Centre (2008), *The Carbon Footprint of Australian Tourism*

# WHAT IS THE RISK OF INACTION?

Climate change is likely to have an effect on the popularity of Australia as an international and domestic tourist destination, the reliability of the physical infrastructure that comprises Australia's transport networks and the state of the natural assets on which much of the Australian tourism sector is based. This is likely to result in serious consequences for the viability of operators within the tourism and transport sectors.

## The Implication of climate change for tourism and transport

Due to the uncertainty of future warming scenarios the precise impact of climate change on the tourism and transport industries is difficult to predict. This is especially true given the diverse range of activities and locations Australia's tourism and transport sectors operate in. It is not likely that the effects of climate change will be felt uniformly across each sector, or sub-sector.

This uncertainty is exacerbated because the direct physical risks of climate change are not the only risks the tourism and transport sectors face from the impact of climate change. These sectors also face indirect and reputational risks:

- *Indirect risk from climate change policy* – including but by no means limited to domestic and international emissions trading schemes.
- *Reputational risk* – where Australia's reputation as a prime tourist destination is potentially affected due to climate change affecting our natural and cultural assets and/or consumers changing decisions on the basis of perceived responsiveness, or lack of responsiveness, to climate change and the need to reduce greenhouse emissions.

The full implications of indirect and reputational risk will vary depending on the extent of various Governments' regulatory and policy responses. Some of these responses are currently being formulated and implemented but much is yet to be determined, as is the extent to which consumer sentiment and response to climate change strengthens or weakens over time.

Given this uncertainty it is impossible to make explicit predictions of how the tourism and transport sectors will be affected. The following section should therefore be viewed as a broad analysis of some of the possible impacts that may result from climate change. These impacts include direct, indirect and reputational risks. The extent to which these impacts affect the tourism and transport sectors is likely to vary under different warming scenarios.

The tourism, transport and aviation sectors have been analysed separately. The unique profile of aviation activity provides logic for addressing this sector discretely from other transport activities.

The analysis in the following tables relies on the following framework which assesses four aspects of the potential implications of climate change:<sup>19</sup>

### Exposure

Exposure relates to the *extent* to which the tourism and transport sectors are at risk from the impacts of climate change, i.e. how much of the sector is exposed to climate change risks.

### Adaptive capacity

Adaptation reflects the *ability* of the tourism and transport sectors to change in a way that makes it better equipped to deal with external influences.

### Adverse implications

Adverse implications describe the *loss that could occur* due to climate change impacts.

