



CLIMATE CHANGE AND TOURISM POLICY IN OECD COUNTRIES





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FOREWORD



Climate change is one of the greatest challenges for policy makers at every level, from global and international to national, regional and local. The tourism industry cannot ignore this challenge. Policy makers and the tourism industry must develop a range of strategies to adapt to the different ways in which climate change may affect tourism operations and opportunities.

Policy-makers also need to urgently develop policies to mitigate the impact of tourist travel, accommodation and activities on climate change. In a business-as-usual scenario, the sector's growth and increasingly significant contribution to climate change would clearly conflict with the requirement to reduce global emissions to meet the climate stabilisation goals set by the international community. Not all governments, however, favour applying the same emission reduction requirements to tourism as to other sectors; some will instead aim for net emissions reductions in ways which reflect the wider context of the place of tourism in the structure of their economies.

The United Nations Environment Programme (UNEP) work on tourism addresses a number of key barriers that limit the integration of sustainability in the decision-making process of the private sector, public policy-makers and consumers. Since 2005, UNEP has assisted developing countries and those with economies in transition to implement planning and management practices to adapt to the impacts of climate change in the tourism sector and to mitigate emissions from the sector.

The Organisation for Economic Co-operation and Development (OECD) has long-standing expertise on tourism. The Tourism Committee acts as the OECD forum for exchange, for monitoring policies and structural changes affecting the development of domestic and international tourism, and promoting the sustainable economic growth of tourism. In many ways, its horizontal approach linking tourism to related policies, including those aimed at the economy, trade, transport, green growth and sustainable development, is unique.

This report combines an assessment of the current situation with a review of the state of policy-making on tourism and climate change and provides recommendations to address the mitigation and adaptation challenges that the sector faces. National governments are key actors, particularly in regulating and taxing greenhouse gas emissions and creating incentives for carbon reduction, so it is appropriate to devote much of the text to reviewing what is being done at national policy level, both in OECD member countries and elsewhere. Coverage is also given to the role of international organizations and regional and industry-based initiatives.

The inescapable conclusion is that current policy, with few exceptions, is inadequate for the scale of the challenge, both on mitigation and on adaptation. Valuable lessons can nevertheless be learnt from this review. These are drawn out in a concluding chapter which sets the agenda for further research and development.



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ABBREVIATIONS AND ACRONYMS

AIC	aviation-induced clouds
AGD	aviation global deal
AOSIS	Alliance of Small Island States
ATM	air traffic management
CBDR	common but differentiated responsibilities
CDM	clean development mechanism
CEC	Commission of the European Communities
CIE	Coras Iompair Éireann (Irish Public Transport Authority)
COP	Conference of the Parties
COP-3	third session of the Conference of the Parties
DST	decision support tool
EDEN	European Tourist Destinations of Excellence
EECA	Energy Efficiency and Conservation Authority
EPA	Environmental Protection Agency
ETS	Emission Trading Scheme
EU 27	European Union with 27 Member States
GBEP	global bioenergy partnership
GDP	gross domestic product
GHG	greenhouse gas
GIACC	Group on International Aviation and Climate Change
IATA	International Air Travel Association
ICAO	International Civil Aviation Organization
IMO	International Maritime Organization
IPCC	Inter-governmental Panel on Climate Change
IRU	International Road Transportation Union
ISO	International Organization for Standardization
LDC	least developed countries
LRET	large-scale renewable energy target
LTMS	long-term mitigation scenarios
NAC	national adaptation capacity
NCCS	national climate change strategy
NECSTour	Network of European Regions for a Sustainable and Competitive Tourism
NGO	non-governmental organisation
OECD	Organisation for Economic Co-operation and Development
PATA	Pacific Asia Travel Association

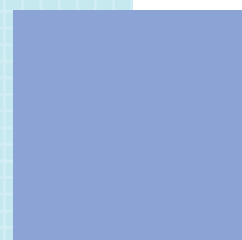
RET	renewable energy target
REFIT	renewable electricity feed in tariff
RF	radiative forcing
RSB	Roundtable on Sustainable Biofuels
SCCP	Special Climate Change Programme
SME	small to medium-size enterprise
SRES	small-scale renewable energy scheme
STCRC	Sustainable Tourism Cooperative Research Centre
TEEP	Tourism Energy Efficiency Programme
3S	sun, sand and sea
TFO	tourist flight operators
TIA	Tourism Industry Association
TNA	Technology Needs Assessment
UNCED	United Nations Conference on Environment and Development
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNWTO	United Nations World Tourism Organization
VRT	vehicle registration tax
WEF	World Economic Forum
WTTC	World Travel and Tourism Council

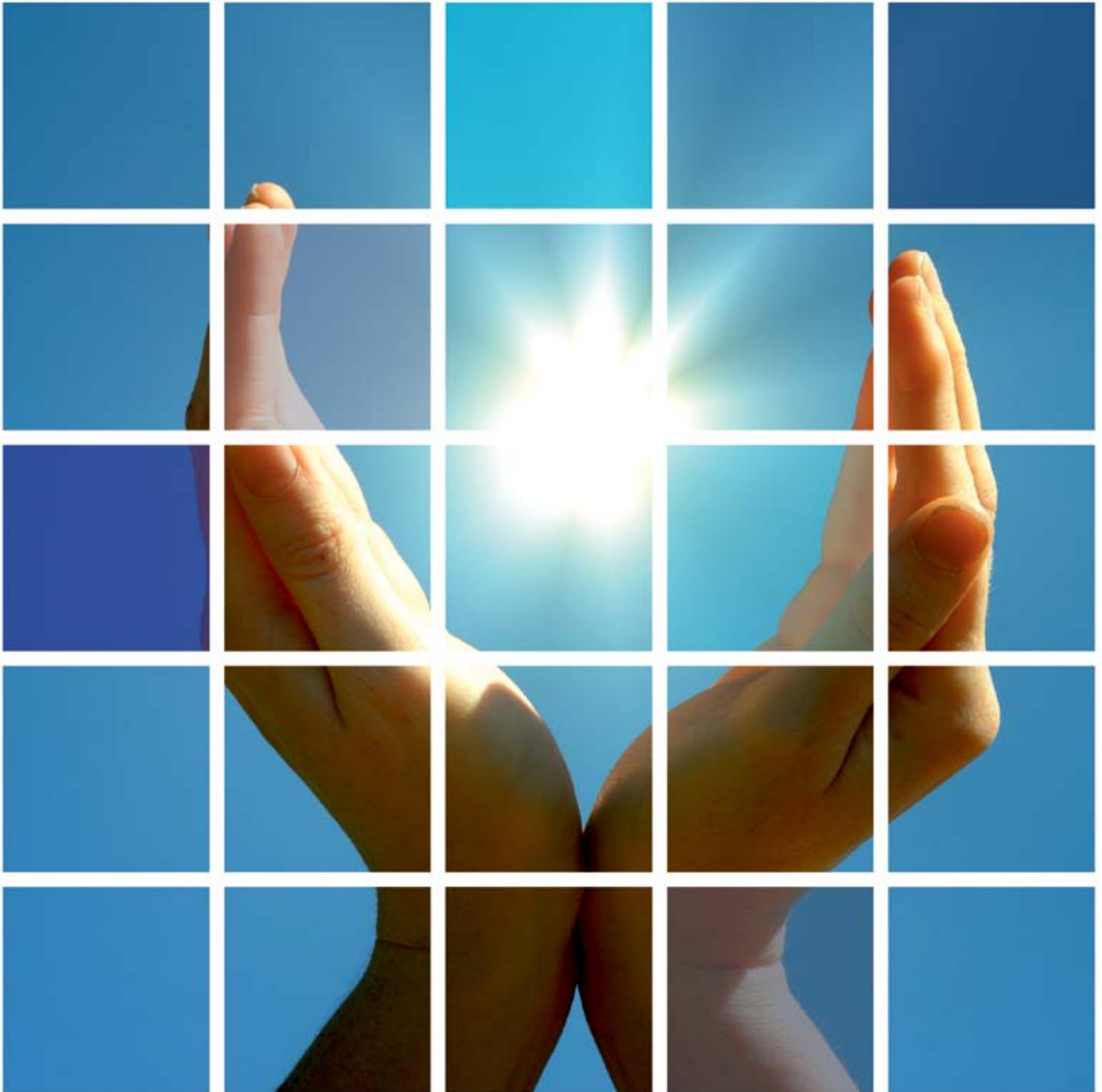
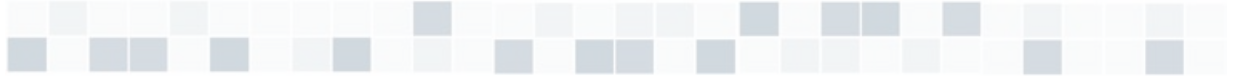
Chemical abbreviations

CH₄	methane
CO₂	carbon dioxide
HFC	hydrofluorocarbon
LPG	liquified petroleum gas
N₂O	nitrous oxide
PFC	perfluorocarbon

Units

CO₂-eq	carbon dioxide equivalent
Gt	gigatonne
GWh	gigawatt hour
ha	hectare
Mt	megatonne
Mwh	megawatt hour
m³	cubic meters
ppm	parts per millions
t	tonne
W/m²	watts per square metre





EXECUTIVE SUMMARY

The OECD works closely with governments to help them identify and implement least-cost policies to reduce greenhouse gas (GHG) emissions, in order to limit climate change. It also works with governments on integrating adaptation to climate change into all relevant sectors and policy areas. Similarly, the United Nations Environment Programme (UNEP) recognises the need to raise awareness within the tourism industry and among consumers on the topic of climate change, to facilitate adaptation to its existing and expected effects, and to anticipate and mitigate its future impacts.

Tourism contributes to climate change, and is also affected by it. The sector accounts for an estimated 5% of anthropogenic CO₂ emissions but its overall contribution to climate change, if measured as radiative forcing¹ of all greenhouse gases, is in the order of 5.2-12.5%² (Scott *et al.*, 2010). Aviation accounts for 40% of tourism's CO₂ emissions, car transport for 32% and accommodation for 21%. The remaining 7% arises from activities for tourists (4%) and other forms of transport (3%), including in particular cruise ships.

Over the next 25 years, GHG emissions from tourism are projected to more than double in a business-as-usual scenario, *i.e.* extrapolating current trends while taking account of gains in efficiency (UNWTO-UNEP-WMO, 2008; for a higher estimate see WEF, 2009). While tourism is not unique in this respect, these trends are out of step with the climate policy objectives of the international community. Global emissions have to be reduced by at least 50% from their 1990 level by 2050, if temperature stabilisation is to be achieved at less than 2°C average warming above pre-industrial levels (IPCC, 2007). For industrialised countries, this translates into economy-wide overall emission reductions of more than 3% per year.

The results presented in this report indicate that many governments and tourism organisations favour reducing the emissions from tourism in line with the reductions required of other sectors. Other governments, because of the structure of their economies, the important contribution of tourism (including travel for business purposes) to national welfare and their distance from large global markets, will seek to achieve net emissions reductions in the context of balanced initiatives across various sectors of their economies.

Policy options to reduce the impact of

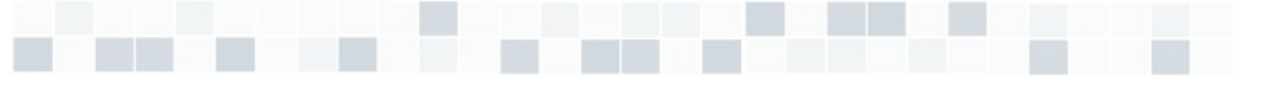
tourism on climate change will accordingly need to reflect the wider context of the place of tourism in the structure of a country's economy and, more broadly, the complex dimensions that underpin a country's connectedness to the global economy.

No binding emission reduction targets or mitigation policies have so far been formulated specifically for tourism. The only significant exception is the European Union's ETS for aviation, which will commence in 2012 and cover intra-European and international aviation. The International Civil Aviation Organization (ICAO) has presented the objective of improving fuel efficiency across the aviation sector by 2% per year between now and 2050 through better air traffic management, the introduction of new technology, market-based measures and alternative fuels. ICAO argues that multilateral collaborative action is the most appropriate mechanism to address international aviation emissions in a post-2012 framework. While aviation is the tourism sub-sector with the highest emissions (including domestic, intra-regional and inter-regional flights), there is also a need to limit emissions from road transport and throughout the tourism supply chain. This will require policies to support low carbon transport modes, and a sector-wide shift to renewable energy sources, in particular in accommodation. Demand management to increase average length of stay and to reduce average travel distances can make a significant contribution to emission reductions.

The transformation towards a low carbon tourism sector will require major investments in technology, a strong focus on carbon management by businesses, and behavioural changes by tourists. However, the main responsibility for promoting emission reductions lies with governments. One of the most efficient ways of initiating change towards low-carbon

¹ Radiative forcing is the change in global average temperature caused by all emissions of greenhouse gases in a given year, relative to the year 1750.

² The range of this estimate is primarily attributed to uncertainties regarding the role of aviation-induced cirrus clouds and their heat-trapping properties (Lee *et al.*, 2009).



tourism economies will be by raising the costs of energy and emissions through taxes or tradable permits – particularly if incorporated into an economy-wide trading system. Such measures, however, should reflect sector-specific and country-specific considerations, so as to minimise the cost of reducing emissions. The rate of energy price increases should be significant year-on-year, signalled in advance, and foreseeable over longer time periods, to allow companies to integrate energy costs in long-term planning and decision-making.

Tourism stakeholders can prepare for low-carbon futures by integrating energy and emission-related concerns in their planning. Such strategies do not necessarily imply declining visitor numbers or revenues. Destinations can also seek to de-carbonise their tourism systems by focusing on high-yielding markets whose emissions are also lower. To this end, a considerable range of tools is now available to increase revenues and profits while reducing emissions.

Where it does not appear feasible to increase the cost of fossil fuels, subsidies could play a greater role in initiating shifts in consumption to low-carbon tourism. These may take the form of supporting renewable energy systems, or shifting fiscal burdens to reward low-carbon consumers – as exemplified by the French bonus/malus system for cars. They may also include tax breaks or tax relief for businesses investing in low-carbon technology or management, as well as grants, matching funding, benefits in kind or other incentives to support best practice, innovation and more costly restructuring and retrofitting.

Knowledge and awareness campaigns could be implemented to facilitate these changes. These campaigns would provide information about the challenges involved in meeting climate stabilisation objectives, and their costs, as well as outlining alternatives and providing strategic tools to address energy consumption. Governments should work in co-operation with the relevant ministries to discuss the current energy intensities of the tourism sector, and their expected growth or decline, in the light of national tourism

development plans. Research can help to assess energy intensities and the level of taxation, regulation and incentives needed to meet climate policy goals.

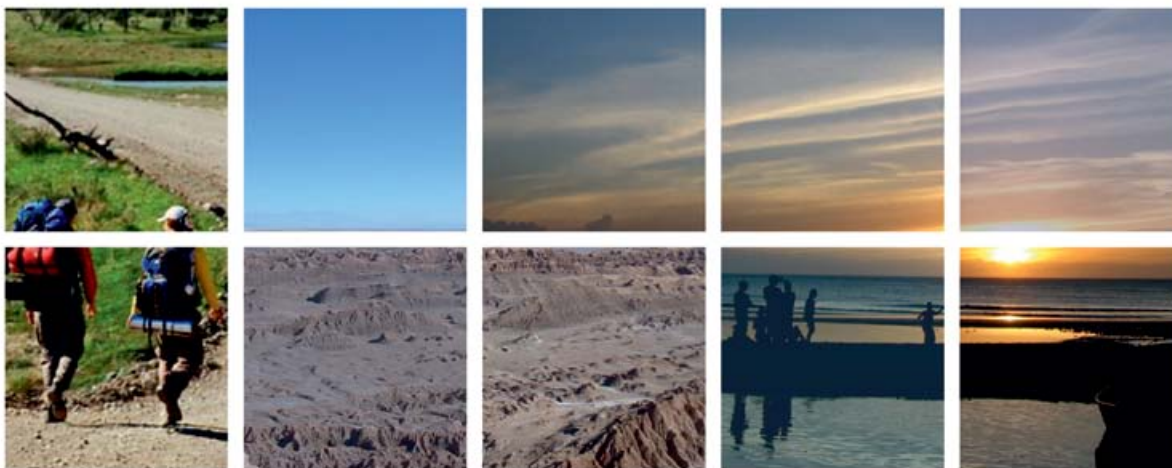
With regard to adaptation policy, only few countries have specifically addressed tourism and presented analyses of climate change impacts, adaptive capacities and associated vulnerabilities. Potential adverse impacts are linked to increases in extreme weather, flooding and drought; water shortages (also affecting water-related tourism activities) and declining water quality; changes in snow reliability; coastal erosion; and conditions becoming less suitable for tourism such as increasing heat stress in already warm countries. However, some northern European countries also report expectations that they may profit from climate change. Specific policies to address adaptation in tourism have not been introduced, and the legislation that does exist in some countries on flooding or water scarcity, for example, is not specific either to climate change or to tourism.

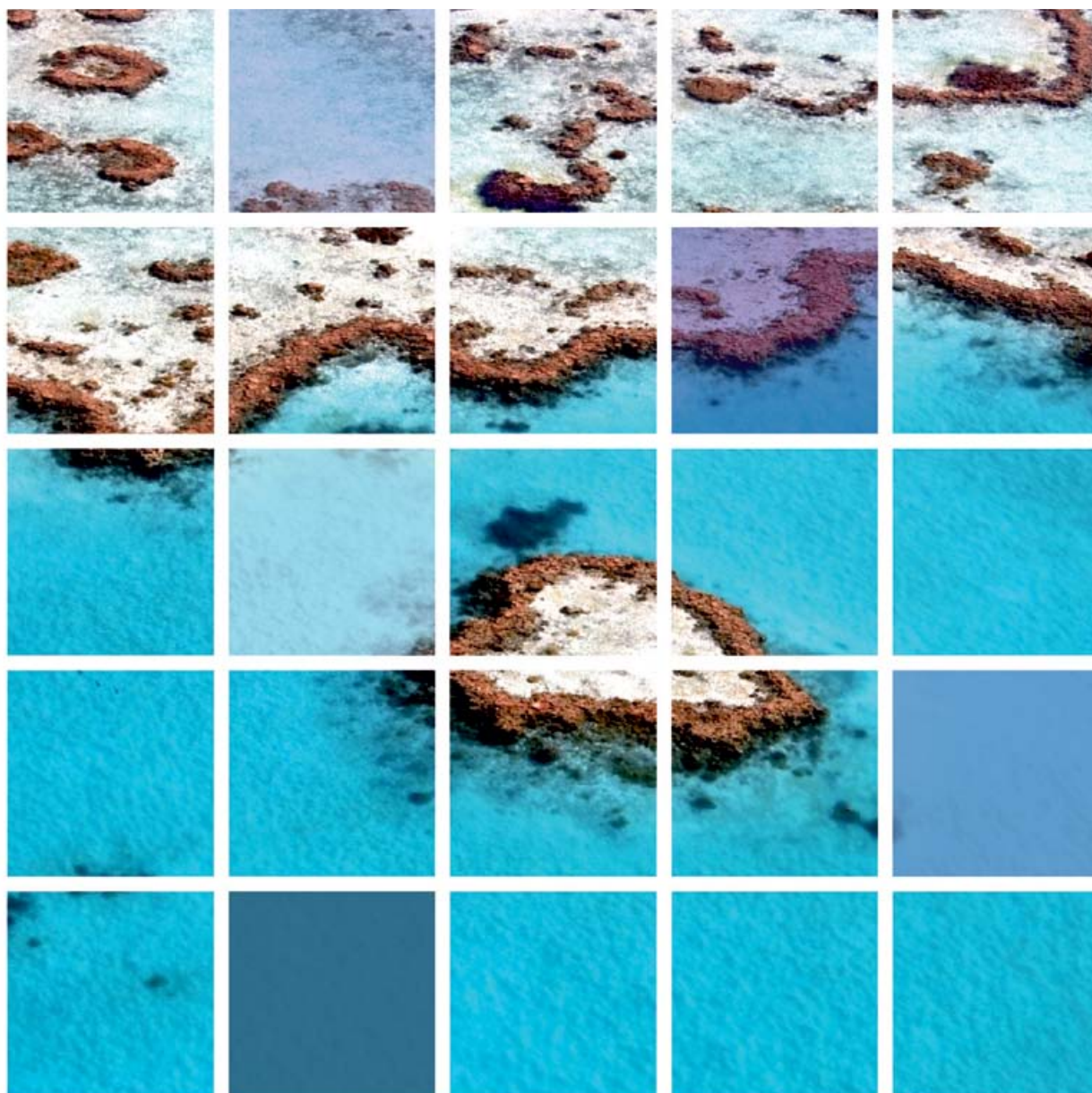
While existing assessments as identified for this report reflect growing awareness of climate change, key research gaps remain unaddressed. How will heat stress in the Mediterranean affect tourism flows, for instance, or how sustainable is the development of snowmaking capacities as a measure to compensate for loss of natural snow? With regard to time-scales, while some adaptation assessments focus on impacts occurring more than half a century from now, it is less clear that investors and other stakeholders are capable of addressing, and willing to address, such long-term future scenarios. One conclusion is thus that climate change adaptation assessments need to integrate greater complexity and more relevant time scales, as well as the levels at which policies can be implemented (individual tourists, businesses, urban agglomerations, regions or country-wide).

Water is a key issue for tourism, and closely linked to both adaptation and mitigation. Future water availability and quality will depend on the emission pathways chosen over the coming decades. Less ambitious climate policy is very likely to lead to a situation where the number of people facing water scarcity rises by more than two billion – reflecting the potential

Countries such as Austria, Germany, Ireland, or South Africa have shown that it is possible to identify current and future impacts

Findings presented in this report also indicate low awareness of the tourism sector's climate change mitigation and adaptation needs, a lack of knowledge and research regarding the complexities of tourism-climate interrelationships, and a concomitant overall lack of mitigation and adaptation plans and policies. Individual governments could thus clearly do more to understand how tourism and related sectors (transport, food) contribute to and will be affected by climate change. This improved understanding would help them determine the appropriate policy mix to reduce the impact of tourism on climate change, including how mitigation goals and adaptive capacities could be increased without adversely affecting the sector.





Chapter
01

CONCLUSIONS AND POLICY RECOMMENDATIONS

MITIGATION ■ ■ ■

Insights presented in this report indicate that tourism, although a relatively minor emissions sector, is a significant one if a business as usual approach is maintained. Many governments, industry and tourism organisations expressed the view that tourism must achieve significant reductions in GHG emissions, in line with other industry sectors. None of the commitments expressed by industry are, however, binding, while the “aspirational” targets postulated by various organisations and industry groups have been criticised as impossible to achieve (Scott *et al.*, 2010). Global, national and regional climate policy will thus have to play a key role in achieving any significant de-carbonisation of global and national tourism systems.

In order to be effective, tourism-related climate policy should focus on significant sources of current and future emissions. Currently, three sub-sectors account for 93% of total emissions of CO₂ from tourism: aviation (40%), car travel (32%) and accommodation (21%). However, when considering non-CO₂ GHG on the basis of radiative forcing, which is a more appropriate measure of the contribution made by tourism to climate change, aviation remains the most important emissions sub-sector, responsible for 54-83% of tourism's contribution to radiative forcing. One important conclusion is that absolute emissions from tourism would continue to grow even if emissions from car travel and accommodation were reduced to zero, given the observed and expected strong growth in air travel (Scott *et al.*, 2010; Owens *et al.*, 2010) and limitations on replacing jet fuel with biofuels (IEA, 2009; UNEP, 2009; UNESCO, 2009). If absolute emission reductions in tourism are to be achieved, structural changes towards low-carbon mobility appear unavoidable (Peeters and Dubois, 2010; Scott *et al.*, 2010; UNWTO-UNEP-WMO, 2008).

More insights can be derived from the analysis of growth patterns in tourism. Three processes in particular are contributing to rapidly increasing emissions: the growing number of tourists, their choice of increasingly remote destinations – as reflected in growing average travel distances – and the use of increasingly energy intense transport modes. Policy measures should consider these developments,

while acknowledging the distributional inter-relationships, as a large share of current emissions from tourism result from a comparably small share of long-haul trips originating from wealthy countries (UNWTO-UNEP-WMO, 2008). Furthermore, travel intensities are unevenly distributed not only between countries (Schafer and Victor, 2000), but even more so within countries, with a small proportion of highly mobile travellers responsible for a considerable share of tourism-related emissions (Gössling *et al.*, 2009; Chakravarti *et al.*, 2009). Finally, large cities generate more tourism than rural areas (Dubois, 2009).

The absence of a price on greenhouse gas emissions encourages pollution, prevents innovation, and creates a market situation where there is little incentive to use innovations (OECD, 2010b). Governments have a wide range of environmental policy tools at their disposal to address this problem, including regulatory instruments, market-based instruments, agreements, subsidies or information campaigns. However, one of the most efficient ways of reducing emissions, and promoting innovation (in the form of renewable energies, or other less-polluting or climate change-friendly technologies), is to increase fuel prices. The introduction of a tax on fuel, or on emissions, that is proportional to fuel use or to emissions produced, can ensure cost-efficient abatement (Stern, 2007; Mayor and Tol, 2007, 2008, 2009, 2010a, 2010b; Johansson, 2000; OECD, 2009, 2010b; WEF, 2009; PricewaterhouseCoopers, 2010). As outlined by the OECD (2010b:2):

- Compared to other environmental instruments, such as regulations concerning emission intensities or technology prescriptions, environmentally related taxation encourages both the lowest cost abatement across polluters and provides incentives for abatement at each unit of pollution. These taxes can also be a highly transparent policy approach, allowing citizens to clearly see if individual sectors or pollution sources are being favoured over others.

Energy prices also need to be progressive (increasing at a significant rate per year) and foreseeable (be implemented over longer

Box 01

EXAMPLES OF TAXES AND FEES USED TO PROTECT THE ENVIRONMENT

SWEDEN: NO_x ABATEMENT TECHNOLOGY

Tax designed to be “neutral”, *i.e.* companies with average emission intensities pay no tax, while relatively cleaner plants receive a net refund and dirtier plants pay a net tax.

Within one year of the introduction of a tax on NO_x emissions, 55% of companies adopted abatement technology, between 1992–2006 emissions declined by 25 % in real terms.

Source: OECD, 2010b

BELIZE: CORAL REEF PROTECTION

Cruise traveller visitor's tax of USD 7 of which USD 1.40 is earmarked for conservation of the reef.

Conservation fees derived from every departing visitor (managed by Protected Areas Conservation Trust to protect barrier reef and rainforest).

Source: Center on Ecotourism and Sustainable Development, 2006; Barker and Roberts, 2008.

NEPAL: MOUNTAIN PROTECTION³

Entry permit must be purchased for 200 Nepali Rupees for South Asian Association for Regional Cooperation nationals or 2 000 Nepali Rupees (USD 27.73) for other nationals in order to trek in Annapurna Conservation Area.

Source: UNEP, 2007.

ECUADOR, GALAPAGOS: ISLAND/ WILDLIFE PROTECTION

Each visitor pays an entry tax to the protected natural areas, which is divided among several local and national institutions for allocation to sustainable human development. Funds from the entry tax for tourists are used to finance the conservation of biodiversity of flora and fauna, terrestrial and marine, and benefits the local community by improving basic services, education projects, sports, health, environmental sanitation, environmental services and services directly related to tourists. Foreign tourists who are non-residents of Ecuador and over 12 years of age are required to pay an entry tax of USD 100.

Source: UNEP

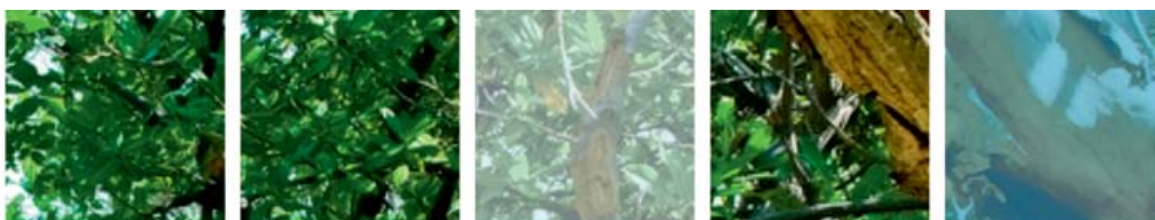
THE MALDIVES: LOW-LYING ISLAND PROTECTION

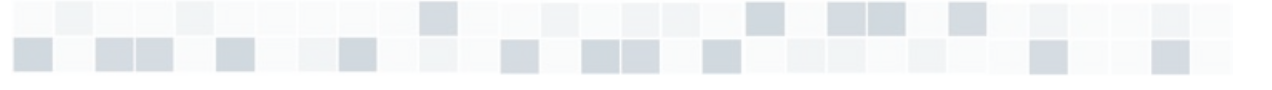
International visitors have to pay USD 10 per bed night at hotels, tourist resorts, guest houses and safari yachts (raised from USD 3 in 1981 and USD 6 in 1988)

Tourism tax collected from all tourist establishments makes up 60 of government revenue.

Source: McAller et al. 2005.

³ This is the first and largest conservation area in Nepal, covering 7 629 km². Approximately 25 000 trekkers visit the Annapurna region every year and the trekking fee collected from the tourists supports more than 40 000 local people. Thus ACAP, with the participation of the trekkers, has been able to increase the standard of living of the local population, protect the environment and develop sustainable tourism.





The report thus underlines the prevailing paradox between ambitious mitigation pledges and the fundamental lack of “serious” climate governance in the countries studied. In order to be effective, tourism climate mitigation policy must be integrated on different levels. Globally, there is a need for all countries to join the UNFCCC and to agree on binding emission reduction targets, which is a precondition for emission trading schemes to work efficiently. Nationally, more ambitious overall climate mitigation objectives need to be defined, and policies implemented to achieve them, notably including the monitoring of progress. In this context, regions and communities should be given the political freedom to go above and beyond national climate policy measures to develop role models for low-carbon societies. Finally, organisations and businesses need to support these processes through developing their own climate targets. To move towards low-carbon tourism, a five-fold climate policy strategy in OECD countries would seem favourable (OECD, 2009):

a) Knowledge and awareness. Several global assessments now exist of the contribution made by tourism to climate change (UNWTO-UNEP-WMO, 2008; WEF, 2009), but only few countries and businesses assess and monitor their tourism-related energy use and emissions. National tourism emission inventories, as well as policies requiring companies to assess their energy use and related emissions, would both create a better knowledge base for decision making and raise awareness among stakeholders. Moreover, only on the basis of such databases can progress be made to reduce emissions, involving regular monitoring.

b) Mix of measures. Technology innovation, emissions management in businesses, behavioural change (demand management), education, research and development as well as politics will all have important roles to play in restructuring tourism systems. None of these alone can

achieve the level of change necessary to meet global mitigation objectives, and without “serious” climate governance, significant change is unlikely. As the example of France shows, Environment Round Tables at the national level can help to identify a wide range of measures to reduce environmental burdens, while simultaneously creating public debate and support, involving large parts of the population in decision making (Commissariat Général au Développement Durable, 2009).

c) Carbon pricing and emission trading. Taxes, emission trading and other economic instruments are needed to steer energy use and emissions, conveying clear, long-term market signals (Stern, 2007; Mayor and Tol, 2007, 2010; WEF, 2009; OECD, 2009, 2010b). It is important for these economic instruments to increase the costs of fossil fuels and emissions significantly. Price levels also need to be progressive (increasing at a significant rate per year) and foreseeable (implemented over longer time periods), to allow companies to integrate energy costs in long-term planning and decision-making. Perverse subsidies, such as the non-taxation of kerosene or the financial support of fossil fuel consumption, also need to be addressed. The IEA (2010) even sees “eliminating fossil fuel subsidies as the single most effective measure to cut energy demand in countries where they persist”.

d) Regulation. While carbon pricing is the most efficient tool to stimulate behavioural change and changes in production, market failures (e.g. oligopolies, imperfect competition, lack of markets for air pollution) justify additional policy intervention. Energy-intensive forms of tourism and transport as well as behavioural change difficult to steer through rising energy costs also need to be addressed through other measures, such as speed limits, or limits on motorised transport at the destination level. Moreover, regulation could include

building codes and other minimum standards to reduce emissions. Actual enforcement of existing environmental regulation needs to be ensured. Overall, there appears to be broad support for such policy intervention (OECD, 2010a; PricewaterhouseCoopers, 2010; WEF, 2009).

e) Incentives. The introduction of low-carbon technology needs to be supported through incentive structures. An ecological tax reform, for instance, could shift tax burdens from labour to energy and natural resources, and thus “reward” users of low-carbon technology. Other incentives could include financial reward mechanisms or awards (WTTC, 2010). There is also a wide range of examples of bonus-malus systems in tourism and transport, rewarding those choosing to pollute less (Gössling, 2010).

In conclusion, the mitigation challenge cannot be taken too seriously. Achieving emission reductions in line with current political climate stabilisation goals will require enormous political will and long-term thinking. Governments are well advised by Köhler *et al.* (2009:2994), who conclude that:

...a large-scale shift in the preferences – and therefore choices – of consumers and also strong and lasting policy action is a prerequisite for a transition to a sustainable mobility system. ... this shift must be maintained for a long time (20-30 years), or indeed permanently. The challenge for policy makers is to inspire and connect to grassroots support for social change in order to effectively introduce potentially unpopular changes (*e.g.* fuel tax increases, parking restrictions), and to demonstrate the wider benefits of such changes (*e.g.* reduced air pollution, more reliable public transport) to garner this support.

A number of OECD countries have presented analyses of impacts, their adaptive capacities, and the vulnerabilities arising out of these assessments. Future key impacts that could become relevant for tourism include an increasing frequency of weather extremes, flooding, droughts and water shortages; increasing temperatures limiting the availability of snow (OECD, 2007); declining water quality and coastal erosion reducing the attractiveness of tourism sites; less suitable conditions for tourism, such as increased heat stress in warm countries, and more variable weather and precipitation affecting tourism activities. Specific policy addressing adaptation in tourism has, however, not been introduced, perhaps with the exception of freshwater use, where some legislations exist in countries like Israel to deal with increasing use and declining resources. Such policy, however, is not specifically designed either for climate change or for tourism.

Existing reports, *e.g.* UNWTO-UNEP-WMO (2008), do reflect a growing awareness of the challenges for tourism associated with climate change. The integration of research findings into national adaptation strategies for tourism, however, is notably absent, as is the identification of key research gaps. For instance, several countries have postulated that climate change will lead to heat stress in the Mediterranean and result in changing travel flows to the Baltic and the Northern countries. What they have not done, however, is consider the time horizons over which warming will become relevant, the role of weather extremes (for instance, temperature increases not being linear), the weather parameters influencing thermal and perceived comfort (which, apart from temperature, may include rainfall, humidity, radiation and wind speed), the distinction between air and water temperatures relevant for sun, sand and sea tourism, or the fundamentally different cultural resources found in Mediterranean and northern countries. All

of these aspects may affect tourist flows, apart from temperature increases, but little research exists that would identify and quantify their role in tourist decision-making. Expectations regarding increases in arrival numbers – which some countries have even quantified – must thus be seen as uncertain. Likewise, assessments of snow reliability in the Alps (OECD, 2007) have not considered snow-making capacity, while the perception of tourists of snow-poor environments as suitable for holiday-making continues to represent a key research gap. With regard to timescales, it is notable that some adaptation assessments focus on impacts occurring more than half a century and up to 90 years from now. It is questionable how stakeholders and in particular investors will address such long-term future scenarios. Existing assessments thus need to integrate greater complexity and proper timescales, as well as the levels at which policies will become relevant (individual tourists, businesses, urban agglomerations, regions or country-wide).

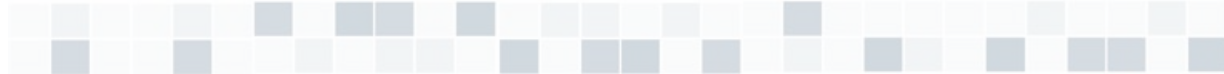
Water is a key issue for the adaptation of tourism. It is closely linked to mitigation, as future water availability and quality will depend on the emission pathways chosen over the coming decades. Less ambitious climate policy is very likely to lead to a situation where the number of people facing water scarcity rises by more than two billion – reflecting the potential consequences of a 2°C to 3°C average warming scenario by 2100. This will also affect many of the assets tourism uses, such as lakes, rivers, snow and fresh water, while generally questioning the broader socio-economic stability upon which tourism depends. There is thus a need to raise awareness of the importance of water for tourism, and the considerable – mostly negative – changes tourism will face if water becomes increasingly scarce.

Water conservation, efficient use and re-use are of greatest relevance in tourism, but it will require strong policy environments to achieve this. Left to itself the tourism industry is not likely to

make water use a key priority, given the generally low cost of water in comparison to other operational costs and turnover. It will usually be most cost-efficient to focus on technical adaptation measures including installing water-saving devices in hotel rooms, or using desalination technology, based on renewable energy, to meet water demand in water-scarce coastal environments.

Overall, there is evidence that greater efforts could be made in OECD countries to understand the impacts of climate change on tourism. This should include considering the time horizons for different impacts, and their geographical scales, as well as complexities in tourist behaviour. Impacts, adaptation capacity, and resulting vulnerabilities must be more comprehensively identified, and adaptation policies derived from such assessments. This will have to include a focus on opportunities. Progress in implementing these policies should be monitored, and the policies re-evaluated over time (Jopp *et al.*, 2010).

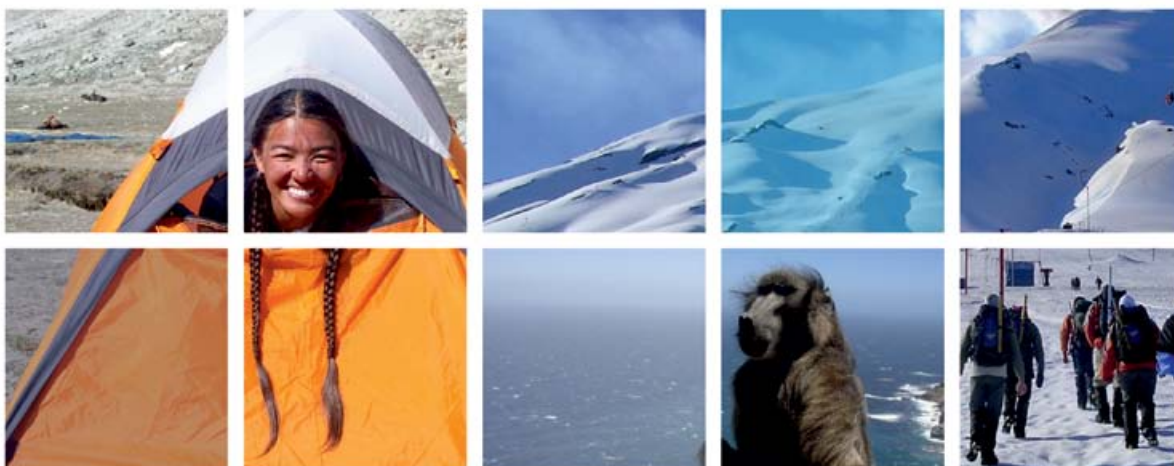
Countries such as Austria, Germany, Ireland, or South Africa have shown that it is possible to identify impacts, even though key scientific uncertainties remain with regard to tourist perceptions and potentially altered travel behaviour. The definition of adaptation goals and the implementation of policies is still in a development stage in virtually all countries. There is thus considerable room for engaging more thoroughly with adaptation. To move forward, governments may seek to fund research that addresses key research gaps, and contributes to an identification of impacts, adaptive capacity and key vulnerabilities. The development and implementation of policy could then be based on these insights. As little progress has been made in this regard, and no examples appear to exist that could serve as guidelines for countries, governments may take their point of departure in adaptation plans developed in other economic sectors, where greater progress has often been made to identify adaptation needs, strategies, and policies.

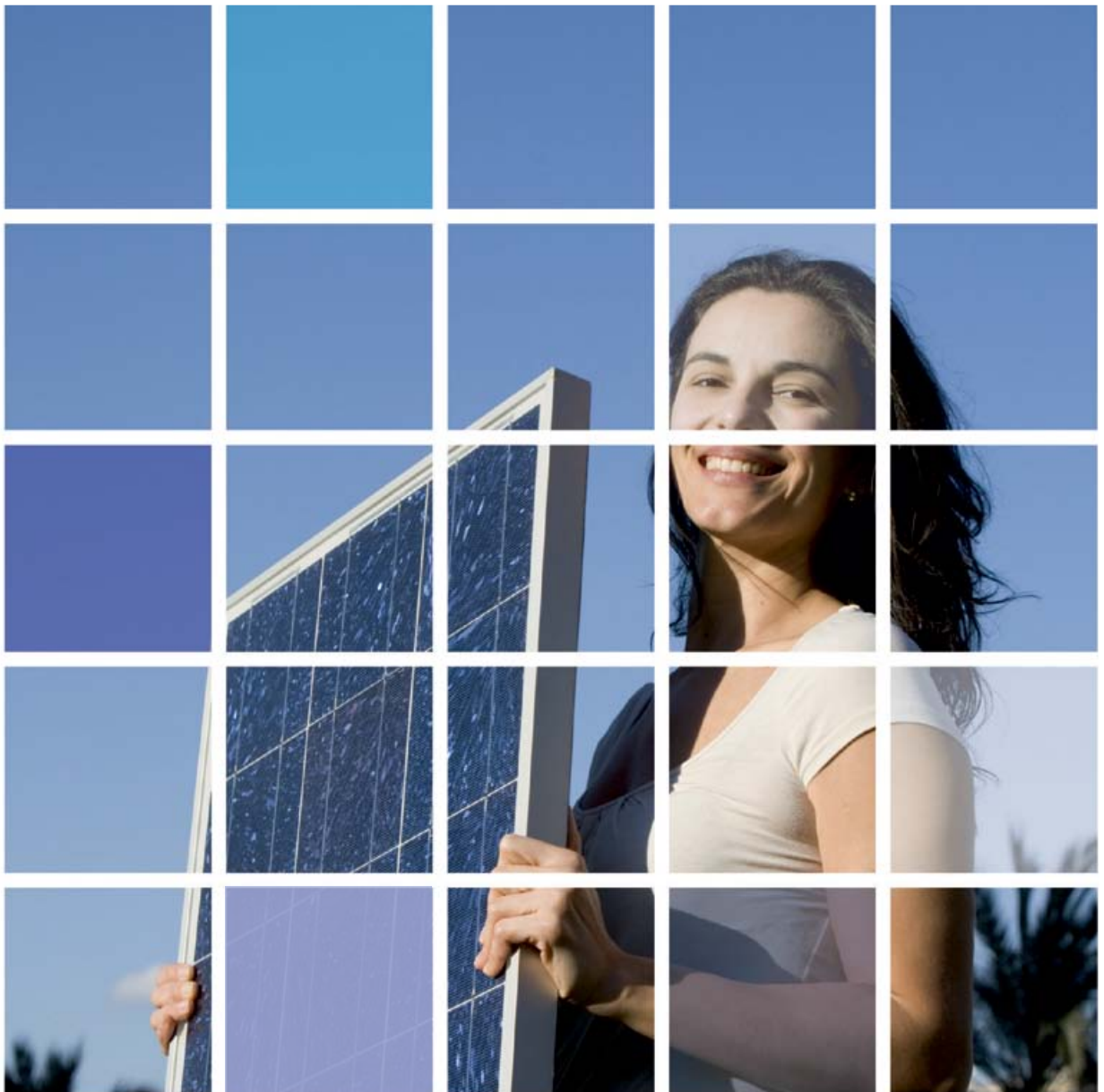
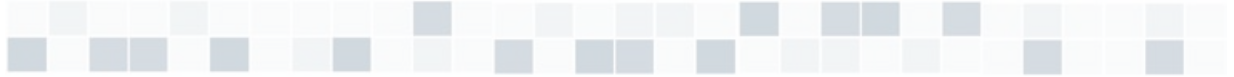


In summary, the report has shown that mitigation has received more attention than adaptation to climate change, even though not much has been achieved in either area. It also appears clear that most initiatives have taken place at the national level, indicating that the implementation

of supra-national governance is difficult. Conversely, the implementation of local or regional policy may often be hindered by national legislation; consideration should be given to facilitating the implementation of policy at lower governance levels that exceeds national objectives.

Mitigation has received more attention than adaptation to climate change, even though not much has been achieved in either area.





Chapter
02

CLIMATE CHANGE: A CHALLENGE FOR TOURISM

INTRODUCTION: climate change and the need to reduce emissions ■ ■ ■

Various reports have outlined the global environmental and socio-economic risks associated with the magnitude of climate change projected for the end of the century. These risk projections feature prominently in international policy debates. The Intergovernmental Panel on Climate Change concluded, with a very high degree of confidence, that climate change beyond certain threshold levels would impede the ability of many countries to make progress on sustainable development, and would become a growing security risk (IPCC, 2007). The Stern Review concluded that the costs of economic disruption resulting from inaction would be far higher than the costs of reducing GHG emissions now (Stern, 2006). The Global Humanitarian Forum, headed by former UN Secretary-General Kofi Annan, outlined the extent of the effects of climate change, already affecting the livelihoods of 325 million people, causing 300 000 deaths per year and resulting in economic losses of USD 125 billion (Global Humanitarian Forum, 2009). This death toll is expected to rise to an estimated half a million a year by 2020, with four billion people regarded as vulnerable to climate change and half a billion regarded as at extreme risk.

Some additional warming from present levels cannot be avoided, but the extent of future temperature increases will heavily depend on global emission pathways (IPCC, 2007). Action needs to be taken swiftly to avoid “dangerous interference with the climate system”, defined as average global warming exceeding 2°C by 2100 (UNFCCC, 2010a, 2010b). Temperature increases are likely to exceed this 2°C threshold if current emission trends continue, or even if countries succeed in achieving the emission reduction commitments

they have made to date (Anderson and Bows, 2008; Hansen *et al.*, 2006; Meinshausen *et al.*, 2009; Parry *et al.*, 2008; Rogelj *et al.*, 2009). The Copenhagen Diagnosis consequently concludes that there is a very high probability (greater than 90%) that warming will exceed 2°C by 2100, unless global emissions peak soon and start to decline rapidly (Figure 1). Warming rates will accelerate if positive carbon feedbacks significantly diminish the efficiency with which land and oceans absorb CO₂. At the high end of emission scenarios, with “business as usual” continuing for several decades, global mean warming is estimated to reach between 4°C and 7°C by 2100 (Copenhagen Diagnosis, 2009:51). Recent high warming trends of $+0.187 \pm 0.052^\circ\text{C}$ per decade (Copenhagen Diagnosis, 2009:14) have been confirmed by the World Meteorological Organization (2009), the Hadley Centre (2009) and the Goddard Institute for Space Studies (GISS, 2010).

It is clear that current emission trends, if continued, will exceed “safe” levels of climate change. In order to stay within socially and environmentally safe limits, emissions must be reduced drastically. The German Advisory Council on Global Change (WBGU, 2009) suggests that limiting cumulative CO₂ emissions to 750 Gt in the period 2010-2050 would give a 67% probability of limiting global warming to 2°C or less. This approach, establishing an overall “cap” on “acceptable” emissions up to 2050, allows in turn the calculation of how much can be emitted every year. Depending on when emissions peak, this will require either a relatively gradual decline in emissions over time, if the peak comes early or a steeper decline if the peak is later (Figure 1).

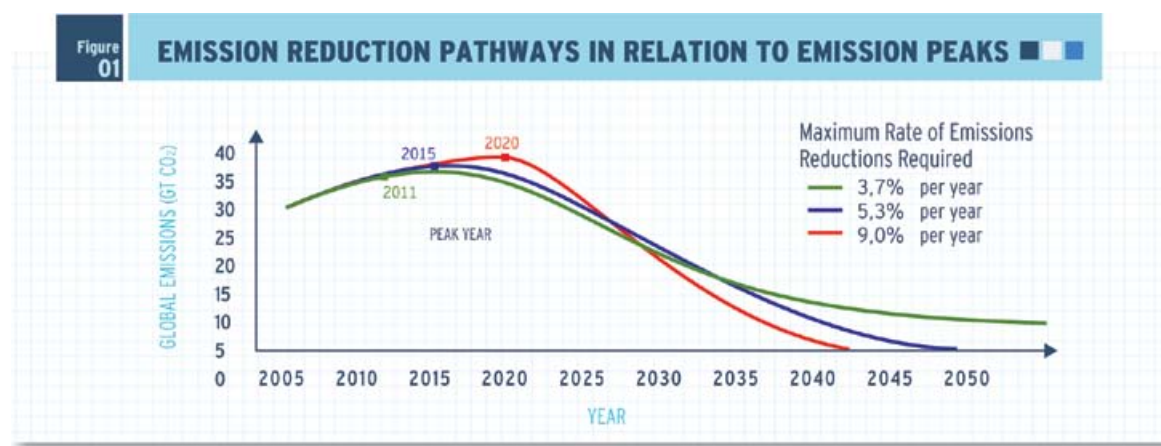


Table
01

DISTRIBUTION
OF EMISSIONS
FROM TOURISM
BY SUB-SECTOR

SUB-SECTORS	2005	
	CO ₂ (Mt)	%
Air transport	515	40 %
Car transport	420	32 %
Other transport	45	3 %
Accommodation	275	21 %
Activities	48	4 %
TOTAL	1304	100 %
Total World (IPCC 2007b)	26400	
Tourism contribution	5 %	

Source: UNWTO-UNEP-WMO, 2008.

All calculations in UNWTO-UNEP-WMO (2008) represent energy throughput. As the construction of hotels, cars, airports, and other infrastructure all consume considerable amounts of energy, a lifecycle perspective accounting for the energy embodied in the tourism system would lead to higher estimates. Finally, aviation is relevant as a contributor not only of emissions of CO₂, but also of other GHG. A

recent estimate presented by Scott *et al.* (2010) assessed the contribution made by tourism to climate change in terms of radiative forcing (Box 2), and found the sector to contribute between 5.2% and 12.5% of all anthropogenic forcing in 2005. These figures are an update on UNWTO-UNEP-WMO (2008). They are higher than the estimate for CO₂ alone because of the radiative forcing caused by aviation.

Box
02

RADIATIVE
FORCING

The commonly used metric to quantify the climate impact of some phenomena is 'radiative forcing of climate'. The formal definition adopted by the IPCC is:

Radiative forcing is the change in the net, downward minus upward, irradiance (expressed in Watts per square metre, W/m²) at the tropopause due to a change in an external driver of climate change, such as, for example, a change in the concentration of carbon dioxide or the output of the Sun. Radiative forcing is computed with all tropospheric properties held fixed at their unperturbed values, and after allowing for stratospheric temperatures, if perturbed, to readjust to radiative-dynamical equilibrium. Radiative forcing is called *instantaneous* if no change in stratospheric temperature is accounted for. Radiative forcing is further defined as the change relative to the year 1750, referring to a global and annual average value.