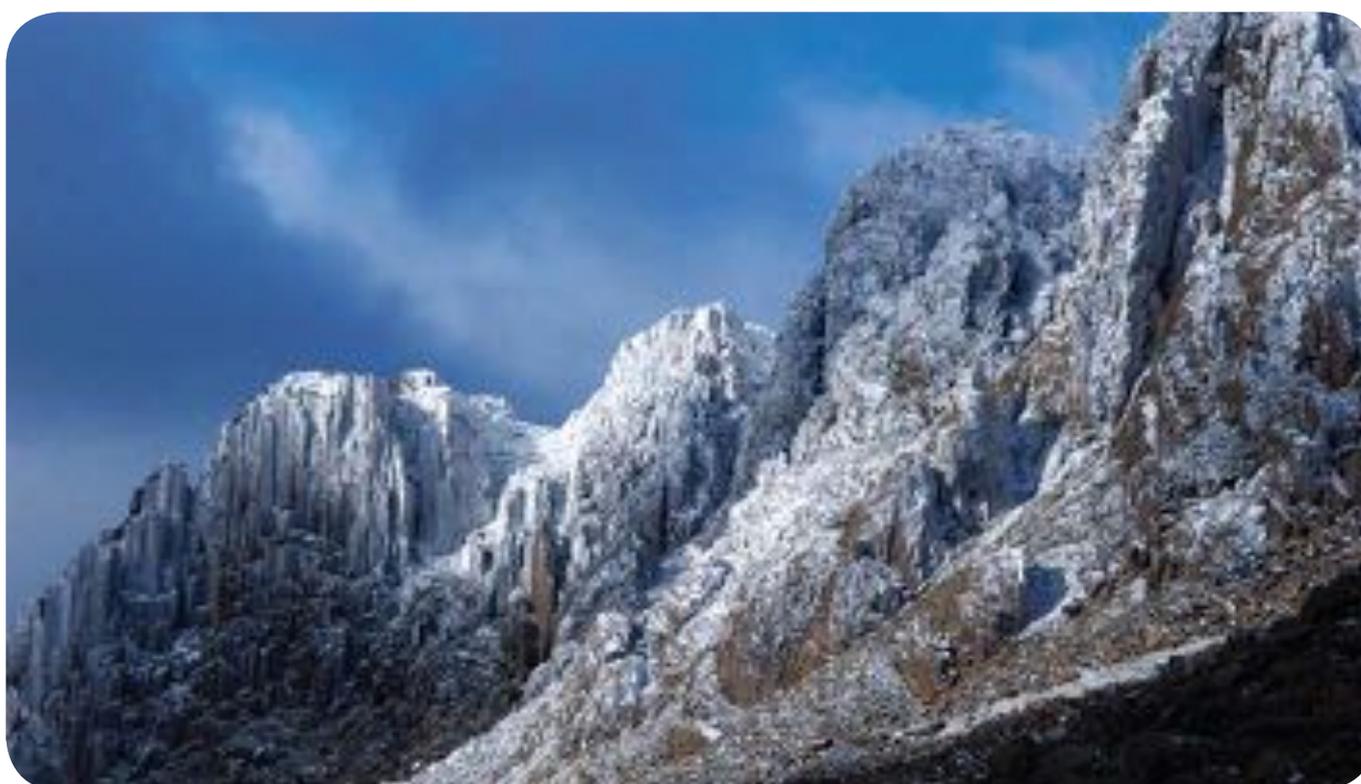
### Potential to benefit

Potential to benefit is an estimate of what *potential* the tourism and transport sectors have *to introduce adaptation options*, and therefore benefit from circumstances induced by climate change.

<sup>19</sup> Framework adapted from: Australian Greenhouse Office (2005), *Climate Change Risk and Vulnerability*

## TOURISM SECTOR

<b>EXPOSURE</b>	<p>Many parts of Australia’s tourism sector are highly exposed to the direct physical risks of climate change and extreme weather events. Resorts in places such as the North Queensland already deal with the threat of cyclones and severe storms and they will face greater risk if the severity and frequency of these storms increases.</p> <p>Tourism operators that service natural landmarks such as Australia’s alpine environments and the Great Barrier Reef are highly exposed to the potential physical damage that could occur to these environments.</p> <p>The tourism sector is also exposed to reputational risks. Much of Australia’s attraction and reputation as a world class tourism destination is underpinned by the health of our natural assets such as the Great Barrier Reef. Failure to adequately protect and conserve our valuable natural assets will affect consumer choices.</p>
<b>ADAPTIVE CAPACITY</b>	<p>Some tourist operators will be able to adapt to the effects of climate change by shifting the location of their operations or by changing the focus of their operations.</p> <p>Some technological measures such as increased snow making in the Australian Alps will help the tourism sector adapt to a changing climate. In other cases an increased focus on built and social destinations and activities rather than natural highlights (landscapes, ecosystems) may be necessary if Australia suffers significant environmental damage.</p> <p>There are also opportunities for tourist assets to reduce their carbon emissions through energy efficiency initiatives and the use of renewable energy.</p>
<b>ADVERSE IMPLICATIONS</b>	<p>The primary concern to tourism operators in Australia is the effect global climate change could have on natural environments that are significant tourist attractions. The damage and possible collapse of these environments would have severe adverse social and economic implications for Australian tourism.</p> <p>The tourism sector is also exposed to the indirect effects of rising fuel and electricity costs that will result from regulatory efforts to reduce greenhouse gas emissions – i.e. by putting a price on carbon. Rising energy costs globally could also deter international tourists from travelling the considerable distances required to visit Australia and could also deter domestic tourists.</p> <p>Tourist assets in exposed locations also run the risk of rises in the cost of insurance and even the total withdrawal of insurance as the frequency and intensity of extreme events further increases.</p>
<b>POTENTIAL TO BENEFIT</b>	<p>There are few areas in which the Australian tourism sector could potentially benefit from the effects of global climate change.</p>