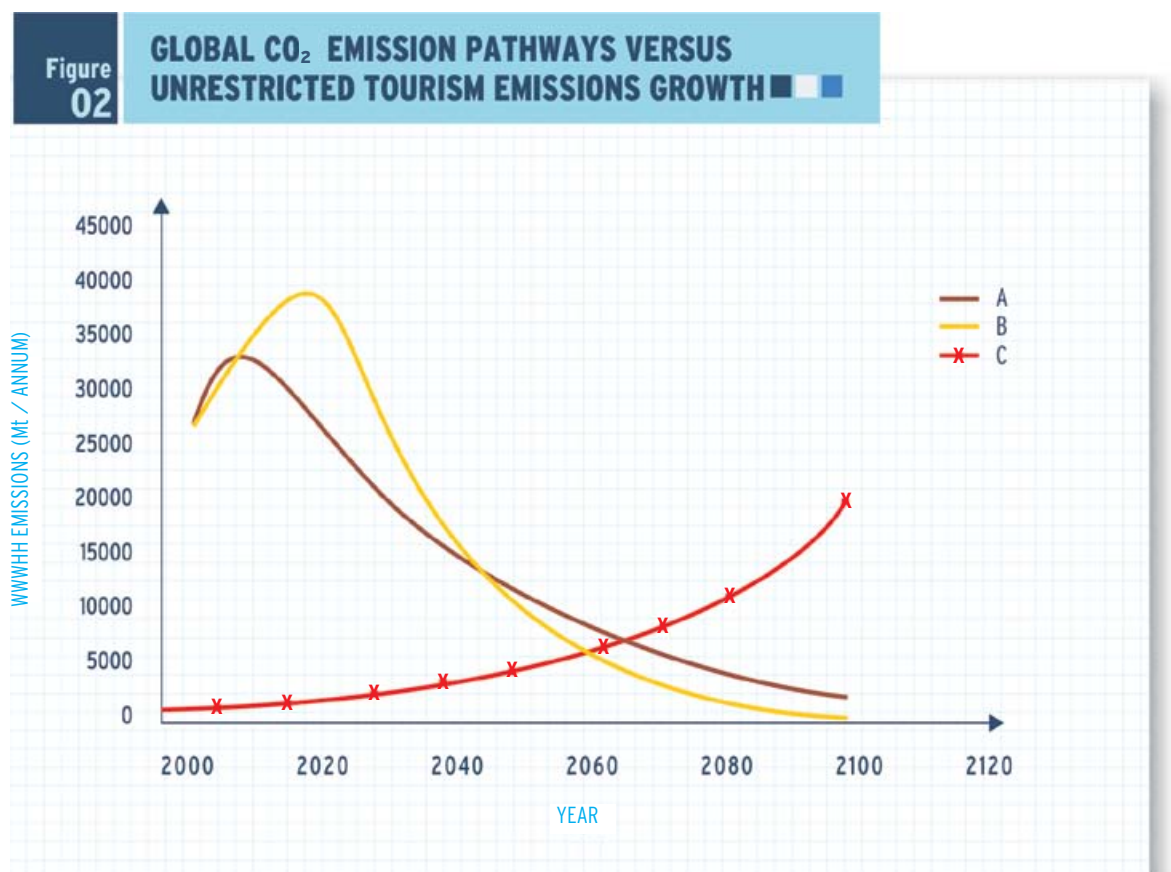
The RF metric is used because of a linear relationship between a change in global mean radiative forcing (RF) and a change in global mean surface temperature. It thus represents the contribution to global warming made by long-lived (greater than 100 years) and short-lived (hours to years) greenhouse gases. As much of tourism's contribution to climate change is related to air travel and short-lived greenhouse gases, RF is a better concept than CO₂ alone to adequately depict the sector's impact on climate.

A business-as-usual scenario in tourism, taking account of current trends in energy efficiency gains, would lead to rapid growth in emissions from the sector. By 2060 the tourism sector would account for emissions exceeding the emissions budget for the entire global economy.

Based on a business-as-usual scenario for 2035, which considers changes in travel frequency, length of stay, travel distance, and technological efficiency gains, UNWTO-UNEP-WMO (2008) calculate that CO₂ emissions from tourism may grow considerably in the coming 25 years. Their scenario shows emissions increasing by 135% by 2035, compared to the 2005 level, to reach 3 059 Mt CO₂. These estimates can be compared with a projection for emission growth by the World Economic Forum (2009) which suggests emissions of 3 164 Mt CO₂ by 2035.

As a result, if travel and tourism remain on a business-as-usual pathway, they will become important sources of GHG emissions in the medium-term future. Figure 2 shows

this for a world economy embarked on an absolute emission reductions pathway (Scott *et al.*, 2010). Lines A and B in Figure 2 represent emission pathways for the global economy under a -3% per year (A) and -6% per year (B) emission reduction scenario, with emissions peaking in 2015 (A) and 2025 (B) respectively. Both scenarios are based on the objective of avoiding a +2°C warming threshold by 2100 (Scott *et al.*, 2010). As indicated, a business-as-usual scenario in tourism, taking account of current trends in energy efficiency gains, would lead to rapid growth in emissions from the sector (line C). By 2060 the tourism sector would account for emissions exceeding the emissions budget for the entire global economy (intersection of line C with line A or B).



Source: Scott, *et al.* 2010.

These results emphasise the importance of emission reductions in the tourism sector on a global scale. Continued growth in GHG emissions from tourism would be in conflict with

emission reduction needs as outlined by the Inter-governmental Panel on Climate Change (IPCC) and the existing climate policy objectives of the international community.

ADAPTATION: anticipated impacts of climate change ■ ■ ■

Climate and weather are important attributes of destinations. They influence destination image and destination choice, long-term tourism demand and, as a result of the weather experienced during the holiday, tourist satisfaction (Becken and Hay, 2007; Bigano *et al.*, 2008; Gössling and Hall, 2006; UNWTO-UNEP-WMO, 2008; Scott and Lemieux, 2009; Scott *et al.*, 2010). Major tourism types such as sun, sand and sea (3S) tourism, winter tourism, nature tourism or urban tourism are all dependent on specific climate conditions, although the climate sensitivities of these segments vary considerably. Climate also influences tourism indirectly. It can be one of the factors underlying the attraction of various destinations, such as the existence of specific ecosystems or species, landscapes or landscape elements such as bodies of water and their specific thermal properties, or destination attributes including snow cover or hours of sunshine. Conversely, climate and weather conditions can have considerable influence on the occurrence of events perceived negatively by tourists, including infectious diseases, wildfires, algal blooms, jellyfish or insect outbreaks. Negative events can also include extreme events such as heat waves, cold spells, drought, fires or storms. Climate variability and weather conditions

consequently influence seasonality and the attractiveness of destinations, as well as operational costs including heating and/or cooling, snowmaking, irrigation requirements or pest management.

More generally, environmental conditions perceived as negative can cause significant losses to regional tourism industries and individual businesses. Snow-poor years in the European Alps and North American mountain resorts provide one such example. Some of the most tourism-dependent countries, including small tropical islands, may even be entirely dependent on climate for their tourism industries. Even though it is not as yet understood how climate change will affect travel choices, it seems clear that shifts in consumer travel demand will be induced by changes in destination image, by perceptions of personal safety, and even, under “serious” climate mitigation scenarios, by changes in travel costs because of climate policy (Boxes 3 and 6). Particularly under high emission scenarios, key elements of the global tourism sector are likely to be transformed fundamentally (Hall and Higham, 2005; Gössling and Hall, 2006; UNWTO-UNEP-WMO, 2008; Scott *et al.*, 2008; Scott and Lemieux, 2009).

Box

03

ADAPTATION TO CHANGES IN TRAVEL COSTS

In July 2008, the European Parliament voted to phase in aviation emissions into the EU's Emission Trading Scheme (ETS) from 2012. It is estimated that the ETS may cost the sector up to GBP 2.8 billion a year, as airlines will have to pay for the greenhouse gases they emit via a system of carbon permits. Each airline will be given a national ceiling for emissions. Once they exceed that cap, they will have to buy carbon credits. The rules will be apply to all airlines flying into and out of the EU, including non-European carriers. Airlines will have to pay for 15% of their emissions permits initially. The cost of the aviation industry entering the ETS is expected to be borne by the consumer. The result is that the price of European travel will be affected as airline ticket prices may rise between EUR 5 and EUR 40 by 2020 depending on the length of the flight (Box 5). Adaptation efforts will have to consider the effects of such mitigation initiatives on mobility and on the tourism system.

Source: OECD, 2010.

- Socio-economic impacts: these include potential social and economic disruptions due to climate change.

Vulnerability assessments have identified that small island states, including the Caribbean and Pacific islands, as well as Southeast Asia and Africa, are particularly at risk (Gössling and Hall, 2006; UNWTO-UNEP-WMO, 2008). This is because key tourism products in these regions are dependent on climate and weather, and because they are relatively distant from major markets, increasing transport costs under “serious” climate policy scenarios. Within Europe, the winter tourism industry in the Alps has been identified as particularly vulnerable to climate change (OECD, 2007; Behringer *et al.*, 2000). Further research is however needed to understand how changing environmental conditions affect tourist perceptions and travel choices.

TOURISM, WATER AND CLIMATE CHANGE ■ ■ ■

coast of South America ranging between 1.4 billion and 2.1 billion (Vörösmarty *et al.*, 2000; Arnell, 2004). Fresh water will become even scarcer in the future (Clarke and King, 2004). Some scientists point to the need to adapt to likely global average temperature increases of 4°C by 2100, with up to 3.2 billion people facing water stress (Parry *et al.*, 2009). Stress related to climate change will add to the already growing demand for water related to population and economic growth, as well as changes in lifestyles leading to higher water consumption and the expansion of water supply (and thus abstraction) systems.

It is generally established that more and more people are affected by water stress. Some 450 million people were already living under severe water stress in 1995 (Vörösmarty *et al.*, 2000), with estimates of the number living in water-stressed basins in northern Africa, the Mediterranean region, the Middle East, the Near East, southern Asia, northern China, Australia, the United States, Mexico, north eastern Brazil and the west

litres. The indirect water use of an average air-based trip may thus equal the direct water use associated with a two-week stay in, for instance, the Mediterranean, at an estimated average water use per tourist of 400 litres per day (WWF, 2004).

Fresh water is needed for direct consumption in a variety of tourist infrastructure, including swimming pools, irrigated gardens or golf courses. In accommodation facilities alone, water is used in bathrooms, for laundry and cleaning, in activity areas such as indoor pools and spas, as well as for food production (Gössling, 2001). Indirectly, water consumption is also embodied in food production and preparation, as well as in the goods and services used more generally by tourists, which may often require substantial amounts of water. A distinction between consumptive uses (*e.g.* golf, taking showers) and non-consumptive uses (*e.g.* swimming and other water sports) would appear to be helpful, but there seems to be no research that would allow conclusions to be drawn about the share of consumptive versus non-consumptive uses on the basis of recyclable versus “lost” water. Another important dimension concerns problems created by the intensity of water use, concentrated at particular times or in certain locations (WWF, 2004; Gössling, 2001).

Tourism can exacerbate fresh water problems, as it is often concentrated in regions such as islands and coastal zones with limited fossil water resources, low aquifer renewal rates, and few or no surface water sources (Rodríguez Díaz *et al.*, 2007). Where seawater is used in desalinated form, this can lead to local problems related to the discharge of brine. Local air pollution may be caused by generators used to power desalination plants, which also contribute to climate change through associated energy use and emissions. Besides shifting water consumption from parts of the globe with relative water abundance to those that are water scarce, tourism also increases total water demand, as people appear to use more water when on vacation than at

home (Gössling, 2002a, 2005). It may often affect water quality, too, through the discharge of untreated sewage, nutrient loads and toxic substances into adjacent water bodies (UN, 1995; WWF, 2004). Consequently, sustainable water use in tourism should be concerned with both water quantity and water quality (Orams, 1998; Garrod and Wilson, 2003; WWF, 2004).

Tourism-related water consumption is still little investigated. There are few detailed studies of water use in different geographical settings and different accommodation. Water use per tourist varies widely. Many city hotels, for example, have low consumption rates compared to large resort hotels in the tropics, which irrigate large gardens and maintain swimming pool landscapes and even golf courses. The existing literature suggests water consumption rates in a range from 100 to 2 000 litres per tourist per day, the general rule being that more luxurious hotels use more water than smaller ones (Gössling, 2001; Bohdanowicz and Martinac, 2007) and resort-style accommodation facilities use more water than simple high-rise mass tourism or campsite facilities (Rico-Amoros *et al.*, 2009).

Fresh water availability is unevenly distributed between countries and within countries. Renewable per capita water resources range from only 10 m³ per year in Kuwait to more than 1.5 million m³ in Alaska, USA in 2000 (FAO, 2010). Within countries there can be divisions into water scarce and water abundant regions, for instance, due to watersheds and different precipitation regimes (Gössling, 2001). While many countries have vast fresh water resources, desalination has taken on major importance in some large industrialised countries, such as the United States, Italy and Spain, as well as in a range of small islands and island states. In some places, particularly islands, tanker ships have started to be used to import fresh water, for example to the Bahamas, Antigua and Barbuda, Mallorca, the Greek Islands, South Korea, Japan, Taiwan, Nauru, Fiji and Tonga (Clarke and King, 2004).

Box

04

GOLF TOURISM AND WATER

Golf is the recreational activity that takes the biggest share of water consumption. Increasing golf tourism is likely to add further to water demand. Rodríguez Díaz *et al.* (2008), for instance, report water consumption of between 2 000 and 17 000 m³ per ha of irrigated golf course area; they also report that the number of golf courses in Spain had reached 289 by 2005 - an increase of 83% since 1997 - and was expected to double again in the next decade. A modern 18-hole golf course in a Mediterranean sand dune system uses 0.5–1.0 million m³ of fresh water per year (van der Meulen and Salman, 1996).

Table 2 shows selected water parameters for OECD member countries and selected non-members. Barbados, Brazil, China, India, Malta and Mauritius are

chosen either as large countries or as small water-dependent islands serving as case studies for a larger range of small island states.

COUNTRY	TOTAL NATURAL RENEWABLE WATER RESOURCES (MILLION m ³ /YEAR)	TOTAL WATER USE IN 2000 (MILLION m ³ /YEAR)	% OF RENEWABLE WATER USED	TOURIST ARRIVALS IN 2000 (THOUSANDS)	AVERAGE LENGTH OF STAY	WATER USE PER TOURIST PER DAY	TOTAL TOURISM-RELATED WATER USE (MILLION m ³)	TOURISM-RELATED WATER USE AS % OF TOTAL	TOURISM-RELATED WATER USE AS % OF DOMESTIC
AUSTRALIA	492 000	23 932	4.9	4 931	26	300	38.5	0.16	1.09
AUSTRIA	77 700	2 112	2.8	17 982	4.6	150	12.4	0.59	1.68
BARBADOS	80	84	104.9	545	10.1	400	2.2	2.61	7.34
BRAZIL	8 233 000	59 298	0.7	5 313	12.1	300	19.3	0.03	0.16
CANADA	2 902 000	45 974	1.6	19 627	5.2	150	15.3	0.03	0.17
CHILE	922 000	12 539	1.4	1 742	10.1	200	3.5	0.03	0.25
CHINA	2 896 569	630 289	21.8	31 229	8.1	200	50.6	0.01	0.12
CZECH REPUBLIC	13 150	2 566	19.5	4 666	3.5	200	3.3	0.13	0.31
DENMARK	6 000	1 267	21.1	2 088	8.1	200	3.4	0.27	0.83
EGYPT	86 800	68 653	79.1	5 116	6.0	400	12.3	0.02	0.23
FINLAND	110 000	2 478	2.3	2 714	5.9	150	2.4	0.10	0.71
FRANCE	203 700	39 959	19.6	77 190	7.5	400	231.6	0.58	3.69
GERMANY	154 000	47 052	30.6	18 983	8.1	200	30.8	0.07	0.53
GREECE	74 250	7 759	10.5	13 096	8.1	400	42.4	0.55	3.34
HUNGARY	104 000	7 641	7.4	2 992	8.1	200	4.9	0.06	0.68
INDIA	1 907 760	645 837	33.9	2 649	31.2	150	12.4	<0.01	0.02
IRELAND	52 000	1 129	2.2	6 737	7.4	150	7.5	0.66	2.88
ISRAEL	1 670	2 041	122.2	2 417	15	300	10.9	0.53	1.73
ITALY	191 300	44 372	23.2	41 181	8.1	400	133.4	0.30	1.65
JAPAN	430 000	88 432	20.6	4 757	8	200	7.6	0.01	0.04
KOREA	69 700	18 590	26.7	5 322	8.1	200	8.6	0.05	0.13
MALTA	51	55	109.6	1 216	8.4	400	4.1	7.34	10.21
MAURITIUS	2210	612	27.7	656	10.4	400	2.7	0.45	1.71
MEXICO	457 222	78 219	17.1	20 641	9.9	300	61.3	0.08	0.45
NETHERLANDS	91 000	7 944	8.7	10 003	2.7	150	4.1	0.05	0.83
NORWAY	382 000	2 185	0.6	4 348	8.1	150	5.3	0.24	1.06
POLAND	61 600	16 201	26.3	17 400	4.8	150	12.5	0.08	0.60
PORTUGAL	77 400	11 263	14.6	12 097	6.7	400	32.4	0.29	3.00
ROMANIA	211 930	76 686	1.7	21 169	6.8	150	1.2	0.01	0.06
RUSSIAN FEDERATION	4 507 250	17 320	721.7	6 296	5.3	150	25.7	0.03	0.18
SPAIN	111 500	35 635	32.0	47 898	12.9	400	247.2	0.69	5.16
SWEDEN	174 000	2 965	1.7	2 746	8.1	150	3.3	0.11	0.31
SWITZERLAND	53 500	2 571	4.8	11 000	8.1	150	13.4	0.52	2.16
TURKEY	231 700	37 519	16.2	9 586	10	400	38.3	0.10	0.69
UNITED KINGDOM	147 000	9 541	6.5	25 209	8.1	200	40.8	0.43	1.97
UNITED STATES	3 069 400	479 293	15.6	50 945	8.1	300	123.8	0.03	0.20

Note: Table based on UNWTO 2001, 2003a; WWF 2001, 2004; www.fao.org/aquastat 2003. Source: updated from Gössling, 2006.

Table
02

**SELECTED WATER
USE PARAMETERS
IN OECD MEMBER
AND SELECTED
NON-MEMBER
COUNTRIES**

As Table 2 shows, countries differ greatly in their renewable water resources, desalination capacity, renewable fresh water, use of treated wastewater, and overall water use. In Barbados and Malta, for example, water use exceeds renewable water resources, while countries that greatly exceed their renewable water resources include Israel (122%), Bahrain (258%), Saudi Arabia (722%) and United Arab Emirates (1 538%). The range of countries already using a substantial share of their renewable water resources is exemplified by Poland (26.3%), Korea (27%), Ukraine (27%), Mauritius (28%), Germany (31%), South Africa (31%), Spain (32%), India (34%), Morocco (44%), Bulgaria (49%) and Tunisia (60%). The table also shows that tourism generally accounts for less than 1% of total water consumption in the countries cited. Malta (7.3%) and Barbados (2.6%) are exceptions, indicating that temperate and tropical islands with high tourist arrival numbers and limited water resources are more likely to face water conflicts. This stands out even more clearly when tourism-related water use is shown in proportion to total domestic water use. While tourism remains a negligible factor in water use in most countries, it might be responsible for up to 16.9% of domestic water use in islands like the Republic of Cyprus⁴ (Gössling, 2006).

By 2020, tourism-related water use is likely to increase with international tourist numbers and higher hotel standards (UNWTO-UNEP-WMO, 2008). The UNWTO Tourism 2020 Vision in its 2004 projection (UNWTO, 2004) forecasts over 1.56 billion international arrivals by the year 2020, the majority of them in three regions – Europe (717 million tourists), East Asia and the Pacific (397 million) and the Americas (282 million). This forecast shows East Asia and the Pacific, South Asia, the Middle East and Africa experiencing growth rates in international arrivals of over 5% per year, compared to the world average of 4.1% per year, while Europe and Americas experience lower than average growth rates. Conversely, water resources will decrease in many countries, both as a result of the overuse of renewable water supplies, and as a consequence of climate change leading

to altered precipitation patterns. Population growth and modernisation processes, on the other hand, are likely to increase per capita water use. The IPCC (2008) summarises expected changes in a special report on climate change and water. Of particular relevance for tourism are the following issues:

a) Observed changes in large-scale hydrological cycles include regionally changing precipitation patterns, changes in precipitation intensity and extremes, reduced snow cover and widespread melting of ice, as well as changes in soil moisture and runoff.

b) Climate model simulations project precipitation increases in the high latitudes and parts of the tropics, and decreases in sub-tropical and lower mid-latitude regions.

c) Annual average river runoff and water availability will increase in high latitudes and some wet tropical areas, and decrease over dry regions at mid-latitudes and in the dry tropics.

d) Increased precipitation intensity and variability are projected to increase the risk of flooding and drought in many areas.

e) Water supplies stored in glaciers and snow cover are projected to decline in the course of the century.

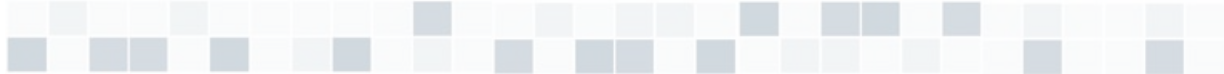
f) Higher water temperatures and changes in extremes, including floods and droughts, are projected to affect water quality and exacerbate many forms of pollution.

g) Changes in water quantity and quality are expected to affect food availability, stability, access and utilisation.

⁴ Footnotes by Turkey and the European Union Member States of the OECD and the European Commission:

Turkey: The information in this document with reference to "Cyprus" relates to the southern part of the Island. There is no single authority representing both Turkish and Greek Cypriot people on the Island. Turkey recognises the Turkish Republic of Northern Cyprus (TRNC). Until a lasting and equitable solution is found within the context of United Nations, Turkey shall preserve its position concerning the "Cyprus issue".

The European Union Member States of the OECD and the European Commission: The Republic of Cyprus is recognised by all members of the United Nations with the exception of Turkey. The information in this document relates to the area under the effective control of the Government of the Republic of Cyprus.



h) Climate change affects the function and operation of existing water infrastructure – including hydropower, structural flood defences, drainage and irrigation systems – as well as water management practices. Current water management practices may not be robust enough to cope with the impacts of climate change.

Many regions and in particular small tropical islands might face relatively high costs in adapting to water scarcity, as they compete more directly with other sectors of the national economy for generally scarcer

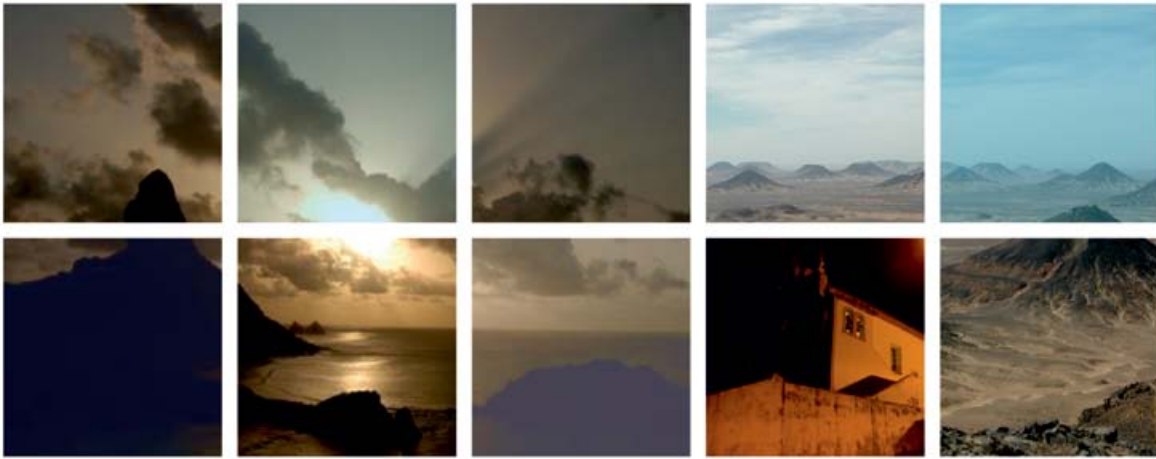
water resources. Impacts will ultimately depend on several factors. These include the relative scarcity of fresh water in tourism areas, and seasonal aspects of availability and demand; the structure of the tourist industry and its development (*e.g.* small guesthouses versus large resort hotels); competition with other economic sectors such as agriculture (Downward and Taylor, 2007); and options to adapt to these changes. Adaptation options may include for example adaptation through technological change – including water saving measures, desalination and grey water use – or the sourcing of water from alternative supplies.

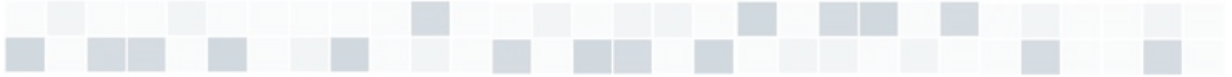
CONCLUSIONS ■ ■ ■

Tourism is as yet only a minor contributor to climate change, although its share may be greater than 10% of global anthropogenic warming if measured as radiative forcing. However, given strong growth trends in tourism, the sector is likely to become one of the major sources of GHG emissions in the near future, particularly if emissions in other sectors decline in line with global climate policy objectives. It will thus be highly relevant to address growth in tourism by implementing policies towards low-carbon holiday experiences and travel, if there is to be a chance of achieving global climate stabilisation objectives, *i.e.* temperature increases not exceeding 2°C.

There is also evidence that tourism will be affected, both directly and indirectly, by climate change. These expected effects include increasing water scarcity in some areas, declining water quality, more intense precipitation events, the loss of water-related tourism assets including glaciers

and snow, increased run-off and potentially foregone opportunities for river and lake-based tourism, impacts on food availability and costs, and impacts on infrastructure. The IPCC (2009) shows that precipitation, soil moisture, runoff and evaporation will change considerably in the future. Many areas will experience a marked decline in precipitation, including some already water scarce or water-sensitive areas, such as the Caribbean basin. Precipitation will increase in other areas, such as the northern parts of the Western Indian Ocean, but this is not necessarily a positive impact, as many islands in this area are dependent on stable weather conditions for their sun-sand-sea products. These developments are indicative of the challenges associated with changing water availability and precipitation patterns, as well as concomitant changes in water quality – notwithstanding the potential for opportunities that may also arise with climate change, such as prolonged tourist seasons in some countries.





Chapter 03

MITIGATION

INTRODUCTION: global climate policy ■ ■ ■

In response to a growing understanding of the consequences of climate change for ecosystems and socio-economic development, a range of conferences have been held since 1992, when the United Nations Conference on Environment and Development (UNCED) took place in Rio de Janeiro. One of the outcomes of UNCED was the United Nations Framework Convention on Climate Change (UNFCCC). This treaty, with the objective of stabilising GHG concentrations in the atmosphere to prevent “dangerous interference with the climate system”, was opened for signature in 1992 and entered into force on 21 March 1994. As of December 2009 it had been ratified by 192 countries. A Conference of the Parties (COP) has been held annually since 1995 to establish a framework for intergovernmental initiatives to deal with the challenges posed by climate change:

The ultimate objective of this Convention and any related legal instruments that the Conference of the Parties may adopt is to achieve, in accordance with the relevant provisions of the Convention, stabilisation of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time-frame sufficient to allow ecosystems to adapt naturally to

climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner (UNFCCC, 2010a).

Global targets for emission reductions are guided by recommendations made by the Intergovernmental Panel on Climate Change (IPCC) as to what would constitute action to prevent “dangerous interference with the climate system”. Burden sharing between countries, *i.e.* the contribution to be made by different countries to global emission reductions, is negotiated under the guiding principle of Common But Differentiated Responsibilities (CBDR). This allows for increases in emissions by developing countries to facilitate economic development, while developed countries reduce emissions more substantially in order to approach a more equitable global distribution of per capita GHG emissions (Figure 3). The UNFCCC is charged with establishing and monitoring national GHG inventories. For most countries these inventories are compared to a base year of 1990 to measure emission reductions as identified in the Kyoto Protocol, the legal framework for emission reductions. Base year emissions are defined as aggregate anthropogenic CO₂-equivalent emissions of the six main greenhouse gases listed in Annex A of the Kyoto Protocol in a historical base year (UNFCCC 1998).

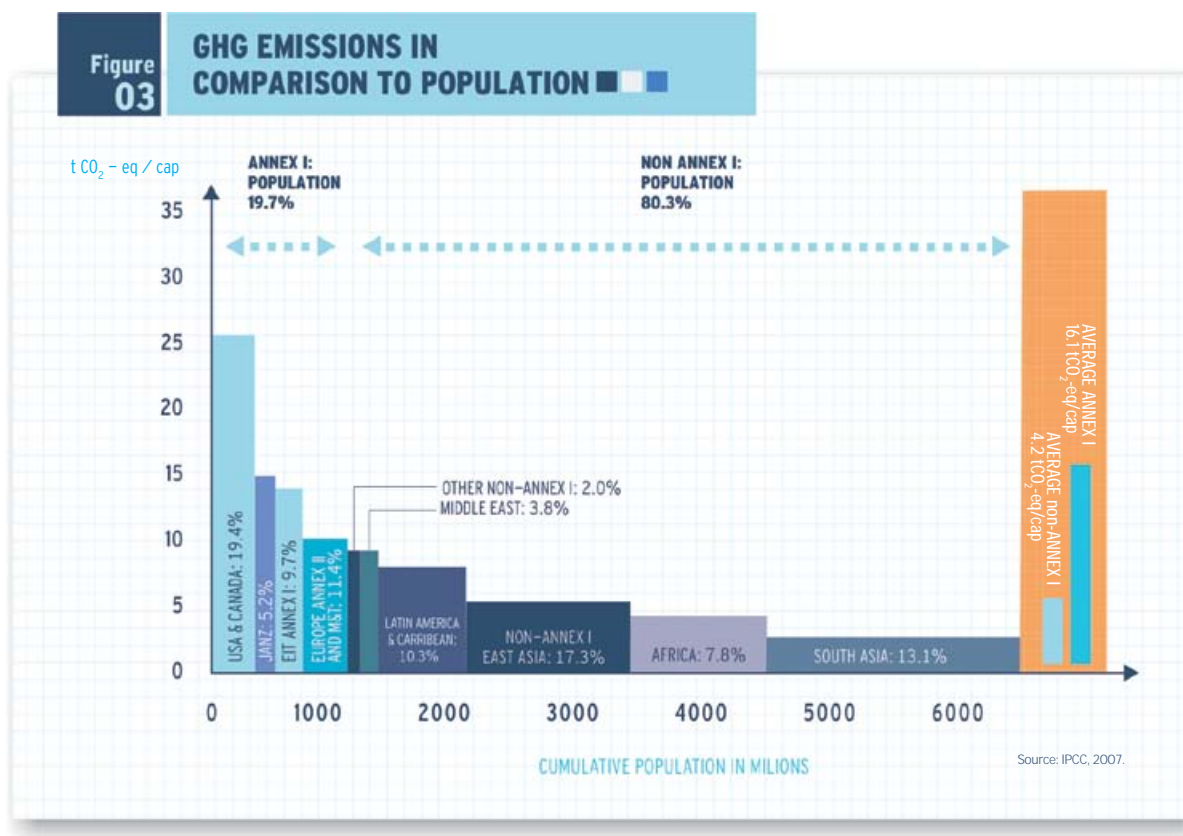


Figure 3 shows that what the UNFCCC defines as Annex I countries (the developed countries and economies in transition) account for about 20% of the world population, and 45.7% of global GHG emissions. The United States and Canada have particularly high per capita emissions, exceeding 25 t CO₂-eq per year. The average per capita emissions of Japan, Australia and New Zealand (JANZ) are 15 t CO₂-eq per year. In the European Union, emissions are in the order of 11 t CO₂-eq per year. The overall average for Annex I countries is 16.1 t CO₂-eq per capita per year, compared to average non-Annex I emissions of 4.2 t CO₂-eq per capita per year. Emissions are lowest in South Asia at about 3 t CO₂-eq per capita per year. It is worth mentioning that the differences in per capita emissions between different individuals within countries may be higher than the differences between countries. This is mostly because of mobility patterns (Chakrawarti *et al.*, 2009): Gössling *et al.* (2009) suggest, for instance, that highly mobile travellers may emit more than 50 t CO₂ per year because of travel alone.

The Kyoto Protocol to the UNFCCC was adopted in 1997 in Kyoto, Japan, at the Third Session of the Conference of the Parties (COP-3) to the UNFCCC, and entered into force on 16 February 2005. The Kyoto Protocol ascribes differentiated responsibilities to countries to reduce GHG emissions, depending on their economic development and emission levels. Its Annex B lists the countries to which the Protocol ascribes legally binding commitments (which include most countries in the OECD as well as countries with economies in transition) and defines those commitments.

For the purpose of monitoring under the UNFCCC, Annex I countries have to submit updated GHG inventories once a year. Those Annex I Parties that are included in Annex B to the Kyoto Protocol have agreed to reduce their anthropogenic GHG emissions including CO₂, CH₄, N₂O, and the F-gases hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride. Currently they have to achieve averaged emissions reductions in the period 2008-2012 amounting to 5% of their 1990 emissions. However, emission cuts will have to go further if warming is not to exceed the 2°C target.

Voluntary Post-Kyoto emission pledges have already been submitted to the UNFCCC by some countries. By 31 January 2010, the UNFCCC had received national pledges – most conditional – to cut and limit GHG from 55 countries accounting for 78% of global emissions from energy use (UNFCCC, 2010c). Emissions from international aviation and cruise ships and other seaborne transport are not attributed to country targets. Responsibility for emission reductions in these sectors are with the International Civil Aviation Organization (ICAO) and the International Maritime Organization (IMO) respectively.

The Copenhagen Accord, noted by Parties at the UNFCCC Climate Conference in Copenhagen in December 2009 and now supported by 139 countries, recognises the scientific view that the increase in global temperature should be below 2°C to achieve the ultimate objective of the UNFCCC, *i.e.* to stabilise greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. The Accord further recognises the need to strengthen the long-term goal, referencing various matters presented by the science, including in relation to temperature rises of 1.5°C. Numerous scientific, political and other groups support setting the more ambitious goals of limiting global warming to 1.5°C, reducing emissions by 45% by 2020 and maintaining GHG concentrations below 350ppm.

Aviation

Civil aviation has grown continuously since the 1960s. The sector is now responsible for emissions of about 700 Mt of CO₂ in 2004, *i.e.* 2.6% of total anthropogenic CO₂ emissions in that year, or 1.3% to 14.0% of radiative forcing (90% likelihood range) (Lee *et al.*, 2009). As outlined by UNWTO-UNEP-WMO (2008), about 80% of this share can be attributed to tourism, the remainder being mainly air freight. Article 2 of the Kyoto Protocol states that the responsibility for limiting and reducing GHG emissions from international aviation in Annex I countries lies with the International Civil Aviation Organization (ICAO), while emissions from domestic flights are included in national greenhouse gas inventories of Annex

B countries and part of national emission reduction targets. Because of continued strong growth, CO₂ emissions from aviation are expected to increase by a factor of between 2.0 and 3.6 above their 2000 levels by 2050 (Owens *et al.*, 2010).

In order to reduce emissions from these sectors, various suggestions have been made. The ICAO annual assembly in 2004 dismissed the idea of itself establishing a global Emission Trading Scheme (ETS) for aviation, but endorsed the inclusion of aviation in existing national and/or regional ETS as a more cost-effective approach than fuel taxes or charges on aviation activity. Three years later, however, the ICAO annual assembly in October 2007 decided against requiring airlines to limit GHG emissions through participation in the European Union ETS. Instead, ICAO created a panel to develop a comprehensive climate change plan for the international aviation industry. Disagreeing with this decision, the 42 countries in the European group of ICAO made a 'reservation' against the resolution, indicating that they may choose to ignore it on legal grounds in that it compromises the EU's capacity to achieve its international GHG emission obligations under the Kyoto Protocol. The 37th ICAO Assembly in October 2010 endorsed the adoption of multilateral collaborative action as a mechanism to effectively address international aviation emissions in a post-2012 framework. It also adopted a commitment to achieve a sector-wide 2% annual improvement in fuel efficiency until the year 2050 (ICAO, 2010). Even if this target is reached, however, absolute emission growth from the sector will continue, given the observed and expected growth rates in passenger traffic of about 4% per year.

For some countries, due to their geographic remoteness and distance from large markets, long haul air travel provides the supporting infrastructure that is critical to their economic growth and connectedness to the rest of the world. Simple policy prescriptions designed to reduce long haul travel can have a disproportionate economic effect on these countries, whereas others may not be so severely affected because they are close to large source markets where substitution

effects are positive. A more complex set of policy responses will be required to achieve climate change objectives.

In addition, the structural composition of different economies, and the relative economic importance that tourism plays in them, will also define the parameters of governments' policy response. Moreover it is acknowledged that there is a complex interrelationship between the growth in tourism and the globalisation of business. In addition to its importance to tourism, long haul capacity provides the infrastructure that supports business and academic/educational travel as well as facilitating freight services.

International Shipping

Emissions from shipping are estimated to have been in the order of 1 046 Mt CO₂ in 2007, which corresponds to 3.3% of global CO₂ emissions in that year (IMO, 2009a). About half of this was from tourism (UNWTO-UNEP-WMO, 2008; WEF, 2009). The International Maritime Organization (IMO, 2009a, 2009b) anticipates that, in the absence of mitigation policies, emissions from shipping will grow by 1.9%-2.7% per year until 2050, resulting in overall growth of 150%-250% in the period 2007-2050.

As reported by Eijgelaar *et al.* (2010), tourism is an important component in this growth. Worldwide cruise demand has grown steadily at an average annual rate of 7.4% since 1990 (CLIA, 2009), and emission growth from this sector has consequently been faster than from shipping more generally. However, it is still only responsible for a minor share of shipping's contribution to overall global emissions of CO₂. For 2007, IMO estimates the global fuel use of all passenger ferries and cruise ships at 31.3 Mt, corresponding to 96 Mt CO₂ (IMO, 2009). Nevertheless, it should be noted that cruise ships carried only 16 million passengers in that year (Intel, 2008), making cruise tourism the most energy intense form of tourism on a per tourist trip basis. As with aviation, efforts to reduce absolute CO₂ emission levels from international shipping have been unsuccessful (Hautes, 2009). As of July 2010 the IMO had not adopted either binding targets or measures to reduce emissions.

European Union

The European Union (EU) is the only region in the world to set itself a legally binding target for emission reductions. Its current legislation, which imposes obligations on the largest polluters, foresees the reduction of GHG emissions by 2020 to 20% below the base year 1990, but ministers in France, Germany and the UK recently called for the adoption of a 30% reduction target (OECD, 2010a). There are ongoing discussions on the control of emissions from consumption not currently covered by the EU ETS, which are likely to lead to the introduction of significant carbon taxes in the EU in the near future (Euractiv, 2009). Moreover, the cap on emissions within the EU ETS will be tightened year-on-year. In the medium-term future (*i.e.* in the next 5-10 years) the consumption of energy-intensive products and services, including tourism, can be expected to become appreciably more expensive.

Partly in response to the slow progress in addressing emissions from aviation at the global level, a regional mitigation policy response for aviation has emerged in the EU. In November 2007 the EU parliament voted to include emissions from both domestic and international flights in the EU's ETS. As subsequently modified, the EU plans now include shipping and aviation in an open ETS (European Parliament and Council, 2009). The current proposals are:

- Aviation will be included in the EU ETS from 2012.
- Emissions from aviation in 2012 will be capped at 97% of their average 2004-2006 levels. This cap will decline to 95% from 2013 onwards, although this percentage may be reviewed as part of the general review of the Emissions Trading Directive.
- Airlines will receive 85% of their emission allowances for free in 2012. This percentage may be reduced from 2013 as part of the general review of the Emissions Trading Directive.
- An exemption has been introduced for commercial air operators with very low traffic levels on routes to, from or within the EU, or with annual emissions of less than

10 000 tonnes CO₂. Many operators from developing countries with only limited air traffic links with the EU will thus be exempt –but this rule is not expected to have a significant effect on the overall volume of emissions that are covered by the EU ETS.

- A special reserve of free allowances has been added for new entrants or very fast-growing airlines. The reserve does not increase the overall cap on allowances, and therefore does not affect the environmental impact of the system. Airlines that are growing will be able to benefit from the reserve up to a limit of one million allowances (one allowance = one tonne CO₂).

- Consistent and robust enforcement throughout the EU is to be ensured. As a last resort, member states could ask for an operator to be banned from operating in the EU if it persistently fails to comply with the system and other enforcement measures have proven ineffective.

The EU aviation policy will apply to all flights originating from or ending in the EU's current 27 member states (EU 27), irrespective of the country of origin of airlines and/or aircraft. The distribution of free allowances will follow the principle of grandfathering, *i.e.* it will be based on the airlines' historical emissions, with the remaining 15% sold at auction. While the EU approach is the only regional policy response worldwide, it is not likely to change tourism flows significantly or to reduce absolute emissions from the aviation sector (Mayor and Tol, 2009; Gössling *et al.*, 2008; Scott *et al.*, 2010).

Tourism in more general terms is the subject of a recently presented new EU tourism policy framework document. This concentrates on four main strategic objectives: i) improving the competitiveness of the tourism sector in Europe; ii) promoting its continuous sustainable development; iii) enhancing Europe's image as home to sustainable and high quality destinations; and iv) maximising the potential of EU policies and financial instruments for the development of European tourism (CEC, 2010). As regards sustainable tourism development, it refers to the use of "sustainable management indicators" to promote development that

respects “environmental, social and economic criteria”. It also refers to awareness campaigns for tourists, awards, cooperation with other countries outside the EU, and the identification and wider communication of best practice. The document mentions climate change only

once, in connection with facilitating “a better identification of the risks linked to climate change by the European tourism industry in order to avoid unsuccessful investments and to explore opportunities to develop alternative tourist offers”.

NATIONAL TOURISM-RELATED CLIMATE POLICY ■ ■ ■

The OECD and UNEP Secretariats have conducted a survey in order to understand the extent to which countries are well prepared to deal with the climate change challenge for tourism. The survey, “Climate Change and Tourism”, was sent to all OECD member countries and selected non-members. As of January 2011, the Secretariat had received replies from the following 18 countries: Australia, Austria, Egypt, Estonia, Germany, Greece, Hungary, Ireland, Israel, Japan, Mexico, Netherlands, New Zealand, Poland, Portugal, Slovak Republic, Slovenia and South Africa. Results relating to mitigation are presented in the following pages. Where feasible, or for some countries where no survey results are available, these findings are supplemented with a review of governmental or non-governmental reports.

Anguilla

Anguilla identifies its dependence on fossil fuels as a threat to its economy. Wind and solar power are to be developed to reduce the island’s dependence on fossil fuels in the short term and to achieve energy independence in the long term (government of Anguilla, 2008). Anguilla identifies a growing number of vehicles and imports of consumer goods, as well as the production of fresh water, as key issues in energy management. Overall, the government seeks to promote Anguilla as a “worldwide leader in environmental responsibility, to the benefit of local pride and competitiveness in the tourist industry, and as a model of these values among other island communities and beyond” (government of Anguilla, 2008: 6).

The most important aspects of Anguilla’s National Energy Policy include: i) reducing the island’s dependence on fossil fuels for power generation and transportation; ii) using locally available renewable resources such as wind

and solar power; iii) developing technological education and expertise in the renewable power generation sectors in Anguilla to create a local skill base; iv) promoting “aggressive” energy efficiency measures amongst government, civil society and the private sector; v) making a transition from primarily diesel-based to renewably-based power generation; vi) developing a legislative framework for customer-generated renewable power; and vii) shifting fiscal incentives in the transport sector from fossil fuel powered vehicles to those that are powered by hybrid, electric and hydrogen technologies.

The government underlines its belief that its energy policy will help the island gain promotional advantage, and thus be beneficial for tourism. Various policy recommendations are made in the National Tourism Policy document to implement the government’s vision in the various sectors. Aviation is however not mentioned in the document (government of Anguilla, 2008).

Australia

The government of Australia (2008), through its Department of Resources, Energy and Tourism, presented a tourism and climate framework for action in 2008. The framework states that short and medium-term actions are required to position the tourism industry to adjust to a carbon-constrained future, including reducing emissions to minimise increasing costs associated with the introduction of a carbon price. To this end, the Sustainable Tourism Co-operative Research Centre (STCRC, 2009) has assessed the national carbon footprint associated with tourism. The introduction of an ETS, anticipated by the government of Australia (2008) for 2010, was postponed in April 2010. In September 2010 the Australian Prime

Minister, the Hon. Julia Gillard MP, announced the membership of a Multi-Party Climate Change Committee which will explore options for the introduction of a carbon price. On 24 February 2011, the Prime Minister outlined a proposed framework for implementing a carbon price mechanism in Australia. This two stage plan will start with a fixed price emissions trading scheme for three to five years before transitioning to a fully flexible cap-and-trade emissions trading scheme. The government proposes that the carbon price commence on 1 July 2012, subject to the government's ability to negotiate agreement with a majority in both houses of Parliament and pass legislation in 2011. Two roundtables and a series of targeted working groups have also been established to engage the business community, environment and non-government organisations on climate change policies.

Survey results: The Department of Climate Change and Energy Efficiency reports that several mitigation policies and programs are in place which may have significant or direct relevance to businesses within the tourism sector. These include: i) the mandatory disclosure of the energy efficiency rating of commercial buildings from November 2010, a programme under which anyone selling or leasing office space greater than 2 000 m² must obtain and disclose an energy efficiency rating. Larger hotels and tourism retailers may be affected by phase two of the programme, which involves consideration of expanding this disclosure to other commercial building types; ii) renewable energy policies to encourage the take-up of renewable energy, including the Renewable Energy Target (RET) Scheme, implemented by the Australian government in August 2009 and designed to ensure that 20% of Australia's electricity supply will come from renewable sources by 2020. Since 1 January 2011 the RET scheme has been operating as two parts, the Small-scale Renewable Energy Scheme (SRES) and the Large-scale Renewable Energy Target (LRET). The SRES has been designed to assist households, small tourism business and community groups with the installation of eligible renewable energy systems. The SRES will work in conjunction with the existing Solar Credits mechanism, which boosts support for small generation units such as solar panels;

and iii) the Australian government established the Australian Carbon Trust to manage two initiatives, the Energy Efficiency Trust and the Carbon Neutral Program. The former "will demonstrate innovative approaches to energy efficiency investment by business with the aim of showcasing and mainstreaming these approaches across the private sector including the tourism sector". The voluntary Carbon Neutral Program certifies products or business operations as carbon neutral, based on the National Carbon Offset Standard. For carbon neutral products, a trademark has been developed (www.climatechange.gov.au).

More ambitious goals are set by the state government of Victoria. Its Climate Change White Paper outlines that it intends to cut CO₂ emissions by 20% by 2020 and will introduce a bill to provide for this. Furthermore, 5% of Victoria's electricity will come from solar energy by 2020. Mitigation initiatives and programmes by the Victorian government are listed in Annex B of this document.

Austria

The Austrian Lebensministerium, the Federal Ministry of Agriculture, Forestry, Environment and Water Management, presented a strategy in March 2007 to achieve its emission reduction target for 2008-2012. The document outlines the need to develop sustainable mobility in tourism. Several of the strategies suggested in the document are relevant for tourism, particularly with regard to transport, where measures include: i) "enforcement of environmentally friendly and more efficient mobility technologies"; ii) "enforcement of biofuels"; iii) "mobility management - advice and support programs"; iv) "a 'save fuel' campaign aimed at consumers"; v) "awareness-raising"; vi) "enforcement of bicycle and pedestrian traffic"; vii) "changes in legal frameworks to address climate goals"; viii) "the introduction of more efficient cars and/or trucks and use of IT in traffic"; ix) "improvements in freight traffic"; x) "improvement of the attractiveness of public transport"; xi) "economic measures"; xii) "the adjustment of regional and spatial planning"; and xiii) "air traffic". The national adaptation strategy document

(Policy Paper, Draft, Lebensministerium 2010, <http://klimaanpassung.lebensministerium.at/>), which also contains recommendations for adaptation (and mitigation) in the tourism sector, lists various measures. These include giving priority to action on incentives for climate-friendly projects, “soft mobile tourism”, reducing energy demand and promoting “climate-friendly” heating systems, as well as general energy efficiency measures. It focuses especially on integrating climate impacts and sustainable adaptation into the relevant tourism strategies.

Survey results: Projects focusing on “soft mobility” in tourism were initiated as early as the 1990s in Austria, with the participation of three federal ministries (Economy, Family and Youth; Agriculture, Forestry, Environment and Water Management; and Transport, Innovation and Technology), the nine states, model communities and implementation partners in transport and tourism. Information on pilot projects is available from the websites: www.alpsmobility.net, www.xeismobil.at and www.eco-travel.at. These initiatives also led to the implementation of two important EU INTERREG-projects (2000-2006):

- Alps Mobility II, developing and implementing the transnational product Alpine Pearls (www.alpine-pearls.com) to designate vacations based on soft mobility in more than 20 unique Alpine destinations in Europe (Austria, Germany, France, Italy, Slovenia and Switzerland). In Austria these include the villages of Werfenweng, Neukirchen, Hinterstoder and Mallnitz.
- Alpine Awareness (www.alpineawareness.net), promoting environmentally friendly travel, essentially based on public transport, but also on travel by bicycle and on foot.

Both projects achieved considerable innovation. Mobility service centres with a focus on tourism transport were introduced, new public transport connections for tourism were established, and there was a continuous increase in public transport in both winter and summer in the participating destinations. For further activities in Austria see Annex B.

Canada

Provincial governments in British Columbia and Quebec have proposed implementation of a carbon tax, which would also become relevant for tourism (Simpson *et al.*, 2008). In early 2008 the National Round Table on the Environment and Economy (2008) provided a detailed report to the federal government recommending that a carbon tax or a cap-and-trade system, or a combination of the two, should be introduced as soon as possible. The proposed carbon tax was to include all sectors of the Canadian economy, including domestic aviation. The round table is an advisory body made up of business, government and non-government members, representing the interests of a wide range of stakeholders who would be potentially affected by a carbon tax. The government of Canada had specifically asked it to provide advice on a federal strategy on GHG reduction.

Chile

The 2010-2015 Plan of Chile's General Directorate for Civil Aviation aims to minimise GHG emissions and noise from air transport, including airport activity management. Measures adopted in this regard include: air quality control at airport locations; airport ISO certifications; the application of technical requirements for navigation performance on several routes; the implementation of the “Committee of the Minute” for fuel saving (with the aim of reducing aircraft flight time through better routes and enhanced air traffic control); and improvements in the design of national air space, resulting in the better use of the Global Navigation Satellite System. These initiatives, combined with the modernisation of the main national carrier's fleet, resulted in IATA presenting the Eagle Awards 2008 to the General Directorate for Civil Aviation for excellence in air navigation services.

Egypt

Survey results: The “Green Sharm Initiative” launched by the Ministry of Tourism is designed to position Egypt as a global

pioneer in the holistic greening of tourist destinations. The main rationale behind Green Sharm is to make this destination environmentally sustainable and to capitalise on ecotourism trends. The initiative focuses mainly on golf, diving tourism and safari (squad) tourism. It aims to reduce emissions, but also to address coastal erosion and the degradation of coral reefs (diving). An analysis of emissions in Sharm revealed that 44% arise locally. Sharm's energy supply is entirely based on fossil fuels. Transport emissions per passenger km in Sharm are above benchmark levels, mainly because of taxis and local dive boats. Emissions related to hotel energy consumption are also high relative to benchmarks, and rising per guest night. Water desalination in Sharm is energy intensive, while water wastage and water consumption per guest night are relatively high. Waste management practices in Sharm are "significantly below acceptable standards", according to the Ministry of Tourism, leading to negative tourist perceptions. In particular, the current rate of environmental degradation in Sharm risks the loss of 16%-35% of tourism revenue in 10 years.