## TRANSPORT SECTOR

<p><b>EXPOSURE</b></p>	<p>Some parts of the transport sector are highly exposed to the indirect effects of policy and regulation designed to mitigate and abate greenhouse gas emissions. The transport sector is currently reliant on fossil fuel sources that emit greenhouse gas in both their production and consumption and will therefore be affected by any regulations or policies targeting fossil fuel emissions. Research by Sustainable Infrastructure Australia and commissioned by the Tourism and Transport Forum found the proposed Carbon Pollution Reduction Scheme (CPRS) could impose a further \$180 million on the electricity costs of rail operators over the first three years of its operation.<sup>20</sup></p> <p>Some major transport infrastructure, such as ports and railways, are also exposed to the direct impacts of climate change. Rail infrastructure is commonly located in low lying and coastal areas and ports face direct risk from severe storm activity and sea-level change.</p>
<p><b>ADAPTIVE CAPACITY</b></p>	<p>While the transport sector is reliant on fossil fuels its adaptive capacity will remain low. However, new technologies such as hybrid and electric vehicles and new infrastructure such as an expanded rail network provide opportunities for the transport sector to transition successfully to a low carbon future.</p> <p>Some transport operators will need to adapt to the impacts of climate change by shifting their assets away from exposed locations or risk being exposed to the changing intensity and frequency of extreme events.</p>
<p><b>ADVERSE IMPLICATIONS</b></p>	<p>The transport sector is likely to suffer from rising energy costs as a result of efforts to regulate greenhouse gas emissions and implement a cost on carbon.</p> <p>The transport sector could also suffer reputational damage if it is perceived as not doing enough to address the risk of climate change.</p>
<p><b>POTENTIAL TO BENEFIT</b></p>	<p>Transport sector operators are likely to gain a benefit over competitors by making a faster transition to more sustainable forms of energy than their competitors. This benefit could include improved operating costs relative to competitors that did not utilise low carbon forms of energy and improved efficiency. It could also result in a clear reputational benefit.</p>

## AVIATION SECTOR

<p><b>EXPOSURE</b></p>	<p>The aviation sector is exposed to the indirect effects of climate change due to its inclusion in domestic and international emissions trading schemes including the Federal Government's Carbon Pollution Reduction Scheme.</p> <p>Many major and regional airports are located on low lying land close to the coast and face risk of inundation by heavy rain and storm-surge events.</p> <p>The highly visible nature of the aviation sector also makes it vulnerable to reputational critique, even if such attacks are disproportionate to the sector's overall greenhouse gas contribution.</p>
<p><b>ADAPTIVE CAPACITY</b></p>	<p>While the aviation sector has made considerable efficiency improvements to its aircraft fleet and management practices and operations, the current lack of a commercial scale low-emissions alternative fuel supply market does not allow the aviation sector to make the transition to low greenhouse gas emitting operations.</p>
<p><b>ADVERSE IMPLICATIONS</b></p>	<p>Rising costs of fuel and greater regulation are two of the possible adverse implications that are likely to result from the impacts of climate change. Fuel already makes up a significant percentage of the aviation sector's total operating costs. The sector will be significantly affected if it is forced to absorb further cost increases.</p> <p>The aviation sector could also be affected by a downturn in demand for flights which could result from fewer tourists travelling to, from, and within Australia resulting from actual or perceived damage by climate change to natural attractions in Australia (and around the world).</p>
<p><b>POTENTIAL TO BENEFIT</b></p>	<p>The aviation sector has little potential to benefit from the direct, indirect and reputational effects of climate change due primarily to current product supply constraints that are inherent to the sector.</p>

<sup>20</sup> Sustainable Infrastructure Australia (2008), *Carbon Pricing and Passenger Rail Operator Electricity Charges*

# EXAMPLES OF INDUSTRY ACTION

Many companies and organisations in the tourism and transport sectors are already acting to address the risk of climate change. The following examples highlight some of the action that has been taken to date.

## Airline Efficiency Improvements

Through a combination of technological improvements and increased operational efficiency the aviation industry has reduced per passenger greenhouse gas emissions.

Modern jet aircraft are now 70% more fuel-efficient than they were 40 years ago and 20% more efficient than they were 10 years ago. The new Boeing 787 will consume 20% less fuel than similarly sized planes<sup>21</sup>, while the Airbus A380 consumes 12% less fuel per seat than its nearest competitor.<sup>22</sup> These gains have occurred alongside (and in spite of) passenger convenience improvements in speed and range<sup>23</sup>.