The Ministry of Tourism has identified seven key targets in Sharm under the umbrella of the Realistic Green programme, as well as the reduction of GHG emissions in the period 2015-2020. These key targets are:

- reduce destination-related emissions by 36% compared to business as usual
- reduce hotel energy consumption per guest night by 13%
- reduce water consumption per guest night for existing hotels by 13%, and for new hotels by 28%
- reduce water wastage in the supply network by 75%
- achieve level three in solid waste management best practice (where level five is the highest standard)
- achieve level two in sewage treatment best practice (where level three is the highest standard)
- reduce the rate of degradation of coral

reefs to 5% per year

With regard to threats, the Ministry of Tourism is aware of financial constraints on retrofitting and restructuring, as well as the limited technical potential to reduce emissions from aviation. There is support for change from civil society, as well as from non-governmental organisations (NGOs) and international organisations. Ecotourism is seen as a future model for tourism development, and there are options for local and international fund raising.

Estonia

Estonia joined the Kyoto Protocol in 1998 and has reduced CO₂ emissions by 47.5% compared to the reference year of 1990. It is implementing the EU integrated energy and climate change policy, and has targets of increasing the share of renewable energy in the overall energy mix to 25% by year 2020 and increasing the share of biofuels in the transport sector by 10%. In 2007 the government established minimum energy efficiency requirements in relation to all new buildings and those that are reconstructed pursuant to the Building Act. In addition, Estonia's aviation is to be included in the EU emission trading scheme.

The overall goal of the Estonian National Tourism Development Plan 2007-2013 is to ensure the competitive and sustainable development of the Estonian tourism sector. In promoting sustainable tourism, Estonia is raising awareness in the tourism sector through various initiatives including the European Tourist Destinations of Excellence (EDEN) scheme, seminars on tourism in protected areas, training programmes on nature tourism and ecotourism, and conferences such as Development Opportunities of Responsible Tourism in Estonia in 2008 and the Green Tourism Forum in 2009. Estonia does not see the development of the tourism sector as directly threatened by mitigation policies; on the contrary, application of the principles of sustainable development increases the sector's long-term competitiveness.

France

In May 2007 the French president decided that society as a whole should decide how to address climate change. An Environment Round Table was initiated, encompassing the relevant sectors such as energy, transport, building and agriculture, and large-scale consultations generated 11 000 contributions, which were discussed during the four Round Tables held in October 2007. This resulted in 268 commitments, all of which were endorsed by the president. Subsequently, 34 operational committees were set up to propose concrete action to implement these commitments. Most committees completed their work by May 2008, opening the way to legislative proposals in Parliament (Commissariat Général au Développement Durable, 2009).

An important aspect of the Environment Round Table was the assessment of costs in an *ex ante* approach. Results indicated that while substantial financial resources would be required to meet the ambitious objectives of the Round Table Acts, these would also serve as drivers for greener growth, creating up to 600 000 jobs in the period 2009-2020. Overall, the *ex ante* assessments showed that the returns to be expected over the long term would be higher than the costs, "confirming the idea that it is worthwhile for society to invest in ambitious environmental policies" (Commissariat Général au Développement Durable, 2009:33).

Moreover, the tax system was restructured to achieve environmental objectives. Around 40 tax measures, covering all the Environment Round Table action programmes, were adopted within the framework of the 2009 Budget Act No. 2008-1425 of 27 December 2008 and the 2008 Budget Amendment Act No. 2008-1443 of 30 December 2008. Of these measures, seven related to buildings, five to renewable energy, six to transport, six to waste, seven to agriculture, two to risk prevention, four to biodiversity and five to other issues (Commissariat Général au Développement Durable, 2009).

Tax measures focused on providing incentives for pro-environmental behaviour by creating new subsidies, such as the extension of the assessment basis for the sustainable development tax credit, zero interest rate eco-loans, or tax exemptions for private individuals who install photovoltaic solar panels. Conversely, the polluter pays principle was applied to resource-intense activities, including an eco-tax on heavy goods vehicles, the bonus-malus scheme for new cars, or the introduction of a general tax on polluting activities aimed at incineration and landfill (Commissariat Général au Développement Durable, 2009).

Further measures are being examined, such as the introduction of a carbon tax (the CCE or *Contribution Climat Énergie*) on energy from fossil fuels, which aims to encourage household consumption and company procurement of low-carbon products, and to provide incentives for energy savings. The carbon tax will be introduced progressively, starting at EUR 17 per tonne of CO₂ in line with the average value of a tonne of CO₂ on the French emissions quotas market since it was set up, and rising to EUR 100 per tonne of CO₂ by 2030 (Commissariat Général au Développement Durable, 2009).

Germany

Survey results: The mitigation policies adopted and implemented by the federal government of Germany are outlined in the National Inventory Report for the German Greenhouse Gas Inventory 1990-2008 (Umweltbundesamt, 2010). In 2007 the government adopted an ambitious energy and climate programme with 29 key elements. Most of these elements are relevant to tourism, particularly measures with regard to energy efficiency and renewable energy. More recently, in September 2010, the government announced a three-tiered departure tax for aviation, with effect from 1 January 2011 (Box 5). Table 3 summarises the main policy strategies identified by the German government.

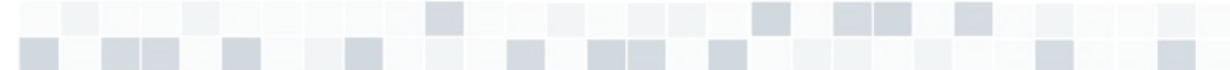


Table 03

POLICY STRATEGIES IDENTIFIED BY THE GERMAN GOVERNMENT

TITLE OF MEASURE	CO ₂ SAVING BY 2020 IN Mt
MODERNISING FOSSIL POWER PLANTS	-15
Emissions trading	
ELECTRICITY FROM RENEWABLE ENERGIES	-54.4
Amendment to the Renewable Energy Sources Act, support concept on repowering onshore wind power, Power Grid Development Act, designation of priority areas for offshore wind power, feed-in regulation for biogas	
COMBINED HEAT AND POWER	-14.3
Combined Heat and Power Act, promoting CHP in the Renewable Energy Sources Act	
MODERNISATION OF BUILDINGS AND HEATING SYSTEMS	-31
Building modernisation programme, amendment to the Energy Saving Ordinance, amendment to the Heating Costs Ordinance, facilitating contracting, energy-efficient modernisation of social infrastructure, programme for the energy-efficient modernisation of federal buildings.	
HEAT FROM RENEWABLE ENERGIES	-9.2
Renewable Energies Heat Act, market incentive programme for heat from renewable energies in existing buildings.	
SAVINGS IN ELECTRICITY	-25.5
"Top Runner" approach to implementing the Eco-Design Directive, support programme for climate protection and energy efficiency, energy consumption labelling of appliances, replacement of night-storage heaters, smart metering for electricity consumption, guidelines for public procurement for energy-efficient products and services.	
TRANSPORT	-33.6
CO ₂ strategy for passenger cars, expansion of bio fuels, CO ₂ based vehicle tax, energy labelling for passenger cars, reinforcing the influence of the HGV toll, including aviation in emission trading, measures in the field of shipping, expansion of electric mobility.	
OTHER GREENHOUSE GASES (METHANE, N₂O, F-GASES)	-36.4
Chemicals Climate Protection Ordinance, ending the storage of untreated wastes, decline in emissions from mining.	
TOTAL	-219.4
Percentage change compared with base year.	-36.6

Source: BMU, 2007.



In September 2010, the German Federal government announced a departure tax for aviation, to take effect from 1 January 2011. The tax is expected to yield EUR 1 billion annually, and is meant to function as a substitute for the lack of taxation on kerosene in Europe and internationally. The tax only includes commercial passenger travel.

The tax is structured in three tiers. For flights up to 2 500 km from Frankfurt/main airport it is levied at EUR 8 per passenger per flight; for flights of between 2 500 km and 6 000 km it is EUR 25 per passenger per flight; and for flights greater than 6 000 km it is EUR 45 per passenger per flight. The tax applies to all flights departing from German airports. Since it is designed primarily as a government revenue-raising measure, the significance of the tax for mitigating climate change is considered secondary; it unclear whether it will actually affect travel behaviour and lead to significant emission reductions.

Source : Bundesregierung, 2010.

A climate initiative was launched in 2008 which has relevance for tourism through its wetland and rainforest conservation projects (www.bmu-klimaschutzinitiative.de/en/home). This initiative is also seen as an avenue to provide financing. The auctioning of certified emission reductions to German industry generates new and additional funding. The most specific campaign to reduce emissions in tourism was the 2006 energy efficiency campaign in German hotels and restaurants with nearly 5 000 participants (www.energiekampagne-gastgewerbe.de). Mitigation efforts are seen by the government as an opportunity to develop sustainable tourism and as a chance for the sector to win competitive advantages compared to other destinations.

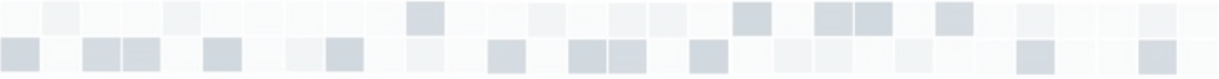
Greece

Survey results: Greece acknowledges the need to reduce emissions from shipping and other transport. As regards international shipping, Greece suggests that a global regulative approach under the International Maritime Organization would be much more effective in reducing CO₂ emissions from shipping than any regional scheme, or any scheme excluding developing countries or countries which choose not to participate. Greece sees technology as having an important role to play in reducing emissions

from shipping; it has reserved its position on market-based proposals including an ETS for shipping, pending the resolution of issues concerning the allocation of initial emission allowances (free or auctioned/sold) and distortion of competition. Finally, Greece supports the Danish proposal for the establishment of an International GHG Fund, with the IMO managing the revenue gathered through such a scheme for distribution to developing countries for mitigation, adaptation, transfer of technology or other purposes related to the reduction of global warming worldwide.

With regard to other transport, measures and actions taken by the Greek government include:

- Measures aimed at developing and modernising rail transport. The main thrust of this policy is to establish an infrastructure network based on environmentally friendly transport methods. Rail connections between the country's main ports are a particular focus, to develop integrated transport that maximises the use of the national railway system.
- Measures to raise standards for passenger cars, motorcycles and scooters. To obtain authorisation for use on Greek roads, such vehicles must meet EU emission standards (*i.e.* acceptable limits



for exhaust emissions of new vehicles sold in EU member states), defined in a series of EU directives progressively introducing increasingly stringent standards. A number of environmental protection standards are also incorporated in tourism legislation governing Greek companies hiring out cars and motorcycles to tourists.

-Measures which aim at renewing the motor vehicle fleet in different categories, either via incentives to motor vehicle owners or via obligations which motor vehicle owners are required to meet. Financial incentives were provided up to 31 December 2009 for the replacement of two-wheel vehicles with models using new technology, under Law 3245/2004 on motorcycles (registered not later than 1994) and Law 3333/2005 for scooters (registered not later than 1996). Other measures aimed at renewing the fleet of public passenger cars. Incentives were also provided in the past by the Greek government to promote the renewal of the fleet of public transport buses, aiming at the replacement and modernization of old vehicles.

-Actions focusing on behavioural change.

Also relevant in the context of mitigation are various laws that contribute to the protection of the environment. The Special Land Planning Framework for Tourism (Government Gazette 1138/B/2009), currently in force, provides for restrictions concerning the protection of the environment. For instance, article 6 paragraph E1, referring to tourist sports and especially to golf, imposes various measures regarding the protection of the environment and particularly water resources from the danger of overuse and pollution. Ski tourism too raises the need for measures to protect the environment, particularly on issues concerning improving accessibility and limiting the repercussions on the special characteristics of the areas concerned. A new Special Land Planning Framework expected at the end of 2010 will include more restrictions. Draft legislation regarding forestry maps, recently submitted to the Greek parliament, is expected to help protect forests from arson and to tighten restrictions on building without

legal permission.

Investments in the tourism sector that have an ecological orientation can be partly subsidised under the EU "Green Tourism" initiative (under the Operational Programme "Competitiveness" of the 4th Community Support Framework). According to its recently published guidelines, tourism enterprises can make applications under this programme if they want to install eco-friendly equipment, use alternative sources of energy for their everyday operations, or pursue other environmental protection goals. The same guidelines will govern the new (as yet unpublished) Investment Incentives Law. Soon to be considered by parliament, this legislation has "Green Entrepreneurship" as one of its three main pillars. It thereby highlights the importance placed by the Greek government on this concept, with its key components of protecting the environment, reducing energy consumption, exploiting alternative forms of energy, producing new environmentally friendly products and using environmentally friendly methods of production.

The Greek government lays particular emphasis on education and training for all stakeholders involved in tourism, through the organisation of seminars on sustainable development, which will allow them to develop a culture of environmental responsibility. Last but not least, there are several awards and certificates relating to environmental protection initiatives, both national and international, such as the Green Key, Nordic Swan, Green Leaf, EU Flower etc.. These are awarded to tourism enterprises (accommodation providers, basically) that apply environmental policies in terms not only of water consumption, washing and cleaning, waste disposal and energy use, but also regarding the involvement of staff and management in raising environmental awareness in local society. Businesses appear to show continuing interest in obtaining such qualifications, especially since they seem to be a factor that consumers take into consideration when making informed decisions about where to spend their holidays.

The implementation of green policies is



seen as a potential way of gaining recognition from consumers, national institutions, international organisations or other states. Building an image related to environmental protection can be the source of broad awareness and positive comment, not only for Greek tourism companies but also for Greece as a country actively supporting sustainable development. Furthermore, companies involved in green initiatives are seen to gain in terms of competitiveness, while the anticipated financial benefits will help to boost the local economy and employment. The country's natural resources stand to benefit greatly, of course, which is a significant factor as they seem to be rather scarce in specific sectors. Leading healthier lives will also mean a rise in the life expectancy indicator, and thus a reduction in the cost of health care for the state.

On the other hand, adopting an eco-friendly strategy can mean cost increases for the enterprises involved, potentially leading to price increases for the end consumer. There is also no guarantee, since technology is changing at a remarkably fast pace nowadays, that new technological breakthroughs in a few years' time will not supersede today's solutions. Moreover, certificates and labels like the Green Key, awarded to tourism enterprises that assert for instance that they use of organic food/beverages and green household products (*e.g.* detergents), must rely on the respondent's honesty. It is always, therefore, a point to consider whether the people in charge are in fact replying truthfully. Lastly, it is possible that small and medium-sized enterprises may not be able to cope with the costs incurred by becoming more eco-friendly, despite governmental subsidies, which could mean that it is the large enterprises who reap the above-mentioned benefits while the smaller ones struggle to survive.

Hungary

Survey results: The Ministry for the National Economy states that mitigation-related measures may result in increases in transport costs and a need for additional

investment by establishments that provide accommodation. Environmentally conscious transport companies may profit from mitigation, and in more general terms the providers of eco-labelled services may expect a growth in demand. No specific policies for tourism-related mitigation appear to be in place or planned.

Ireland

Fáilte Ireland, the National Tourism Development Authority, presented a strategy in 2008 to deal with climate change, focusing on seven key measures:

- assess the impact of climate change on the tourism industry
- assess the impact on tourism of any measures proposed to tackle climate change
- contribute to the government's Change campaign
- measure and reduce the carbon footprint of the tourism industry
- communicate the challenges to the industry and raise awareness
- offer our visitors a low-emissions choice
- manage Fáilte Ireland's own emissions

In its 2007-2009 environmental action plan, Fáilte Ireland mentions the need to deal with growing energy use and emissions of greenhouse gases. No specific plan is presented of how to reduce emissions, but meeting international commitments as well as exploring the potential of voluntary carbon offsets are mentioned. More comprehensive information is provided in the National Climate Change Strategy 2007-2012, where all emission sectors are considered in detail. With regard to transport, the National Climate Change Strategy (2007) lists "modal shift to public transport as a result of Transport 21 investment; rebalancing of Vehicle Registration Tax (VRT) and motor tax, supported by mandatory labelling; introduction of biofuels obligation scheme in 2009; CIE (*Coras Iompair Éireann*, main authority for the provision of public transport) to be required to move to biodiesel

blend; national efficient driving awareness campaign; Sustainable Transport Action Plan; and support for inclusion of aviation in EU Emissions Trading Scheme”.

Various environmental guidelines are available from the Fáilte Ireland website. The *Carbon Tax on Businesses* document (Fáilte Ireland, 2010) gives information about expected cost increases because of taxes on carbon emissions. The carbon tax at EUR 15 per tonne came into effect on 10 December 2009 in respect of petrol and auto diesel, and from 1 May 2010 has also been applied to kerosene, marked gas oil (*i.e.* ‘green diesel’ or ‘agricultural diesel’), liquefied petroleum gas (LPG), fuel oil and natural gas. The application of the tax to coal and commercial peat is subject to a Commencement Order. The carbon tax does not apply to electricity, as the cost of carbon is already built in to the price. The document also informs businesses on options to reduce energy use, pointing to relevant documents from the Environmental Protection Agency (www.greenbusiness.ie) and the Sustainable Energy Authority of Ireland (www.seai.ie). Businesses are also encouraged to contact the Environment Unit of Fáilte Ireland for further advice and support.

Survey results: Fáilte Ireland (2008) published *Facing the Challenges of Climate Change – Fáilte Ireland’s Carbon Strategy*, a tourism-specific document to help business to reduce emissions. With regard to transport policies, the government’s 2009 policy document *Smarter Travel: A sustainable transport future* sets out how the vision of a sustainable travel and transport system can be achieved through actions by relevant government departments and agencies, facilitated by the Department of Transport. It recommends actions such as fostering a “cycling culture” and a “walking culture” which, Fáilte Ireland believes will also enhance the tourism offer.

Ireland has an emissions-related Vehicle Registration Tax (VRT) and an Annual Motor Tax entirely based on CO₂ emissions, with rates varying considerably between models.

The new model for both the VRT and Annual Motor Tax is aimed at encouraging a switch to “greener”, more environmentally friendly vehicles and discouraging the purchase of vehicles with high emissions. From 1 July 2008, the rate of VRT (purchase tax) for all new and used cars registered in Ireland is calculated on the basis of the CO₂ emissions of the vehicle. From the same date, the Annual Motor Tax for all newly registered cars in Ireland is based on CO₂ emissions instead of engine size.

Government incentives include investments in energy saving technology, as approved by the Ministry for Communications, Energy and Natural Resources, which extended its budget in 2010 to include catering and hospitality equipment. Also relevant for tourism businesses is the Energy Efficiency Retrofit Fund for the public and business sector, which supports energy efficiency investments in upgrading existing buildings and facilities. Fáilte Ireland supports the establishment of environmental standards for the various sectors of the tourism industry and publishes an annual guide containing advice regarding auditing, training and accreditation to reduce consumption of energy and water. “In recent years,” it states, “individual businesses have also found that improving their environmental performance can result in a reduction in operating costs.”

Japan

Survey results: No specific mitigation policies exist for the tourism sector in Japan. Action to reduce GHG emissions is taken in line with overall government policy, the most relevant policy for tourism being the Law Concerning the Promotion of Measures to Cope with Global Warming (government of Japan, 1998).

Mexico

Survey results: According to the Secretaría de Turismo, GHG emissions in the tourism

sector arise from different transport modes associated with tourism activities, final consumption of electricity, the fuel demand of hotels and other facilities, and services such as water supply or drainage, which also require electricity for pumping and treatment. The contribution of the tourism sector to total national emissions is considered minor, but should not be underestimated due to its growth trends and the potential for reducing consumption through efficiency or technology supply conversion to renewable energy sources. Given the increasing risk of heat waves, energy demand and water consumption are expected to increase. The overarching objective is nevertheless to reduce energy and water demand in tourism. In order to achieve this, a programme of certification and best practice will be developed. Two studies of GHG emissions in the tourism sector and the potential to participate in carbon markets will be carried out, and strategies to increase the use of renewable energy in accommodation will be developed. Moreover, a Working Group with the National Commission for the Efficient Use of Energy has been established to encourage the reduction of energy demand in the tourism sector. Lastly, an information and awareness campaign has been designed, "Mexican Tourism Facing the Challenge of Climate Change".

Overall, the development of low-carbon practices is seen as an opportunity to

develop green, environmentally friendly tourism, and to market and promote tourism. Potential barriers to implementation are seen in the resistance of the private sector to invest in energy efficiency and to accept the decarbonisation of the economy as an attractive goal. To this end, policy instruments are currently kept under review with regard to their potential to reduce GHG emissions and their impact on business, as well as possibilities for implementation. Policies contributing to emissions are also under review.

Netherlands

The carbon footprint of Dutch holidaymakers was recently presented by de Bruijn *et al.* (2010). Their report shows that between 2002 and 2008 there was a 16.8% increase in the combined carbon footprint of all Dutch holidaymakers, to a total of 15.6 million tonnes of CO₂ in 2008 (Table 4). This is equivalent to 9% of all CO₂ emissions from the Netherlands in that year as calculated under the Kyoto Protocol. Emission growth was mainly due to the marked increase in the average distance travelled (+33% between 2002 and 2008), with intercontinental, long-haul holidays during the same period increasing by 82%. Domestic tourism, responsible for 48% of all trips, produced 18% of all holiday emissions in 2008.

	2008
CO ₂ emissions per average Dutch holiday	433 kg
CO ₂ emissions per average Dutch holiday per day	49.1 kg
Total CO ₂ emissions Dutch holidays	15.6 Mt
Average annual CO ₂ emissions per person in the Netherlands	10 369 kg ¹
Average CO ₂ emissions per person per day in the Netherlands	28.4 kg ¹
Total Dutch CO ₂ emissions ²	170.1 Mt ¹

**Table
04**

**THE CARBON
FOOTPRINT
OF DUTCH
HOLIDAYMAKERS**

Notes: 1. Based on PBL and EEA estimates (EEA 31 August 2009, PBL 25 June 2009)

2. Excluding LULUCF (forestry and land use)

Source: de Bruijn *et al.* 2010.

The report shows that holidays by cycle and train, as well as non-organised holidays, have a relatively small carbon footprint, whereas holidays by plane, those spent in hotels, and organised holidays, have a relatively high environmental impact. The holiday types with the highest average environmental impact per day are the following (the figures in brackets compare the impact of each type with the average Dutch holiday footprint of 49 kg CO₂ per day):

- cruises (+265%)
- intercontinental (long-haul) holidays (ca. +200%)
- holidays by plane (+102%)
- holidays in hotels/motels (ca. +78%)
- organised holidays (+35%)
- outbound holidays (+27%)

The holiday types with the lowest environmental impact per day are:

- domestic cycle holidays (-76%)
- outbound holidays by train (-55%)
- all camping holidays with a tent (-50%)
- domestic holidays (-47%)
- all non-organised holidays (-39%)
- all nearby outbound holidays (*e.g.* in Belgium: -31%)

The authors conclude that the report provides perspectives for industry stakeholders to develop low-carbon tourism products, and for policymakers to take a new approach on aviation and outbound tourism development. They also warn that business as usual will interfere with national and EU emission reduction targets.

Survey results: The Ministry of Housing, Spatial Planning and the Environment is responsible for policy on climate change. The ministry's most important goals are:

- reducing GHG emissions by 30% by 2020
- raising the share of sustainable energy in total energy generation to 20% by 2020
- energy-saving measures (saving 2% a year until 2020)

The Ministry of Economic Affairs is responsible for tourism policy. So far, the two ministries have not been collaborating in the field of tourism and climate change. With regard to specific measures for tourism, the Ministry of Economic Affairs has promoted the Green Key as an ecolabel for hotels and congress centres. It is currently developing a new consumer label for sustainable travel in the Netherlands.

New Zealand

In 2009 the Tourism Industry Association (TIA) and the Energy Efficiency and Conservation Authority (EECA) launched a national programme to improve the competitiveness and environmental credentials of New Zealand tourism businesses through better energy management. The Tourism Energy Efficiency Programme (TEEP) provides practical assistance for tourism businesses in the accommodation and transport sectors to reduce their electricity consumption, fuel consumption and carbon emissions.

The pilot programme in 2008 included 12 participating tourism businesses and achieved measurable energy savings. Total potential savings for the 12 audits were 3 000 MW/hours of energy (equivalent to the consumption of 263 average houses) and 711 tonnes of CO₂ (equivalent to the emissions of 170 average cars), with expenditure savings for the businesses concerned of USD 375 000.

In 2009 TEEP 2009 included 14 more energy audits. Businesses targeted included two holiday parks, two visitor attractions, two hotels, one land transport and one sea transport operator, as well as six small to medium-sized enterprises (SMEs). TIA also built upon the transport scoping study completed in 2008 and developed an industry-specific stocktake exercise for the small tourist flight operators sector with results to be shared with about 45 operators in the Tourist Flight Operators (TFO) group throughout the tourist flight sector in New

Zealand. The aim was to provide useful information to help operators improve their overall environmental performance fuel and energy efficiency.

In 2008 the Ministry of Economic Development provided funding for the Sustainable Tourism Advisors in Regions Project (STAR). This three-year project, with co-funding from regional organisations, funds an adviser in each of nine regions throughout New Zealand who works face-to-face with tourism businesses to help them improve their environmental performance and increase their awareness and understanding of sustainable tourism practices. The STAR advisers work with tourism businesses to help them perform well against the Qualmark responsible tourism criteria.

Qualmark, New Zealand's quality assurance programme for tourism, introduced mandatory minimum criteria for responsible tourism in all categories in 2008. Qualmark has also introduced an Enviro-award scheme (Enviro-Gold, Silver or Bronze) which recognises businesses that perform well against the range of responsible tourism criteria, and helps visitors to identify and choose such businesses. The responsible tourism criteria consider the following aspects of business performance: energy efficiency, waste management, water conservation, conservation and community.

Qualmark has also introduced a tourism-specific carbon calculator, the Enviro Carbon Gauge (ECG), for Qualmark license holders. The ECG, developed by Lincoln University with funding and support from the Ministry for Economic Development, allows tourism businesses to monitor and measure their energy use.

The governments of New Zealand and Australia are also going to work closely with air navigation service providers as part of the Asia Pacific Initiative to Reduce Emissions (ASPIRE). This is an example of inter-jurisdictional co-operation under which the air navigation service providers of three countries, the United States Federal Aviation Administration (FAA), Airservices Australia

and Airways New Zealand, will aim to work closely with governments, airlines and other air navigation service providers in the region to:

- accelerate the development and implementation of operational procedures to reduce the environmental footprint for all phases of flight on an operation by operation basis, from gate to gate;
- facilitate worldwide inter-operability of environmentally friendly procedures and standards;
- capitalise on existing technology and best practices;
- develop shared performance metrics to measure improvements in the environmental performance of air transport system; and
- provide a systematic approach to ensure appropriate mitigation actions with short, medium and long-term results.

Survey response: New Zealand has introduced an Emissions Trading Scheme (ETS) to help reduce domestic emissions of greenhouse gases, as part of the government's primary response to global climate change. The ETS covers forestry, transport fuels (including domestic aviation), electricity production, industrial processes, synthetic gases, agriculture and waste (with staged introduction into the scheme by January 2015 at the latest). It will thus be indirectly relevant to tourism.

The scheme introduces a price on greenhouse gas emissions to provide an incentive for people to reduce those emissions and plant forests to absorb carbon dioxide. The New Zealand scheme covers emissions of the following six greenhouse gases: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF₆). These are the greenhouse gases covered by the Kyoto Protocol to which New Zealand is a signatory.

The Energy Efficiency and Conservation Authority is working with the Tourism Industry Association of New Zealand to help tourism businesses improve their competitiveness

and environmental credentials through better energy management. Over the course of 2008 and 2009 their Tourism Energy Efficiency Programme (TEEP) involved working with a range of accommodation, transport (including aviation) and attractions/activities. Case studies have been developed to help educate other tourism businesses about opportunities for improvement and cost savings. In 2010 the TEEP programme offered a free energy efficiency package (worth NZD 3 000) to small and medium-sized enterprises in the main centres of Auckland and Wellington, with an opportunity to access a subsidy to help implement the recommendations of an energy assessment (www.climatechange.govt.nz, www.tianz.org.nz).

Other agencies responsible for work applicable to tourism include:

- Ministry of Transport – New Zealand Transport Strategy, including work on biofuels, electric vehicles and vehicle fuel efficiency labelling, and fuel efficient driver training for bus drivers
- Ministry of Economic Development – energy policy, including the New Zealand Energy Strategy and the New Zealand Energy Efficiency and Conservation Strategy
- Energy Efficiency and Conservation Authority – energy efficiency including a tourism specific programme

The New Zealand government considers that aspects of climate change mitigation policy giving rise to potential threats in the tourism sector relate to the performance of the aviation sector and its financial viability, as well as the consequences of New Zealand's domestic ETS for international competitiveness.

Norway

The Norwegian government has outlined, through its Ministry of the Environment (2006-2007), three political targets:

- Norway will be carbon neutral by 2050
- Norway will undertake to reduce global

greenhouse gas emissions by the equivalent of 30% of its own 1990 emissions by 2020

- Norway will strengthen its Kyoto commitment by 10 percentage points, corresponding to 9% below the 1990 level


A three-tiered strategy is proposed to achieve these targets: i) to work for a more ambitious international climate agreement; ii) to contribute to emission reductions in developing countries and in rapidly growing economies such as China and India; and to iii) intensify efforts to reduce emissions in Norway. Domestically, the most important policy instruments are the Norwegian emissions trading scheme and taxes on emissions. Three Norwegian taxes are explicitly linked to GHG emissions, the CO₂ tax and the taxes on imports of chemicals containing hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs).

Poland

Survey results: In the policy document Directions for Tourism Development until 2015, GHG emission reductions are considered in several priority areas. "Strengthening the competitiveness of tourist products" foresees the development of appropriate tourism infrastructure, with constructions having to meet GHG emission standards. "Integration of products and tourist offers of the regions" aims at developing assessment criteria for "integrated branded tourist products" that consider energy efficiency and resource consumption, including land use. Finally, "Development of major types of tourism" is to consider sustainability issues.

Portugal

Survey results: At a national level, sustainability considerations are integrated in all general policy documents. With regard to tourism, a sustainability report has been produced since 2008 in order to monitor the performance of the sector and of Turismo de Portugal, the National Tourism Authority. Territorial plans are essential as a guarantee



of sustainable development strategy implementation. In this regard, apart from regional and local level spatial plans, Portugal has been a pioneer in developing laws to protect coastal zones, and has recently adopted a national strategy for integrated coastal zone management (OECD, 2011).

Portugal has integrated EU Directives and Decisions related to mitigation (2008/101/EC and 406/2009/EC) into national law. Furthermore, there are national financial support and incentive systems for investments in energy efficiency and renewable energies, which also cover the costs of participation in ecolabels, green certification and product marketing. These are partially financed by EU structural funds, called National Strategic Reference Framework (QREN), and by Support Line I of the Tourism Intervention Programme, at the national level managed by Turismo de Portugal.

Mitigation is expected to have a particular effect on tourism transport and accommodation, and changes are seen to be required in the way these sectors are managed. In particular, the integration of aviation in the EU ETS raises concerns. Some regions, such as the Autonomous Regions of Azores and Madeira, are highly dependent on air transport; increasing fares may affect revenues and tourist flows. However, environmental policies are also expected to encourage technological progress, the use of alternative fuels and infrastructure, and improvements in operations. More sustainable tourism practices are also expected to meet emerging tourist demands. Mitigation is also seen as a means to reduce expected negative impacts on climate change, which will affect Portugal (negative impacts on weather).

Slovenia

Survey results: Current tourism policy in Slovenia does not foresee any specific measures for mitigation in tourism. The national climate change strategy, which

is currently under preparation, will cover all economic sectors, including tourism. In 2010 the government prepared a Draft Climate Change Act and a long-term climate (low carbon) strategy. Measures to reduce emissions will primarily focus on reduced use of fossil fuels, more efficient use of energy, the use of renewable energy, a reduction of GHG emissions from waste deposits and agricultural activities, an increase of CO₂ sinks, and carbon capture and storage.

In the field of public passenger transport (train and bus), the objective of transport policy is to expand and increase the frequency of services within the local, regional and national system. Of special importance for tourism is the accessibility of the best-known tourist destinations, such as Bled, Bohinj or Kranjska Gora, by public transport. In accordance with Slovene legislation, the management of local passenger transportation systems fall under the responsibility of municipalities. The key objective in relation to tourist mobility is to offer passengers comfortable long distance travel (to and within Slovenia), along with adequately arranged access to their ultimate local destination without the need to use personal motor vehicles. This means seeking to provide “door-to-door” transport services (from home to hotel). The “door-to-door” project has been designed on the basis of a similar, already well-established air transport project (various websites offer quick purchase of low-cost flight tickets, including information on other intermodal transport links). Similar solutions are to be prepared for international rail transport, particularly in the Alpine area in which Slovenia is located, as well as in the broader European area. Despite various initiatives to reduce emissions, Slovenia nevertheless expects that emissions related to transport will continue to increase. Overall, climate change mitigation is expected to lead to higher operational costs, which will affect the productivity and competitiveness of the tourism sector.

Slovak Republic

Survey results: Several economic and

financial instruments have been developed to support investment in tourism. Those which appear most relevant in the context of mitigation efforts include support for agritourism and rural tourism through the Agriculture and Rural Development Programme, the natural heritage conservation support programme, and the promotion of cycling routes under the Operational Programme for the Bratislava Region.

South Africa

Survey results: South Africa is in the process of developing a national climate change response policy, to be finalised by the first quarter 2011. Its objective is to “make a reasonable contribution to the stabilisation of greenhouse gas concentrations in the atmosphere at a level that prevents dangerous anthropogenic interference with the climate system”. The national climate change response policy will provide an overarching framework for mitigation in sectors that contribute emissions of GHG. There are thus no specific climate change mitigation plans for tourism, but several documents are relevant for the sector, including South Africa’s Long-Term Mitigation Scenarios (LTMS), a Technology Needs Assessment (TNA), and a greenhouse gas inventory for 2000. The LTMS investigates mitigation options and their costs.

Policies focus primarily on achieving greater energy efficiency and introducing a higher share of renewable energy. To this end, the Energy Efficiency Strategy published in 2005 sets a target of achieving 12% lower energy use, with disaggregated targets for each sector. For transport, absolute energy use is to decline by 9% by 2015 (base year unclear). Demand side management projects have been carried out by the state electricity utility Eskom since 2004. The 2003 White Paper on Renewable Energy sets the target of developing renewable energy sources of 10 000 GWh by 2013, and the 2007 National Industrial Biofuels Strategy outlines the goal to base 2% of national liquid fuels supply on biofuels by 2013. A Renewable Electricity Feed In Tariff (REFIT) was introduced in 2009. A

Vehicle Emission Tax, to be implemented in September 2010, will influence a shift in the composition of the vehicle fleet towards more energy efficient and environmentally friendly vehicles.

Perceived threats of mitigation policies are increased costs for travel, which may negatively affect the tourism sector, and what are seen as costly energy efficiency programmes in accommodation. The overall result may be fewer foreign arrivals and a reduced contribution by the tourism sector to GDP and employment. However, mitigation policy may also lead to long-term cost savings and better operational efficiency for tourism businesses. It might make it possible for tourists to travel carbon neutrally. There will be technology transfer and the development of Clean Development Mechanism (CDM) projects more generally. Overall, mitigation will lead to growing awareness of energy use and related issues.

Sweden

The national strategy for tourism companies and destinations makes mention of climate change and the impact of tourism on the climate. It also outlines a potential threat, in that technological change might not be able to reduce emissions at the speed required by Sweden’s climate policy on reducing emissions from fossil fuels. At the same time, the report outlines the great potential of “smart carbon” travel as well as technology change to contribute to emission reductions. No specific strategies are discussed.

Turkey

Within the scope of the UNFCCC, Turkey supports efforts being made by the international community on greenhouse gas emissions and has itself launched significant efforts in all sectors, although Turkey does not have quantitative emissions reduction commitments. In the energy sector – the major source of Turkey’s greenhouse gas emissions – the Renewable Energy Law introduced in

2005 targeted a reduction in emissions by 75 million tonnes CO₂-eq. tonnes of emissions by 2020.

The Marmaray under-sea tunnel project, currently under construction in Istanbul, will connect the Asian and the European side of the city, reducing CO₂ equivalent greenhouse gas emissions by 130 335 tonnes CO₂-eq per year.

United Kingdom

In November 2008 the UK Parliament enacted the Climate Change Act 2008, which sets binding targets for reducing UK emissions. The long-term target is an 80% reduction by 2050, compared to the base year 1990, with an interim target of at least

26% lower CO₂-eq emissions by 2020. The Act focuses on trading schemes for the purpose of limiting GHG emissions, or the encouragement of activities that reduce such emissions or remove greenhouse gas from the atmosphere. Tourism is not mentioned in the Act, but it is understood that all sectors are to be part of emission reductions.

As of 1 November 2010, the UK introduced a new air passenger duty (APD) for aviation, which replaced its earlier two-tiered APD. The new APD distinguishes four geographical bands, representing one-way distances from London to the capital city of the destination country/territory. The duty levied is based on two rates, a reduced rate for the lowest class of travel, and a standard rate for other classes (Table 5).

BAND, AND APPROXIMATE DISTANCE IN MILES FROM	IN THE LOWEST CLASS OF TRAVEL (REDUCED RATE)		IN OTHER THAN THE LOWEST CLASS OF TRAVEL* (STANDARD RATE)	
	2009 – 10	2010 – 11	2009 – 10	2010 – 11
Band A (0 – 2000)	£11	£12	£22	£24
Band B (2001 – 4000)	£45	£60	£90	£120
Band C (4001 – 6000)	£50	£75	£100	£150
Band D (over 6000)	£55	£85	£110	£170

* [However if only one class of travel is available and that class provides for seating in excess 40* then the standard (rather than the reduced) rate of APD applies].

Source: HM Revenue and Customs, 2008.

Table
05

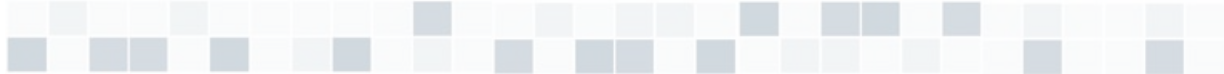
UK AIR
PASSENGER
DUTY AS OF 1
NOVEMBER 2010

United States

Various climate bills to introduce national cap-and-trade systems have been presented to the US Congress in recent years. So far, however, none has been passed and sent to the president for signature. Federal climate legislation may emerge soon; as Goulder and Stavins (2010) point out, this could either involve congressional action or GHG regulation by the US Environmental Protection Agency under the Clean Air Act. Notably, in response to the absence of federal action, climate policy initiatives have already emerged at regional and state level. Such initiatives are planned,

developed or implemented in more than half of the fifty states. One example is the Climate Action Reserve (CAR), established in the State of California in 2008. This voluntary ETS, endorsed by the California state government, appears to be rapidly embraced by companies, as it is expected that CAR credits will be eligible under a future mandatory US carbon market (www.climateactionreserve.org).

With regard to aviation, Simpson *et al.* (2008) discuss a recent legislative initiative

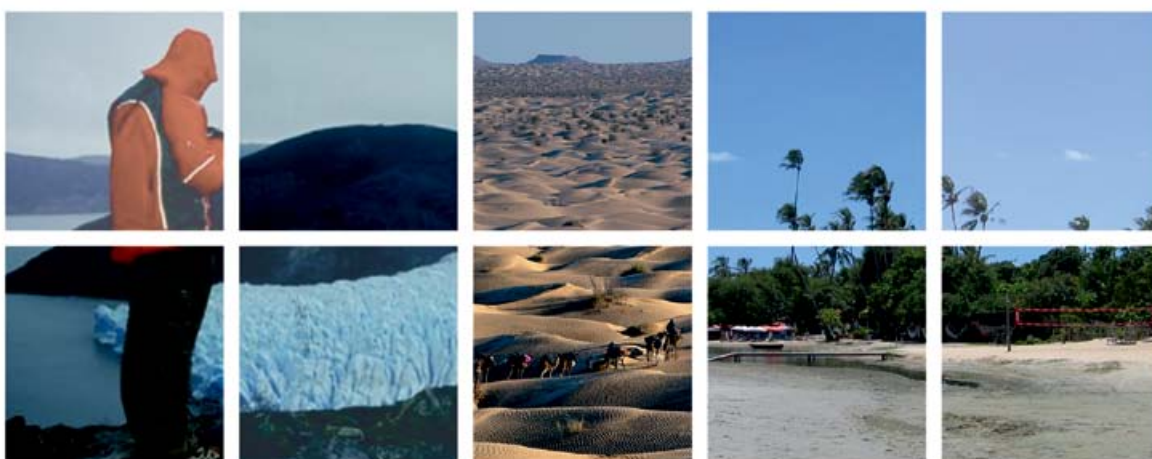


A first assessment would lead to the conclusion that the development of tourism-related mitigation policy in OECD member countries and selected other countries has hardly begun. Only one-third of the countries reviewed here have identified tourism-related mitigation strategies, and only five out of 44 have actually implemented any such policies.

that may have implications for GHG emissions in the aviation industry in the US. In 2007, the US Senate Committee on Environment and Public Works approved the Lieberman-Warner Climate Security Bill and forwarded it to the full Senate for consideration. This proposed legislation includes a cap-and-trade GHG emissions trading scheme. If enacted, the Lieberman-Warner Bill would create a regulatory system similar to the ETS for the American aviation industry. The US commercial aviation industry (Air Transport Association, Air Line Pilots Association, Cargo Airline Association, and the Regional Airline Association) expressed strong opposition to the proposed legislation (Air Transport Association, 2007) and it is currently unlikely that such an ETS would be implemented in the near-term future. Moreover, US airlines have taken steps to challenge the inclusion of international aircraft in the EU ETS, while the US government appears to favour non-binding resolutions (*New York Times*, 9 September 2010). The important US market, which alone stands for about one-third of the passenger kilometres travelled worldwide (Gössling and Upham, 2009), would thus remain outside of any regulation for years to come, and efforts in other countries and regions to reduce emissions from the sector would be less successful.

Summary: Mitigation action in member and selected non-member countries

The following results are not representative, being based on available documentation as well as results from the OECD survey. Nevertheless, a first assessment would lead to the conclusion that the development of tourism-related mitigation policy in OECD member countries and selected other countries has hardly begun. As shown in Table 6, only one-third of the countries reviewed here have identified tourism-related mitigation strategies, and only five out of 44 have actually implemented any such policies, not counting the use of the EU ETS as a policy framework for aviation. While a considerable number of potential strategies exist, including the use of biofuels, carbon offsetting, disclosure, educational programmes and awareness building, energy efficiency measures, incentives, information technology to facilitate low-carbon choices, low-carbon mobility, mobility management, public transport, development of renewable energies, strategic assessment of emissions to identify mitigation options, sewage treatment, spatial planning, solid waste management, taxation, and the enforced use of low-carbon technology, no country has focused on a comprehensive set of these measures to reduce emissions.



COUNTRY	MITIGATION STRATEGIES IDENTIFIED	POLICY IN PLACE	PERCEPTION AS THREAT/OPPORTUNITY
ANGUILLA	E, EE, RE, I	UNDER DEVELOPMENT	MARKETING OPPORTUNITIES
AUSTRALIA	ETS, RE, EE, CO	D, RE, EE, CO	–
AUSTRIA	TE, BIO, MM, E, EE, PT, T, I, SP	UNDER DEVELOPMENT (EU ETS)	INCREASING COSTS, MARKETING OPPORTUNITIES
BELGIUM	–	(EU ETS)	–
CANADA	T**, ETS	–	–
CZECH REPUBLIC	–	(EU ETS)	–
DENMARK	–	(EU ETS)	–
EGYPT	EE, SW, SEW, TE	–	FINANCIAL CONSTRAINTS LIMITED POTENTIALS (AVIATION) POSSIBILITY FOR FUND RAISING
ESTONIA	RE, BIO	I, EE (EU ETS)	INCREASES LONG-TERM COMPETITIVENESS
FRANCE	B, CO, EI, I, INV, PT, RE	EI, I, INV	–
GERMANY	EE, RE, TE, BIO, T, E, SW	(EU ETS)	–
GREECE	B, E, EE, INV, RE, TE	(EU ETS), INV	–
HUNGARY	–	(EU ETS)	TRANSPORT COSTS INVESTMENT NECESSARY (ACCOMMODATION) NEW MARKETING OPPORTUNITIES COMPETITIVE ADVANTAGE
IRELAND	D, SA, E	T, D, BIO, E, I, EE (EU ETS)	REDUCED COSTS
ITALY	–	(EU ETS)	–
LUXEMBOURG	–	(EU ETS)	–
MEXICO	EE, D, SA, RE, E	UNDER REVIEW	ADDITIONAL INVESTMENT COSTS MARKETING OPPORTUNITY
NETHERLANDS	E	(EU ETS)	–
NEW ZEALAND	BIO	EE, D, ETS, E	COMPETITIVENESS OF AVIATION
NORWAY	ETS, T	–	–
POLAND	EE	(EU ETS)	–
PORTUGAL	I, INV, EE, TE	(EU ETS)	TRANSPORT COSTS NEW MARKET OPPORTUNITIES, TECHNOLOGICAL INNOVATION
ROMANIA	–	(EU ETS)	–
SLOVAK REPUBLIC	LCM	(EU ETS)	EMISSION REDUCTIONS POSE CHALLENGE
REPUBLIC OF SLOVENIA	EE, RE, SW, PT, IT	(EU ETS)	HIGHER OPERATIONAL COSTS
SOUTH AFRICA	EE, RE, BIO	T, I, UNDER FURTHER DEVELOPMENT	INCREASED COSTS FOR TRAVEL COSTS FOR ENERGY EFFICIENCY PROGRAMMES REDUCED ARRIVALS TECHNOLOGY TRANSFER
SPAIN	–	(EU ETS)	–
SWEDEN	TE	(EU ETS)	–
TURKEY	B, RE	–	–
UNITED KINGDOM	T	(EU ETS)	–

Table
06

**MITIGATION
ACTION IN
SELECTED
COUNTRIES***

Notes: * Directly or indirectly relevant for tourism; **in some states or parts of the country

Source: Information based on OECD Survey, 2010.

ABBREVIATIONS:

B: BUILDINGS / BIO: BIOFUELS / CO: CARBON OFFSETTING / D: DISCLOSURE, I.E. AUDIT OF EMISSIONS / E: EDUCATIONAL PROGRAMMES AND AWARENESS BUILDING / EE: ENERGY EFFICIENCY MEASURES / ETS: EMISSION TRADING SCHEME / I: INCENTIVES INV: INVESTMENTS / IT: INFORMATION TECHNOLOGY TO FACILITATE LOW-CARBON CHOICES / LCM: LOW CARBON MOBILITY, SUCH AS CYCLING OR WALKING / MM: MOBILITY MANAGEMENT / PT: PUBLIC TRANSPORT / RE: DEVELOPMENT OF RENEWABLE ENERGIES / SA: STRATEGIC ASSESSMENT OF EMISSIONS TO IDENTIFY MITIGATION OPTIONS / SEW: SEWAGE TREATMENT / SP: SPATIAL PLANNING / SW: SOLID WASTE MANAGEMENT / T: TAXES / TE: INTRODUCTION OF TECHNOLOGY / EU ETS: EUROPEAN UNION EMISSION TRADING SCHEME, RELEVANT FOR AVIATION FROM 2012

public and private sectors.

- Creating a clear framework for sectoral monitoring that is transparent and nationally appropriate, and that quantifies lower emissions.
- Developing taxation processes that offer incentives and reward good corporate behaviour and the achievement of agreed targets.
- Promoting the convergence of action to reduce emissions with reduced fossil fuel reliance, as well as creative sector responses to new energy sources and the emerging new global energy paradigm.

World Economic Forum (WEF)

CEOs from across the world, representing every industrial sector, submitted a set of recommendations to the G8 leaders in June 2008 for inclusion within a post-Kyoto climate framework. In March 2009, in response to these recommendations and in order to elaborate on how they should be implemented, a WEF Task Force on Low Carbon Prosperity was launched. In May 2009 the WEF, in collaboration with UNWTO, ICAO, UNEP and travel and tourism business leaders, produced a report entitled "Towards a Low Carbon Travel and Tourism Sector". In it WEF suggests the following as mechanisms to achieve emission reductions: i) a carbon tax on non-renewable fuels; ii) economic incentives for low-carbon technologies; iii) a cap-and-trade system for developing and developed countries; and iv) further development of carbon trading markets.

Business groups

There appears to be substantial support among business leaders for climate policy, and for measures to achieve emission reductions, on the basis of identical "rules for all". PricewaterhouseCoopers (2010) found in 700 interviews with company executives in 15 countries that: i) government leadership is perceived as indispensable in mitigation; ii) the business community is ready for,

and supportive of, government action; iii) carbon taxes, emission trading and incentives have widespread support in the business community; iv) existing environmental taxes, regulations and incentives are seen as ineffective, inconsistent and unclear, and v) businesses want clear long-term investment signals.

Pacific Asia Travel Association (PATA)

PATA challenged influential travel and tourism leaders in 2008 to help develop, agree and sign up to a cross-sector response to climate change. Travel and tourism leaders responded, indicating that they were ready to be part of the first CEO Challenge. The first PATA Challenge event was held in Bangkok, Thailand and hosted by the Tourism Authority of Thailand. No specific action was agreed upon (UNWTO, 2010).

International Civil Aviation Organization, International Air Travel Association and Aviation Global Deal group

Various commitments to reduce emissions from aviation have been announced by the International Civil Aviation Organization (ICAO), the International Air Travel Association (IATA) and the Aviation Global Deal group (AGD group). ICAO envisages improvements in fuel efficiency of at least 2% per year until the year 2050. IATA anticipates stabilisation in emissions from aviation (no further growth in net emissions) by 2020 and envisages reducing emissions in absolute terms to half their 2005 level by 2050 (Table 7). The AGD group (including Air France-KLM, BAA, British Airways, Cathay Pacific Airways, Finnair, Qatar Airways, Virgin Atlantic and The Climate Group) is more ambitious, foreseeing emission reductions of between 50% and 80% by 2050, with a reduction of up to 20% by 2020. As outlined in section 1, it is highly unlikely that there will be absolute emission reductions in aviation by 2020, rather than "offsetting" through the purchase of permits from other sectors in the case of airlines participating in the EU ETS. It is notable that all organisations refer to CO₂, and it is unclear how non-CO₂ emissions will be addressed.

Table

07

EMISSION
REDUCTION
TARGETS AND
SUGGESTED
ACTION IN
AVIATION

	INTERNATIONAL CIVIL AVIATION ORGANIZATION (ICAO)	INTERNATIONAL AIR TRANSPORT ASSOCIATION (IATA)	AVIATION GLOBAL DEAL GROUP (AGD GROUP)
EMISSION REDUCTION GOAL	Improvements in fuel efficiency of at least 2% per year until the year 2050	Stabilisation by 2020 (base year 2005), 50% cut by 2050	up to 20% cut by 2020 50% to 80% cut by 2050,
GHG CONSIDERED	CO ₂	CO ₂	CO ₂
SUGGESTED MEASURES	Energy efficiency measures Air traffic management Biofuels Open and unlimited emission trading with other sectors	Energy efficiency measures Air traffic management Biofuels Open and unlimited emission trading with other sectors	Energy efficiency measures Air traffic management Biofuels Open and unlimited emission trading with other sectors

Source : ICAO 2009; IATA 2009a; AGD group 2009.