In addition to airline manufacturers making improvements to the efficiency of aircraft, Air Navigation Service Providers (ANSP's), which provide air traffic control management and related airside services to the aviation sector, have worked jointly with airlines to increase fuel efficiency and reduce greenhouse gas emissions by introducing improvements to the operational efficiency of the sector. Initiatives being introduced include:

- Changing management procedures to hold aircraft on the ground prior to departure rather than in the air when there are expected delays at the destination airport
- The use of improved navigational equipment to enable more direct routes and smaller separation limitations between aircraft in flight
- The daily provision of flexible tracking (Flextracks) to allow airlines to fly optimised routes based on prevailing winds
- Management of delays en-route rather than in terminal areas.

Australia's ANSP, Air Services Australia, claims that in favourable conditions the use of Flextracks can lead to fuel savings of 8% while holding an aircraft on the ground, rather than in flight, can save up to 600 kg of CO<sub>2</sub> emissions.<sup>24</sup>

*In the aviation industry, where fuel represents a significant proportion of overall operating costs, a commitment to research and development focussed on fuel efficiency measures has delivered proven and consistent fuel efficiency gains over time. A tradition of recruitment, across the industry sector, of highly proficient engineering and other technical staff ensures continued focus on efficiency measures. Carbon abatement achieved by efficiency measures and expressed in terms of emissions per passenger flown, is, however, negated by overall emissions growth due to sector growth.*

<sup>21</sup> Boeing, *787 Dream Liner*, Available: <http://www.boeing.com/commercial/787family/background.html>

<sup>22</sup> Airbus, *A380 Economics*, Available: <http://www.airbus.com/en/aircraftfamilies/a380/economics.html>

<sup>23</sup> International Air Transport Association, *Fuel Efficiency*, Available: [http://www.iata.org/whatwedo/environment/fuel\\_efficiency.htm](http://www.iata.org/whatwedo/environment/fuel_efficiency.htm)

<sup>24</sup> Bureau of Infrastructure, Transport and Regional Economics (2008), *Avline 11*

## Air New Zealand, Boeing and Rolls Royce

Air New Zealand is a world leader in the search for sustainable fuels for use in aviation. Its aim is to meet 10 percent of its total annual needs – around one million barrels – using environmentally sustainable fuels by 2013. Studies have already shown that sustainable fuels can lead to a 40-50% reduction in CO2 emissions on a lifecycle basis.

On December 30, 2008, Air New Zealand, in conjunction with Rolls Royce, Boeing, and Honeywell's UOP subsidiary, with support from Terasol Energy, conducted the world's first flight test on a large passenger aircraft using fuel sourced from the jatropha plant. One of the Air New Zealand Boeing 747-400's Rolls Royce engines was powered by a blend of 50:50 jatropha and Jet A1 fuel. More than a dozen key performance tests were undertaken in the two hour test flight from Auckland International Airport. The tests indicated that the jatropha fuel met or exceeded all requirements. To complete the testing programme engineers will thoroughly assess the engine and fuel systems to look for any changes as a result of the use of biofuel. Assuming all tests are positive, it is believed that jatropha can be certified as an alternative jet fuel within two years.

Jatropha fuel is promising because its carbon footprint could be as much as 25% of conventional fuels given that the CO2 emitted in use is recycled by the CO2 absorption in the next crop. It also contains less sulphur and trace metals than traditional jet fuel.

The jatropha oil used in the test flight was sourced from South Eastern Africa and India, and the plants were grown on sustainable farms. The plant seems to thrive in difficult growing conditions including arid and non-arable areas that do not compete with existing food crops.

*Air New Zealand's biofuel tests are a promising sign of the aviation industry's commitment to reducing greenhouse gas emissions. TTF supports further actions to use sustainable biofuels that do not impact food resources, at scale an industry wide scale.*





## Europcar

As part of its commitment to lowering greenhouse gas emissions, car rental company Europcar has recently added the Toyota Prius to its rental fleet. The Toyota Prius is a petrol-electric hybrid vehicle that uses an electric motor in conjunction with a traditional petrol engine to produce improved fuel efficiency and reduced greenhouse gas emissions.<sup>25</sup>

*To achieve significant abatement from rental fleets in the future will require significantly higher penetration of low emissions vehicles into rental fleets.*

## Alice Springs Crowne Plaza

The Crowne Plaza, Alice Springs' largest hotel, is installing a 305-kilowatt solar power system which will provide 40 – 80% of the hotels electricity requirements.<sup>26</sup> The solar system will be installed on the roof of the hotel and is part of the Alice Solar City project. The system is expected to reduce the hotel's emissions by 420 tonnes per year.<sup>27</sup>

Each hotel room will be connected to a network which monitors the amount of energy being produced by the solar panels. Guests will be able to tune into a dedicated channel to for real-time explanations of the energy savings. A special monitor in the hotel lobby will also display energy data for the system.

*Communicating emissions abatement efforts and effectiveness to consumers in a consistent and clear manner is an important component of an overall abatement strategy in those industry sectors (such as tourism) where the level of industry operator interaction with the general public is high.*

<sup>25</sup> Europcar, *Offsetting Carbon Emissions*, Available: <http://www.europcar.com.au/about-us/greenfleet.aspx>

<sup>26</sup> Antara News (2008), *SunPower, Invest North to build roof-mounted solar system*, Available: <http://www.antara.co.id/en/arc/2008/10/6/sunpower-invest-north-to-build-roof-mounted-solar-system/>

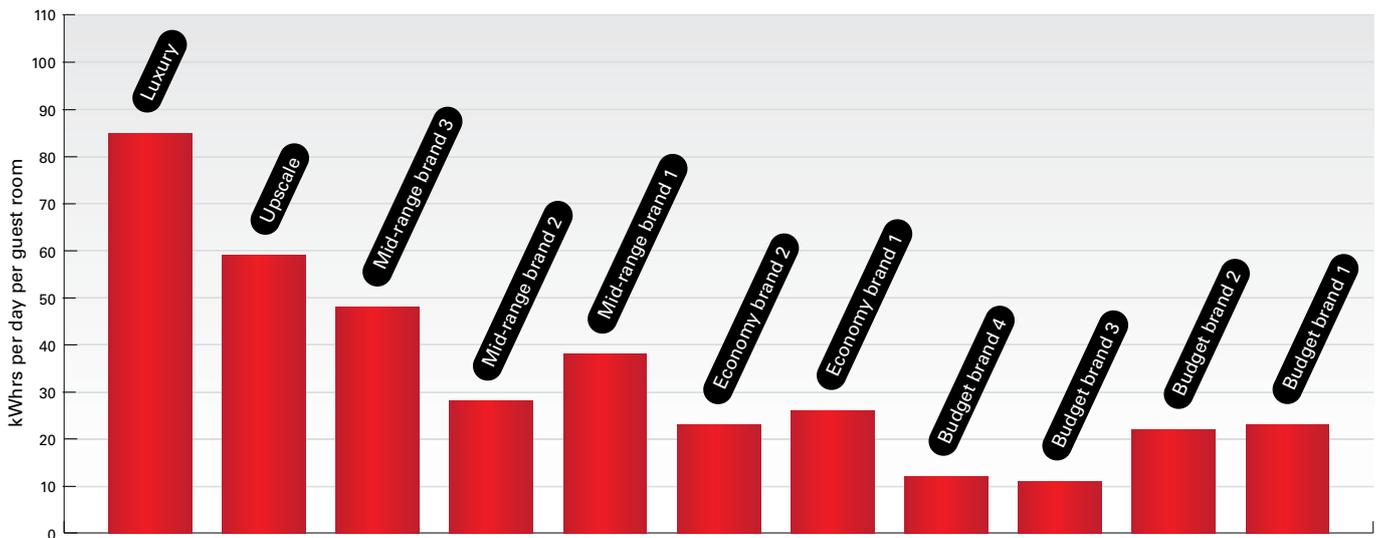
<sup>27</sup> Robinson, N. (2008), *It Takes a Town Like Alice Springs to Shine Light on Energy*, The Australian

## Accor

Accor is a hotel and tourism operator with hotels in over 100 countries. Accor operates over 300 hotels and resorts in the Asia Pacific region.

As part of its approach to addressing climate change and sustainability Accor reports the kilowatt hours per day of energy consumption per guest room for each of its hotel brands. This information is provided in an easy to read graph as part of its annual report.<sup>28</sup> The reporting method gives readers a clear view of the different performance of each of Accor's hotel and motel brands. The annual report also shows average water consumption per guest room, enabling comparison of water conservation performance between the different hotel and motel brands owned by Accor.

Figure 3 shows how the information Accor provides enables a clear comparison of the performance of different hotel brands.