With regard to mitigation measures, fleet renewal, air traffic management (ATM), the use of biofuels (see Annex C), and, most importantly, open and unlimited emission trading with other sectors are presented as strategies to deal with emission growth (ICAO, 2009; IATA, 2009a; AGD group, 2009).

International Road Transport Union

The International Road Transport Union (IRU), an organisation representing the

road passenger transport and road freight industry, announced its "30 by 30" resolution in November 2009, representing a voluntary commitment to reduce the industry's CO₂ emissions by 30% by 2030, taking 2007 as the base year (UNWTO, 2010). Although IRU does not specify whether this commitment means lower emissions in absolute or relative terms, the latter is likely, *i.e.* even if the goal is achieved, absolute emissions from passenger and goods road transport would continue to increase because of increased traffic.

ACTION BY INTERNATIONAL ORGANISATIONS ■ ■ ■

Organisation for Economic Co-operation and Development (OECD)

The OECD has frequently outlined the need to reduce emissions substantially (OECD, 2009). While it has produced no tourism-specific documents in this regard, the OECD (2009) has outlined the need for a policy mix to reduce emissions economy-wide, including market-based approaches, regulations and standards, research and development, as well as information-based instruments to facilitate consumer choices. Together with

the International Energy Agency (IEA), the OECD recently published a review of transport energy use and emissions, concluding that key climate policies should include: i) land use planning to increase population density and mixed use development; ii) promotion of teleworking and other information-based substitutes for travel; iii) parking supply management (limiting parking space, car free zones) and pricing (cash out schemes); iv) car sharing; v) road pricing; vi) improved bus transit systems; and vii) encouragement of cycling and walking (IEA and OECD, 2009).

United Nations Environment Programme (UNEP)

The UNEP has been promoting tourism sustainability for a long time through its Tourism and Environment Programme, with the aim of facilitating local efforts by tourism stakeholders to “mainstream” climate change, *i.e.* to integrate climate change into their broader institutional, industry, sectoral, policy and national goals and programmes. Capacity building has been a particular focus, but UNEP has also contributed to the development of a number of key documents. Specific strategies to reduce emissions in tourism, for instance, are outlined in UNEP-Oxford University-UNWTO (2008), while issues relating to biofuels are discussed in UNEP (2009).

World Tourism Organization (UNWTO)

The Davos Declaration, adopted by UNWTO at the Global Conference on Climate Change and Tourism in Davos, Switzerland in October 2007, specifies that the tourism sector must respond rapidly to climate change within the evolving UN framework, and progressively reduce the GHG it contributes. UNWTO outlines the need for action by the sector to this end, and amongst other things to “mitigate its GHG emissions, derived especially from transport and accommodation activities”.

The Davos Declaration calls for a range of actors, including governments and international organisations, to collaborate on international strategies on transport, accommodation and related tourism activities. Through the “Davos Process”, UNWTO is pursuing programmes on both adaptation and mitigation. Mitigation of GHGs from air transport, which is acknowledged as the primary and growing contributor to global emissions of GHGs from tourism, is seen as critical to sustainable tourism development.

With regard to aviation, the largest emissions sub-sector in tourism, UNWTO asserts that the following principles should be incorporated into ongoing work on mitigation of GHG emissions from air passenger transport

(UNWTO, 2010:2), as UNWTO’s contribution to the UNFCCC COP 16 meeting in Cancun, Mexico (UNWTO, 2010:2-3):

- Assessment of mitigation measures in the context of broad-spectrum tourism, including domestic, inbound and outbound flows, rather than for air transport in isolation, considering social and economic costs and benefits in cohesion with the climate change mitigation impact.
- Application of the UNFCCC principle of Common But Differentiated Responsibilities (CBDR) amongst countries.
- Classification of differentiation to alleviate negative impacts on tourism destination markets in developing and particularly least developed and island countries, through differentiated targets, financial transfer mechanisms, and/or reductions in emissions levies or requirements for emissions permits, preferably applied in a framework of traffic flow origin and destination rather than solely according to country.
- Effective performance monitoring, unambiguous and appropriate indicators and targets, transparent and public reporting and auditing processes, at national and global levels.
- Treatment of air passenger transport operations analogously with alternative passenger transport modes where available (for example at short-haul) taking into account such factors as respective taxation and subsidy regimes (including government contributions to infrastructure) and enabling such travel choice criteria as price, comfort, convenience and trip duration to be assessed along with GHG emissions and on a non-discriminatory basis amongst modes.
- Open access for air transport to carbon markets, whether national, regional or global.
- Non-duplication of emissions levies on transport and other tourism-related activities (for example as a result of application by more than one authority or through different regimes such as taxation and emissions trading).
- Earmarking of all revenues from levies and trading of emissions permits to GHG mitigation activities yielding measurable, reportable and verifiable mitigation results, including projects in transport and other tourism-related activities, and financial and other incentives

- for the earliest possible global introduction of sustainable additional or alternative fuels for air transport.
- Acknowledgement of the pivotal role of the private sector and of the efforts and collective commitments by airports, air navigation service providers, air carriers and manufacturers for increased fuel efficiency, setting aspirational targets and working towards “carbon neutral growth” and subsequently substantial absolute reductions in emissions.
 - Continued recognition of a key role for ICAO in the fields of airframe and engine technology, air traffic management and operational approaches leading to tighter standards on aircraft emissions and improved operating procedures, and promotion of early certification and acceleration into usage of sustainable additional or alternative fuels for air transport.
 - Address of reduction targets and economic instruments for aviation emissions in co-operation with all parties representing directly affected sectors, including tourism in particular, and development of any global GHG emissions mitigation framework or globally accepted approach specific to aviation in partnership by all related intergovernmental parties including UNWTO and in close consultation with relevant NGOs and with input from both the public and the private sectors.
- ### Commission of the European Communities
- The Commission’s Agenda for Sustainable and Competitive European Tourism (CEC, 2007) is a result of the Commission’s adoption of a renewed Tourism Policy in March 2006. Its main aim is to “improve the competitiveness of the European tourism industry and create more and better jobs through the sustainable growth of tourism in Europe and globally”. To this end, the Agenda’s objectives are to “deliver economic prosperity, social equity and cohesion and environmental and cultural protection”. As regards the challenges involved in achieving these objectives, the Commission mentions “addressing the environmental impact of transport linked to tourism” and also states that “policies and actions need to take into account how demand and supply will be affected by environmental challenges – such as climate change and water scarcity...”. In its 2010 document, the Commission again emphasises as two of its four priority actions the need to “promote the development of sustainable, responsible and high-quality tourism” and the need to “consolidate the profile of Europe as a collection of sustainable and high-quality destinations”. With regard to mitigation, it mentions only one strategy, “the use of ‘clean’ energy” (CEC, 2010). The Commission also states, more generally, that “the sector has to become more resilient to the impact of climate change” (CEC, 2010:6).

ANALYSIS AND CONCLUSIONS: Climate stabilisation objectives and action in OECD countries ■ ■ ■

The IPCC (2007) has outlined the need to stabilise GHG concentrations in the atmosphere at a level that will not cause global average temperature increases of more than 2°C. This is now the stated objective of the international community, as adopted during the COP 15 in Copenhagen in December 2009 to prevent “dangerous interference with the climate system”. However, scientists have outlined (Copenhagen Diagnosis, 2009) that the insufficient ambition of current global climate policy, and the limited commitments so far announced by various countries, may mean that temperatures increase by up to 4°C by the end of the century. This has caused some scientists to underline the need to focus on adaptation, geared to considerably higher levels of warming and the significantly greater risks associated with changes in environmental and socio-economic systems. Consequently, there are two basic pathways open to the international community. One is to tighten global climate policy considerably, to curb emissions at levels in line with the 2°C guardrail. The other is to consider fundamentally different adaptation efforts, in the face of considerably higher costs in the future and significantly higher numbers of climate change related deaths (Stern, 2006;

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Global Humanitarian Forum, 2009).

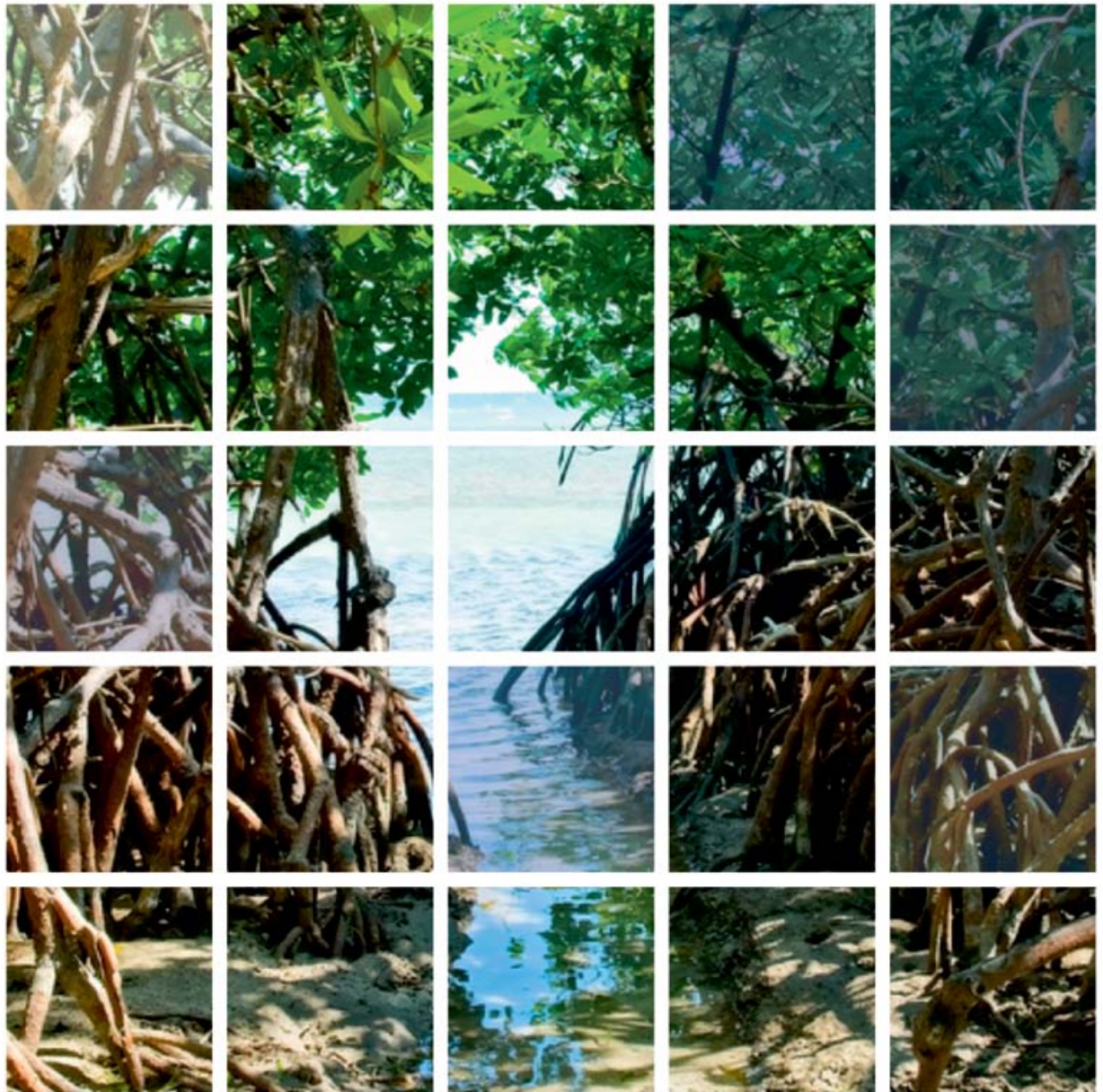
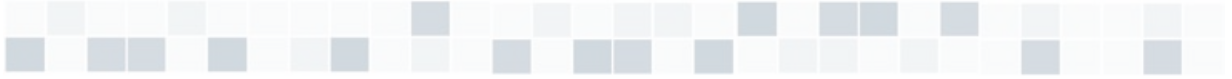
With regard to the analysis of climate policy documents as presented by OECD governments, industry stakeholders and international tourism organisations, there appears to be consensus that average global warming should be kept below 2°C, *i.e.* in line with climate objectives as agreed upon during COP 15. To reach this target would require the global tourism system to reduce absolute emission levels by about 20% by 2020 if it is to act in line with other economic sectors. As emission reductions are to be achieved nationally, however, an alternative perspective is for tourism to stabilise its emissions, with concomitant disproportionately higher emission cuts in other economic sectors. These higher cuts would in reality prove difficult to achieve, given that the overall rate of emission reductions already needs to be of the order of between 3% and 4% per year if mitigation is initiated immediately, and more drastic if it starts later. Nevertheless, there seems no consensus with regard to burden sharing. The implicit consensus in the EU appears to be that tourism emissions will be allowed to grow at the expense of other sectors, because an open trading approach has been taken with regard to the integration of aviation in the EU ETS from 2012 onwards. In this context, a highly relevant issue is the consideration of non-CO₂ GHG from aviation. While UNWTO suggests that all GHG from tourism should be considered, national policy documents show no recognition of the necessity for this.

Most governments, organisations and industry groups are in favour of including aviation in an emissions trading scheme. Unlimited and open trading would however mean that the

share of radiative forcing from aviation would be likely to grow. This is both because other sectors would be declining in absolute CO₂-eq emissions while aviation was growing (Bows *et al.*, 2009), and because the aviation industry would be inclined to purchase emissions permits from other sectors in an open trading scheme. Such purchases of permits would only cover the growth in aviation's CO₂ emissions, leaving out its non-CO₂ radiative forcing. Its overall contribution to global warming would thus grow, with the sector inclined to buy permits for its CO₂, but emitting GHG with a greater RF than that of CO₂ alone (Lee and Sausen, 2000). An open trading scheme focusing on CO₂ alone would therefore mean that aviation could continue to grow in terms of its emissions and even more so in its contribution to radiative forcing, possibly leading to emissions 2.0-3.6 times higher by 2050 than in 2000 (Owens *et al.*, 2010).

With regard to mitigation strategies, it appears that there are plans or ongoing efforts to identify mitigation options for tourism in only a third of the countries studied in this report. Moreover, most strategies as currently presented are generic in character ("energy efficiency achievements", "use of biofuels"). They are not connected to or based on quantified or quantifiable emission reduction goals and the monitoring of progress. To the contrary, some governments identify tourism as a growth area for emissions, and tourism policy in many countries even contradicts climate policy goals, as exemplified by plans to develop long-haul markets. With the exception of legislation implemented in a few countries, there are no discernable efforts to curb emissions from tourism in a systematic, co-ordinated and controlled way.





Chapter
04

ADAPTATION

INTRODUCTION ■ ■ ■

Adaptation is relevant to deal with climate change related impacts that are unavoidable. The level of climate change to which stakeholders may have to adapt, however, depend to a great extent on emission pathways. Policy focusing on adaptation must generally consider more complex interrelationships than policy focusing on mitigation, i.e. dynamic physical change occurring in the short to long-term future, with largely unknown response patterns by tourists. Consequently, developing adaptation policy means dealing with greater uncertainty. Some policy developments, although not specifically designed to address climate change, may nevertheless play a part in this adaptation. A case in point is the recent EU policy to address seasonality, encouraging countries to spread out their holiday periods and thereby distribute tourists more evenly, which could also help overcome problems related to changing weather parameters.

In encouraging the development of adaptation policy, UNWTO (2010:6) emphasises that:

Regardless of relative vulnerability to climate change, tourism and travel businesses and destinations will need to adapt to climate change in order to minimise associated risks and capitalise upon new opportunities, in an economically, socially and environmentally sustainable manner.

Considering that the large information requirements, policy changes and investments required for effective adaptation by tourism and travel destinations will require decades to implement in some cases, the process of adaptation must commence now for destinations anticipated to be among those impacted by mid century.

REGIONAL CLIMATE CHANGE ADAPTATION POLICY ■ ■ ■

There appear to be few regional approaches to deal with climate change adaptation across a number of countries. One example may be the CARIBSAVE Partnership, formed in 2008 between the Caribbean Community Climate Change Centre (CCCCC) and the University of Oxford, and supported by a range of international partners, including UNEP, UNDP, UNWTO, World Bank, and WWF. CARIBSAVE is assessing impacts and challenges associated with climate change adaptation in the Caribbean basin. Current

work focuses on the development of a Climate Change Risk Atlas, including sector approaches to water, energy, agriculture, human health, biodiversity, infrastructure and settlement, and comprehensive disaster management. Issues and variables related to climate change are assessed in a comprehensive framework to identify impacts, adaptive capacity and resulting vulnerabilities (CIDA, 2005). Tourism as a cross-cutting economic sector will profit from these insights.

NATIONAL CLIMATE CHANGE ADAPTATION POLICY ■ ■ ■

The OECD and UNEP secretariats have conducted a survey on "Climate Change and Tourism" to understand the extent to which countries are well prepared to deal with the climate change challenge for tourism (Table 8, p77). As of January 2011, the Secretariat had received replies from the following 18 countries: Australia, Austria, Egypt, Estonia, Germany, Greece, Hungary, Ireland, Israel, Japan, Mexico, Netherlands, New Zealand, Poland, Portugal, Slovak Republic, Slovenia and South Africa.

Results relating to adaptation are presented in the following pages. Where feasible, or for some countries where no survey results are available, these findings are supplemented with a review of governmental or non-governmental reports.

Australia

Survey results: In February 2010 the Australian government released its Climate

Change Adaptation Policy position, outlining its roles and responsibilities and identifying key priority areas for adaptation action (Australian government, 2010a). Climate change is projected to affect a number of key tourist destinations in Australia, including the Great Barrier Reef, the Wet Tropics, Kakadu National Park and the Alpine region, as well as other rural and regional areas and coasts.

Australian governments, at both federal and state levels, have initiated a number of adaptation policies aimed at increasing the resilience of natural systems that are key tourist destinations, including the Great Barrier Reef and the coastal zone. The federal government has also established a number of working groups to implement the National Long-Term Tourism Strategy, which includes a focus on increasing the environmental sustainability of the Australian tourism industry. Specifically, the Industry Resilience Working Group is tasked with identifying the impacts of climate change on the tourism industry and working towards developing industry adaptation strategies.

The working group is currently undertaking a number of projects: to increase industry awareness of climate change, including modelling its economic impacts on the tourism industry to quantify the costs of inaction and qualify the importance of industry adaptation; to support the development of enterprise-level climate adaptation in the tourism industry and demonstrate the value of continuing adaptation efforts; and to communicate federal government policy and programme information that is directly relevant to the tourism industry (Australian government, 2010b).

Climate Change Guide: Mitigation and Adaptation Measures for Australian Tourism Operators, a resource released by the Department of Resources, Energy and Tourism (2010), is designed to provide the tourism industry with information on a range of issues including practical advice on how to reduce emissions through energy, waste, water and chemical reduction, how to adapt business practices and behaviours, and how to disseminate climate change mitigation messages to consumers. In Victoria, for instance, ski resorts have been encouraged to

develop and market other tourism experiences besides snow sports to deal with shorter ski seasons.

On a more general basis, diversifying products, protecting the natural environment and implementing strategic planning processes will provide opportunities for the tourism industry to adjust to green tourism demand. However, these changes will also involve costs to the industry. An analysis of megatrends underpinning tourism to 2020, undertaken by the Sustainable Tourism Co-operative Research Centre (STCRC), highlighted the issue of water scarcity as a concern in environmental trends, noting that in Australia water shortages are becoming increasingly apparent (CRC Tourism, 2010). Australia is expected to experience increased droughts and shifts in precipitation patterns due to climate change. This may have an impact on food supply and water prices, and consequently increase the costs for tourist accommodation, food, water activities and services.

Austria

The 2008 AustroClim Report (Haas *et al.*, 2008) identifies various changes related to climate change that will be of importance for winter, summer, lake and city tourism. These changes include less snow at lower altitudes, more intensive rainfall, more rainfall in winter, greater inter-annual variability in precipitation, lower water levels in rivers, floods, extreme weather events, and a considerable increase in lake temperatures. Some areas in the Alps will also become more risk-prone for tourism due to melting of permafrost areas and falling rocks. While most of these changes are seen as potentially negative for tourism, it is believed that an increase in lake temperatures will mean more days suitable for swimming and bathing and a longer summer season. The warming of lakes also affects water quality, and health issues have to be considered. Changing temperatures also affect rearrangement and water stratification. There will also be changes in biodiversity, which again may affect water, and in particular bathing water quality. In summer, visitor numbers are expected to rise due to higher temperatures and declining

precipitation, leading to changing visitor flows from the Mediterranean. City tourism will profit from a lengthening of the season.

Haas *et al.* (2008) conclude that the current understanding of the impacts of climate change on tourism is still limited, and they call for further research. Some basic recommendations for adaptation in tourism have, however, been developed ("no-regret-options"). Furthermore, action links with other areas are emphasised, including mobility, heating systems, thermal renovation, air conditioning, and snowmaking. Haas *et al.* (2008) note that the timeframes relevant for regulatory instruments are longer (20-30 years) than for investments in the private sector (5-10 years) and that regional situations need consideration. They also point out that there will be conflicting goals with regard to tourism development and climate adaptation. Overall, they derive a number of principles for action, including "robustness", *i.e.* adaptation based on reliable scenarios; "minimisation of problem shifts", *i.e.* the consideration of consequences of adaptation measures for nature conservation and climate change; "differentiation of strategies regarding time (when?) and scale (business, region, county, country)"; "avoidance of unsuitable adaptation"; and "development of economic alternatives for destinations highly vulnerable to climate change".

Survey results: Within the framework of the national climate change programme, research projects are envisaged which will focus on regional and sectoral impacts and their economic, environmental and social consequences for Austria. As a first step in this direction, StartClim was initiated in 2003 as an interdisciplinary programme to investigate the impacts of climate change on Austria (www.austroclim.at). StartClim initiates research on topics not yet established in Austria and promotes the involvement of young scientists. Its short-term projects allow it to reach to subjects of current importance and show where further research is necessary. StartClim-projects have supplied a wealth of new data and understanding which also gives them practical relevance. Reports (in German, overview reports in German and English) can be downloaded from www.austroclim.at/

startclim. The following topics have already been researched within StartClim:

- 2003 First Analyses of Extreme Weather Events and their Impacts on Austria
- 2004 Analyses of Heat and Drought and their Impacts in Austria
- 2005 Climate Change and Health
- 2006 Climate Change and Health, Tourism, Energy
- 2007 Impacts of Climate Change on Austria: Case Studies
- 2008 Adaptation to Climate Change in Austria
- 2009 Adaptation to Climate Change in Austria: Contributions to the development of an adaptation policy for Austria (*e.g.* AlpinRiskGP – estimation of current and future danger potential for alpine tourists and infrastructure as a result of decreasing glaciers and permafrost change in the area of the Großglockner (Hohe Tauern, Austria))
- 2010 Adaptation to climate change: Contributions to an adaptation strategy for Austria 'Hot town, summer in the city – the effects of summer days on recreation and leisure behaviour as well as the sightseeing program of city tourists – presented by the example of Vienna'

Up to now 11 projects and studies focusing explicitly on the interrelationship between climate change and tourism have been conducted. Since the start of the programme the ministry has supported the national research programme on climate change and its effects, commissioning several studies on the effects of climate change on the tourism sector. In 2009 a study focused on the interrelationship between climate change and travel behaviour ('Klimawandel und Reiseverhalten').

Austria is in the process of developing a national adaptation strategy, which can be expected in 2011. In the current government programme, the Federal Ministry of Agriculture, Forestry, Environment and Water Management (www.lebensministerium.at) was assigned to establish such a strategy. The operating modality is split up into different areas of work. It is an ongoing process; several activities have already started, *e.g.* workshops in order to ensure the

participation of all relevant national authorities.

At state level, several initiatives have been set up, *e.g.* the state of Carinthia has initiated a working group of experts of various fields with the objective of developing and implementing strategies and defining specific sectors where appropriate action has to be taken.

Several research projects have also been developed to focus on the impact of climate change on specific regions. Adaptation measures have been developed for the Alpine region (*e.g.* Interreg-Project AdaptAlp – Adaptation to Climate Change in the Alpine Space; Water Management Strategies against Water Scarcity in the Alps) and in Lower Austria (Impacts of Climate Change on Lower Austria; Climatological Atlas of Carinthia).

The development of a comprehensive national adaptation strategy was initiated in 2007, and a participatory process has begun with the relevant stakeholders, based on a study describing existing adaptation measures, climate projections, vulnerability assessments and a portfolio of first recommendations for additional adaptation actions. The sectors covered currently include agriculture, forestry, water management, tourism and the energy industry. Fields of activity so far discussed at expert level include construction and habitation, protection against natural hazards, transport infrastructure, health and natural ecosystems/biodiversity. More topics and cross-sector issues are currently under development.

Estonia

Survey results: Estonia does not have adaptation programmes or policies for its tourism sector. Climate change is not expected to cause problems regarding water quantity or quality.

France


“Climate Change: Costs of Impacts and Lines of Adaptation”, a report presented in 2009 by the National Observatory for the Impacts of Global Warming (2009), contains the following key

messages with regard to tourism:

- The impacts of climate change on the tourism sector are multiple.
- At the 2100 time horizon, analysis of the climatic-tourist comfort index indicates a change that will reduce summer climate attractiveness across the territory as a whole, but mainly in the south and east of France.
- On the other hand, climate attractiveness in 2100 in the inter-seasonal months, especially May and June, will equal current summer climate attractiveness.
- The results of this change in terms of tourist visits are not immediately apparent. If the climate plays a major role in the choice of destination, sensitivity to high heat (and even the perception of what constitutes excessive heat) differs depending on parameters such as the departure period, the type of accommodation and the environment of the trip. Future research work is needed to specify these elements and relate them to aspects of the tourism offer.
- With regard to winter sports, an OECD study in 2007 indicated that the reduction in snow cover will reduce the reliability of the depth of snow in the Alps. Of the 143 French Alpine resorts currently skiable with low snow depths, only 123 would remain so in the event of warming by +1°C, only 96 if warming reaches 2°C, and only 55 in the event of warming of 4°C (OECD, 2007).
- The European Centre for the Development of Vocational Training (2010) outlines training needs as a key priority. “Links between tourism and sustainable growth must be better known in the field,” it states, “especially by key stakeholders. This requires raising the awareness of relevant actors, including consultants and public authorities.”