**Figure 3** Average daily per room energy consumption of different hotel brands.<sup>29</sup>

*Depending upon the source of energy generation, end-use energy consumption can be an acceptable surrogate for greenhouse gas emissions intensity. However this is not always the case and, looking ahead, industry should anticipate that actual carbon emissions will become the standard metric for setting emissions reduction targets and assessing the effectiveness of abatement efforts.*

## Perth MetroRail Project

In 2007 the WA Government completed a \$1.66 billion project to effectively double Perth's metropolitan rail network. The MetroRail project is the largest public transport infrastructure project ever undertaken in Western Australia.

The project involved the expansion of the Joondalup and Thornlie spur lines and the construction of the new Mandurah Line which links Perth and Mandurah. The new line consists of 72 route kilometres of double-track railway and 11 railway stations. 93 new rail cars were also delivered.

The new Mandurah Line is currently carrying 50 000 passengers per day. The previous bus service operating between the two cities carried 16 000 passengers per day. The new line provides a genuine alternative transport option for Perth and Mandurah residents. Trains on the new line travel faster on average than road traffic down the same transport corridor.<sup>30</sup>

*The MetroRail expansion in Perth represents an example of investment in mass transit infrastructure that has had a transformative effect on the patterns of transport in a major Australian city in the last 20 years.*

<sup>28</sup> Accor (2007), "The Spirit of Smiles," 2007 Annual Report

<sup>29</sup> Accor (2007), "The Spirit of Smiles," 2007 Annual Report

<sup>30</sup> Newman, P. (2008), *Fast Rail Best Way Ahead*, *The Australian*

# THE WAY FORWARD

TTF recognises that climate change poses a serious risk to the future viability of Australia's tourism and transport industries.

Climate change poses a direct risk to many of Australia's natural landmarks and icons and if global emissions continue to rise it is likely to have severe social and economic impacts for our country.

TTF also recognises that the activities of Australia's tourism and transport industries have contributed and continue to contribute to the global climate change problem. As with other sectors of the economy, being a small overall contributor to the emissions from the Australian economy and an even smaller contributor to overall global emissions could be an argument for doing less. However, through demonstrating an appreciation of the problem and the meaningful actions that will both improve business efficiency and reduce emissions, the sector can demonstrate its ability to adapt and achieve competitive advantage over other countries seeking to attract customers who may be increasingly concerned about climate change.



With the science of climate change indicating that global emissions must peak and then decline over the coming decade, the next five years will require radical changes in our energy and transport systems. During this period the Australian tourism and transport sectors will support:

- **development of new low emissions transport infrastructure.** An integrated strategy is required to provide new transport links, and better manage existing links, for the efficient movement of freight and passengers within and between Australia’s major urban centres. Expansion of integrated rapid transit networks and sustainable transport infrastructure within our urban centres, using the latest low emission transport technologies, would reduce emissions, ease congestion and make our cities more attractive destinations for tourists.
- **a single recognisable rating standard for the commercial accommodation sector that measures actual greenhouse performance.** Currently there are a number of different rating methods for commercial buildings that are presented to the public. This is confusing both to the industry and to customers. TTF supports a uniform rating standard that is inclusive of all types of permanent accommodation and provides an explicit greenhouse rating that reports greenhouse gas emissions intensity using one meaningful and robust metric that is based on actual resource consumption data. The metric used could be as straightforward as carbon emissions per day per guest room, or available beds. A robust and defensible rating system, taking the best attributes of current schemes, could form the basis of dialogue with government concerning the recognition of the role of the sector in reducing emissions.
- **the continued deployment of modern, more fuel efficient aircraft** and the continued improvement of the aviation sector’s operation. The aviation sector will also further investigate ways to mitigate its contribution to climate change. This will address the lack of understanding of the effect aviation emissions have on the atmosphere by some and the perceived lack of rigorous accounting methods for emissions attributable to aviation internationally.
- **the development of national guidelines for tourist developments.** TTF will work with its members and partners in industry and government to support the adoption of coherent Commonwealth guidelines to assist State and local planning authorities in the assessment of tourist developments which may be affected by climate change impacts.
- **measures to provide for the protection of our natural assets and actions to improve the resilience of these important eco-systems.** A clear and consistent approach to coastal planning is required, that guides investment in important infrastructure for the tourism and transport industries, and protects areas like the Great Barrier Reef from the loss of supporting habitats such as wetlands and declining water quality.

Achieving these outcomes will enable the tourism and transport sectors to face an uncertain future with a clear view of what it can affect. TTF will use its convening power to work closely with its membership to ensure they are both informed and working cooperatively towards these goals.





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