Germany

Survey results: The German Adaptation Strategy (Deutsche AnpassungsStrategie, DAS), adopted by the German Federal Cabinet on 17 December 2008, creates a framework for adaptation to the consequences of climate change in Germany. Within this strategy, risks will be progressively identified, action needs ascertained, appropriate objectives defined and developed and potential adaptation



measures implemented. The overall objective of DAS is to reduce vulnerability, to maintain or improve the adaptability of natural, social and economic systems, and to take advantage of any opportunities. To facilitate a precautionary approach to sustainable planning and action in the private, scientific, business and public sectors, the strategy outlines the need to:

- improve the knowledge base with a view to better define and communicate opportunities and risks, and to identify options for action;
- create transparency and participation by means of a broadly based process of communication and dialogue, and support various stakeholders, for example by providing decision support and information on which to base decisions;
- support public awareness raising and information through widespread public relations work; and
- develop strategies for dealing with uncertainty factors.

Important areas for action identified by the German Adaptation Strategy and relevant to this report include “water regime, water management, coastal and marine protection” and “tourism”. With regard to tourism, changing travel flows because of climate change are seen as a potential threat for economic and social structures in destination countries, potentially amplified by extreme weather events. Winter sports are seen affected at altitudes below 1 500 m in the Alps or below about 800-1 000 m in the central highlands. Rising temperatures at lower altitudes will mean that options to use man-made snow with snow cannons are foregone, and lead to a concentration of ski tourism on the ecologically more sensitive higher regions of the central Alps. The development of other leisure activities (walking, cultural tours, wellness holidays) will therefore become important.

Climate change is also expected to have an impact on coastal regions, as seasons are expected to change, with visitor flows shifting from southern to northern regions. “Many Germans have tended to spend their summer holidays in the Mediterranean countries”, the strategy states. “The total stream of holidaymakers from central and northern Europe to southern Europe, with around 116 million arrivals, is the biggest tourist migration worldwide, and accounts for 41% of internal tourism within Europe. Since there is an increasing probability that southern Europe will experience daily maximum air temperatures of 40°

C or more during the peak season, travellers can be expected to suffer increased heat stress, which can have unfavourable effects on the well-being of older persons and children in particular. In Germany, by contrast, rising temperatures and lower rainfall in the summer could tend to favour tourism, for example because of an extension of the summer season. The Potsdam Institute for Climate Impact Research expects Germany to become more attractive to tourists. Estimates suggest that the number of tourists coming to Germany could increase by 25% to 30%.” To make recommendations for adaptation, the federal government financed a project entitled “Climate trends and sustainable tourism development in coastal and central upland regions” (KUNTIKUM). This project investigated how tourism, as an economic sector especially sensitive to weather and climate, can adapt to the effects of climate change.

With regard to water, climate change is expected to entail effects on groundwater levels, changes in Alpine discharge patterns, changes in water quality, and also an increase in the frequency of extreme events (e.g. floods, storm surges and droughts). These, in turn, will lead to an increased danger of erosion and the associated risks of pollutants and fertilisers entering the groundwater and surface waters. The capacity of combined sewage systems in settlement areas may be exceeded, thereby resulting in increased nutrient inputs into rivers and lakes. Rising water and soil temperatures of aquatic systems in the summer can lead to a reduction in the oxygen concentration of lakes and rivers. Low summer water levels in surface waters increase the concentration of undesirable substances in the water. These substances place a strain on the ecosystem. In cases of drinking water abstraction from bank-filtered water, they may also increase the complexity and cost of drinking water purification.

To address these issues, integrated management of river basins is laid down in the Water Framework Directive (Directive 2000/60/EC) and the Flood Risk Management Directive (Floods Directive 2007/60/EC). This implies co-ordinated management of the protection and use of all bodies of water in a river basin on a transboundary basis. Federal financial assistance totalling EUR 380 million is to be provided between 2009 and 2025 for additional coastal protection measures made necessary by

climate change. Other measures for adaptation include a review of water supply and disposal infrastructures, water efficiency management, and support for individual precautions for flood control.

As a central next step in developing a response strategy to climate change, Germany is currently developing an Adaptation Action Plan (Box 6).

Box

06

GERMANY: ADAPTATION ACTION PLAN

Germany's Adaptation Action Plan will be drawn up in collaboration with the *Länder* (states) and other relevant stakeholders. This Action Plan will be submitted to the federal cabinet and presented to both houses of parliament (*Bundestag* and *Bundesrat*) by summer 2011. To this end, an Inter-ministerial Working Group on Adaptation has been established. The Action Plan will determine the focus on federal measures and measures to be undertaken in co-operation with the federal *Länder*, give an overview of measures by other stakeholders, and establish proposals for progress review.

Source: German Federal Government, 2010.


Greece

Survey results: During the past decade Greece has been growing environmentally sensitive and is integrating this increased sensitivity into its strategic plans and sector specific policies. In the tourism field, the ever rising concern about development in the framework of sustainability is reflected in legislative acts and initiatives that aim at protecting the environment, while at the same time turning tourism infrastructure (accommodation of all types and categories and also special tourism infrastructure such as golf courses, conference centres, ski resorts) into investments built with respect for nature and a commitment to safeguard it. The Special Land Planning Framework for Tourism aims at fostering tourism development in a well-balanced way across the Greek regions, which present notable natural differences and are characterised by unique features, both economically and socially.

According to recent studies including the framework reports of the Intergovernmental Panel on Climate Change (IPCC), climate change will impact upon water resources in the Mediterranean. There is expected to be a significant intensification of phenomena such as recurrent and persistent droughts, an overall decline in precipitation followed by river flow decrease, more intense rainfall concentrated

in fewer days and causing floods and soil erosion, and a serious long-term decrease of soil moisture, accelerating desertification. Other serious impacts of global warming in the Mediterranean, associated with rising sea levels, will include salt water intrusion in coastal aquifers, the loss of habitable and arable land, and serious alterations of natural habitats, in a region already experiencing increasing coastalisation.

Climate change is also expected to affect freshwater availability and quality. This is seen as a serious threat to human health, as a decline in the availability of water for human consumption makes existing systems more prone to pollution and water-borne diseases. Declining water quality and quantity also affects other economic sectors. In agriculture, food security is threatened by lower yields, which also cause revenue losses. Fishing is affected by changes in ocean circulation, increases in water temperature and acidification and changes in coastal ecosystems. Impacts on energy security include reduced hydropower potential and high energy requirements for cooling and desalination. Tourism is affected by reductions in the inflow of visitors, and the loss of revenues, due to inferior services provision for both summer and winter tourism, in parallel with intensification of water demand. There are increased risks for planning and



investment in infrastructure development. The natural environment and biodiversity of the region are also affected, threatening important wetlands and habitats with important roles in safeguarding the overall ecological balance.

A wide range of relevant institutional instruments already exists to address these challenges. Adaptation policies and operational tools, however, including capacity building, have not yet been properly developed at national level, while current national and local water management plans do not take climate change impacts adequately into account.

Greece thus sees it as relevant to provide an integrated and strategic regional approach to existing and emerging challenges, to ensure effective measures which are fast, extensive, focused and integrated at regional, national and local levels. Such an approach should enhance the resilience of water resources through improved, integrated, decentralised and participatory management of water and natural resources. Measures should be based on better scientific evidence and an enlarged knowledge base regarding the evolution of the phenomena and their impacts. Consequently, the following operational objectives have been proposed:

- By the year 2012, countries should elaborate appropriate National Adaptation Plans, which give due emphasis to water resources as a cross-sectoral element, are coherent with national integrated water resource management (IWRM) plans and water strategies, and include lists of both urgent (by 2012) and longer-term (beyond 2012) no-regret interventions.
- By the year 2012, countries should develop and/or update watershed management and protection plans that integrate adaptation issues and related measures. They should incorporate essential new information on the impacts of climate change and the measures required to enhance water use efficiency, ecosystem services and varying types of water storage capacities, with a view to promoting the implementation of such plans starting from 2015;
- Countries should complement the implementation of their respective political com-

mitments within the context of relevant international agreements regarding adaptation to climate change.

To address adaptation with regard to water, the demand and supply-side measures under consideration include a greater role for research and education, focusing on the development of climate scenarios, vulnerability assessments, hydrological monitoring tools and early-warning schemes. Also considered are regulatory frameworks and inter-institutional co-operation, land-use planning for civil protection, and the application of wider planning “margins” in water calculations, drought management plans and flood risk mitigation schemes. Adaptive measures include adaptation of water infrastructure (e.g. dams, storage and drainage systems) as well as promotion of non-conventional water resources. More specifically, Greece suggests seven specific recommendations for action:

- Enhance the knowledge base regarding climate change impacts and vulnerability to them, so that appropriate policy responses can be based on reliable data and information on likely effects, associated socio-economic aspects and the costs and benefits of different adaptation options. Develop methods, models, data sets and prediction and early warning tools in order to enhance monitoring of hydrological cycles and of impacts and to improve risk mapping, the identification of “hot spots” and the development of vulnerability indicators. Facilitate the creation of an experience-sharing regional platform.
- Establish and/or strengthen appropriate operational plans, projects and robust and adaptable institutions to manage future challenges and risks effectively at local, national and regional level. In order to ensure that the development process is less vulnerable to extreme climatic conditions, adopt proactive rather than reactive measures of risk management, and promote the establishment of institutions with the capability to decide the acceptable level of risk, analyse it regularly and take measures to reduce it.
- Integrate water adaptation considerations into all relevant sectoral plans (financial planning, health, spatial planning, agriculture,

energy, tourism and infrastructure development) from the preliminary planning stages, aiming at reconciling human and environmental needs.

- Promote market-based instruments and related financial services to ensure effective adaptation to protect investments against extreme events related to water.

- Promote sustainability criteria and criteria for protecting water infrastructure against climate change impacts, coupled with extensive and realistic climate-related tools for environmental impact assessment (EIA) and strategic environmental assessment (SEA), as a prerequisite for infrastructure planning and construction and for public, private and public-private partnership (PPPs) investment.

- Fully integrate water resources adaptation considerations into bilateral and regional financial assistance programmes and activities, among other things, along the lines of OECD's 2006 Ministerial Declaration on Integrating Climate Change Adaptation into Development Co-operation. In this regard, assist the implementation of urgent actions defined at national and local levels, and of capacity building activities on how to promote the integration of adaptation measures in overall national water policies, as well as how to ensure adequate related financial support.

- Increase regional and trans-boundary co-operation and assistance to cope with emergency situations arising from droughts and floods.

Hungary


Survey results: The Ministry of the National Economy reports that summer resort tourism, cultural tourism (especially open air festivals/events), active tourism (air extreme sports, non-engine water and winter sports) and ecotourism (hiking) might be vulnerable to climate change. More specifically, periods of high season are likely to change, operational costs including heating, air conditioning, irrigation etc. will increase, and more frequent weather extremes will occur. Means of adaptation include raising the awareness of stakeholders and tourists,

identifying risks, stimulating adaptation measures, and monitoring.

Ireland

Survey results: Overall climate change strategy for the government of Ireland is led by the Ministry of the Environment, Heritage and Local Government (National Climate Change Strategy 2007-2012; government of Ireland, 2007). Climate change is expected to lead to some significant changes in tourism flows over time. Compared to the likely negative impacts on certain European locations (e.g. Mediterranean coastal resorts or Alpine ski resorts), impacts in Ireland are however expected to be moderated by the island's temperate climate. Climate change may even be positive, as warmer, drier summer weather will increase the appeal of many Irish coastal resorts and of water-based and other outdoor activities; Ireland as a tourism destination may consequently benefit from increased visitor numbers. Adaptation to climate change is nevertheless seen to be crucial for the sustainability of the tourism industry, because vulnerable ecosystems may be affected, altering the character of Ireland's habitats and biodiversity. There may be increased sediment and nutrient loads in waterways as a result of flooding. Inundation of popular beaches and seaside resorts may increase, and invasive species may have more impact at the expense of native species. Water pollution may increase, with more pressure on sewage treatment plants in flood situations, and growing visitor numbers will place additional stress on already vulnerable natural and cultural heritage (Fáilte Ireland and the Heritage Council, 2009).

The Environmental Protection Agency (EPA), on behalf of the Department of Environment, Heritage and Local Government, is currently undertaking a National Adaptive Capacity (NAC) assessment to set out the context within which adaptation to climate change will take place in Ireland. The assessment will consider the political and economic context of decision-making on adaptation, and describe its current policy, planning and legal frameworks at national and sectoral levels.



The NAC approach is based on the framework set out by the World Resources Institute (2009) and is the first phase in a systematic assessment of institutional adaptive capacity across all sectors in Ireland, including tourism. In particular, potential “entry points” have been identified, where adaptation to climate change might be integrated and embedded into existing systems of governance, planning and assessment. The NAC framework represents a new approach to determining national climate change adaptive capacity. The government of Ireland considers it to be particularly suitable because the lack of co-ordination and integrated decision-making in developing policies is perceived as one of the biggest problems. This is addressed in NAC. “In addition to integrating tourism into any adaptation policies in the future,” it states, “there is also a need to integrate adaptation into tourism policies.”

Key priority areas for tourism-related adaptation include: i) building awareness in the industry of climate change and adaptation; ii) co-ordinating coastal zone management; iii) landscape conservation; iv) conserving landscape character; v) sustainable development of tourism infrastructure (“climate proofing”); vi) product diversification and innovation, also with a focus on “low emissions” offers. With regard to water quality, investments in water supply and waste treatment are seen as essential to meet requirements in regard to the Urban Wastewater Directive, the Water Framework Directive and ongoing support for Blue Flag and Green Coast award schemes.

Israel

Survey results: Israel is characterised by desert and semi-desert climatic conditions. Water availability is consequently one of the most important issues for tourism. According to the State of Israel (2010), natural water reserves rely almost entirely on rainfall, which typically fluctuates to a very extreme extent inter-annually. Frequently there may be a series of consecutive drought years, a situation that appears to be worsening because of climate change. Climate change projections for northern Israel indicate that in

the period 2015 to 2035 natural water supplies will decline by approximately 15% of the long-term average. To ensure that sufficient potable water is available, currently and in future years, Israel is constructing a series of large-scale desalination facilities; these and future facilities are expected to provide 80% (720 million m³ per year) of the domestic sector’s water requirements by the year 2020. Water quality is monitored continuously.

There are no restrictions on absolute water use in tourism. In view of the concerns over more frequent or severe droughts, however, the government in 2009 ran a media awareness campaign and introduced a 40% increase in water tariffs in the domestic and tourism sectors, based on a two-tiered tariff system penalising heavy water consumers. These two steps led to a 10% reduction in domestic water demand. The State of Israel (2010) observes, however, that the rate of water consumption per capita is higher in many hotels than among residents. This may have implications for tourism, as the two-tiered tariff system may be adjusted in future drought years to include a third tier of exceptionally high tariffs for extremely heavy consumers, including hotels with particularly high per capita consumption rates. As of 2010, on the initiative of the Ministry of Tourism, hotels have the option of getting reduced water tariffs if they commit to savings of 5% in water consumption every year. In the past year the government added another water saving measure by installing water saving devices in one million homes and in many hotels.

Water resource shortages also affect sites of national interest to tourists, including the Dead Sea, whose water level has been dropping dramatically (approximately one metre per year) for many years. Extensive intervention will be necessary to ensure the future existence of this international treasure and tourist attraction, particularly in the face of more water shortages induced by climate change. Already the drop in the water level caused by major reductions in natural inflow (mainly due to water consumption by Israel, Jordan, and Syria) has led to a rapidly receding shoreline and occurrences of sinkholes as deep as 18 metres, a potential impediment to the

construction of tourism infrastructure along the shores of the Dead Sea in Jordan, Israel and the West Bank.

Japan

Survey results: no adaptation policy for tourism exists or is being planned.

Mexico

Survey results: the National Climate Change Strategy (NCCS), presented in May 2007 by the Interministerial Commission on Climate Change, identifies opportunities for mitigation and adaptation in different sectors. Since its publication, the various units involved in the Interdepartmental Commission have prepared a Special Climate Change Programme (SCCP). This policy helps to identify the areas that are vulnerable to the effects of global warming, assesses the costs of inaction, and sets targets and measurable goals that must be achieved by the year 2012. Published in the Official Journal of the Federation on 28 August 2009, it establishes six goals for mitigation, five goals for adaptation, and nine cross-cutting goals. The paragraphs of the SCCP regarding mitigation and adaptation in the tourism sector were developed by the Ministry of Tourism.

Climate change is identified as directly affecting tourism services and infrastructure, as well as beaches and shorelines. In order to develop a policy of adaptation in the tourism sector, studies to identify the "territorial, social and economic impacts on the sector" will be promoted, as well as research programs. To this end, regional climate forecast systems will be developed, as well as early warning systems for eight important tourism destinations, together with eight vulnerability and risk maps. Moreover, a sector fund will be implemented with the National Council of Science and Technology to promote applied research. As regards obstacles to adaptation,

one particular problem is a lack of information on the part of communities hosting tourists.

New Zealand

Survey results: Tourism in New Zealand is a highly weather and climate dependent industry, with most of the popular attractions and activities enjoyed by international tourists based outdoors. A major research project to investigate preparing the tourism sector for climate change, Preparing the Tourism Sector for Climate Change (2009-2012), was accordingly commissioned by the Ministry for Economic Development and the Foundation for Research, Science and Technology. Climate change is seen to have the potential both to increase New Zealand's attractiveness to tourists, and to undermine some of its core attractions. Currently little is known about how sensitive the industry is to climatic events and the level of risk projected future changes pose; what the tourism industry's adaptive capacity is; and which adaptation measures could reduce the potential costs of climate change. This research will help protect and grow international tourism in New Zealand by identifying both the tourist activities most vulnerable to climatic change and potential opportunities for new products. It will also identify where investment is needed to limit the negative effects of climate change, and identify adaptation strategies to increase the ability of tourism decision makers to cope with resulting future changes. New knowledge will help to develop policy levers to help increase the international competitiveness of the New Zealand tourism industry (www.climatechange.govt.nz, www.tourism.govt.nz, and www.lincoln.ac.nz/research-centres/LEaP). The research results will help to identify threats and opportunities for New Zealand tourism, which may involve competition for resources, such as water, or new pests and diseases because of increased temperatures.

A number of government agencies are involved in climate change work. The Ministry for the Environment is leading the work on climate change, including an adaptation programme. Other agencies are responsible for work which is applicable to tourism, including:

- Department of Conservation – tourism and conservation initiatives

- Local Authorities – regional climate change planning and adaptation

The government's new direction for fresh water management is outlined in a new strategy announced in 2009, New Start for Fresh Water. The work programme includes:

- a Land and Water Forum led by industry stakeholders that has developed shared outcomes, goals and long-term strategies for fresh water (releasing a report in September 2010)
- engagement between ministers and Maori tribal leaders (New Zealand's indigenous people) to better understand and resolve cultural issues
- a concurrent programme for officials on matters including freshwater allocation, quality and infrastructure, science and monitoring and effective decision-making

The New Start for Fresh Water programme includes water quality and supply issues. Tourism officials and industry representatives are involved in a number of work streams to ensure that tourism's use of water, and the value placed on water, are considered in future decision-making processes (www.mfe.govt.nz, www.landandwater.org.nz).

Norway

The Research Council of Norway has initiated a research programme, Climate Change and Its Impacts in Norway (NORKLIMA). Its primary objective is to generate new knowledge about the climate system, climate trends in the past, present and future, and the direct and indirect impacts of climate change on the natural environment and society, as a basis for adaptive responses.

Secondary objectives include:

- the climate system: improving understanding of climate change both globally and regionally
- effects on the physical environment: enhancing knowledge about the effects of climate change on Norway's physical environment, including its effects on the built environment;

- effects on biotic systems: identifying and quantifying the effects of climate change on marine, limnic and terrestrial ecosystems;
- effects on society: identifying regions and sectors that may be particularly vulnerable to climate change over the next 30-50 years, and providing input for a national strategy for adaptation to projected climate change.

NORKLIMA was amended for the period 2007-2008, and now also includes the objective of improving knowledge of the links between emission trends and the development of society, and of international co-operation to mitigate climate change (Research Council of Norway, 2008).

Poland

Survey results: According to Directions for Tourism Development until 2015, key aspects of Poland's tourism policy are "promoting sustainable consumption, shaping public health through tourism, supporting actions that contribute towards a reduction of the pressure on the global climate – especially in transport, integrating the community around local tourist products, and protecting environmental resources and services provided by ecosystems". No specific documents appear to exist with regard to adaptation to climate change.

Portugal

Survey results: The National Tourism Strategic Plan recommends and encourages destinations to make commitments to environmental sustainability. In the future, adaptation-related legislation will increasingly compel tourist resorts to incorporate materials that have a connection to climate change, with incentives to be made available for innovation. Strategic measures will also include a focus on product diversification, favouring products less sensitive to climate change. There will be a focus on architectural solutions and construction techniques and materials that enhance thermal comfort while avoiding active air conditioning systems. The rational use of water will be promoted.

Environmental certification will be encouraged, also asking businesses to follow the National Strategy for Adaptation to Climate Change.

Although there are no water use plans specifically designed for tourism, the sector will be affected by emerging economy-wide legislation. For instance, the National Ecological Reserve regime restricts area use, which affects the construction of new tourism resorts, and the use of fresh water. Hotels also have to rely on public water provisions, rather than being allowed to use their own wells. There is also a classification system for hotel establishments that discriminates by environmental standard.

With regard to threats and opportunities, Portugal is seen as particularly sensitive and vulnerable to climate change, including more episodes of heavy rainfall, desertification, and rising sea levels threatening low-lying coasts. The latter in particular could have a range of highly negative consequences, with 25-110 cm of sea level rise projected by 2100. To cope with these developments, the National Strategy for Adaptation to Climate Change identifies four objectives: i) information and awareness; ii) reduced vulnerability and increased response capacity; iii) participation, creation of awareness and information; iv) international co-operation. The national strategy also identifies nine key sectors for adaptation relevant specifically for tourism. In a planned next step, sector work groups will work on moving from strategies to actions.

Slovenia

Survey results: The Development Plan and Policies of Slovene Tourism 2006-2011 [RNUST], the strategic plan for the sector, does not contain strategic objectives and activities that directly address adaptation to climate change. Responsibilities for addressing climate change are spread across various ministries, but in 2009 the Government Office of Climate Change was set up as a new central state administrative body directly responsible for climate change and for interdepartmental co-ordination of measures and policies. It is currently preparing a Climate Change Act, for adoption by the national assembly in 2011, which will provide for the inclusion of climate change mitigation and adaptation in national and sectoral policies on the basis of vulnerability studies.

No water shortages are expected to affect tourism, despite an anticipated reduction of available water quantities due to climate change. There is a range of water-related issues connected with tourist activities. These include heat and pollution discharged from swimming pools, the use of water areas for swimming pool facilities, morphological modifications of the coastline, the abstraction of water, drilling for underground water or abstraction of thermal hot water for swimming pools and natural resorts, the release of waste water from tourist facilities and restaurants (exceeding legally defined pollutant limits at releases from industrial facilities), and the abstraction of water for irrigation of non-agricultural land (e.g. for golf courses or artificial snow).

Slovak Republic

Survey results: The Tourism Policy of the Slovak Republic, adopted in 2007, supports forms of tourism that are considerate to the environment, including rural tourism, agritourism, outdoor activities, riverside holidays, cycling on reinforced and marked routes, horse riding, and golf. The policy also supports the use of public transport. Specific support should be given to all those forms of tourism whose development has long-term significance for the economy and which are independent of weather and not easily vulnerable.

With regard to water, tourism is not seen as a water-intensive economic activity. The overall level of water consumption by tourists is not too different from water consumption in households, and tourism is not seen to produce large quantities of waste and wastewater. However, intensive visitor presence in some areas in summer can have negative impacts where basic infrastructure for drinking water and wastewater treatment has not been built. A main objective of legislation is thus to achieve a good water status for all areas by 2015.

South Africa

Survey results: South Africa is in the process of developing a national climate change response policy. The policy will be finalised in early 2011. Its adaptation policy is to "effectively adapt to the unavoidable and potential climate change impacts through interventions that build and sustain South Africa's social, economic and environmental resilience and

emergency response capacity”.

The national climate change response policy provides an overarching framework for adaptation in sectors that are vulnerable to the impacts of climate change, including agriculture and tourism. Although there is no specific climate change adaptation plan for the tourism sector, most of the sectors that are key to tourism growth and development have in place, or at the development stage, strategies and action plans relevant to climate change adaptation. These include:

- Biodiversity tourism. South Africa is said to have the third highest biodiversity in the world. It contains almost 10% of the world's total known bird, fish and plant species. This biodiversity is important as it provide a basis for economic development and a foundation for the growth of the tourism industry.
- Coastal and beach tourism. Coastal areas are perceived as particularly vulnerable to the impacts of climate change because they are subject to changes both in the marine environment and in the terrestrial environment. They would be affected by sea level rise, and any changes in storm surges and wave heights, and they would also be affected by changes inland, including alterations in river flow regimes.

Other impacts associated with climate change are seen in changes in rainfall patterns, flooding and drought, more weather extremes, and the spread of diseases:

- Even without climate change, it is predicted that, within a few decades, South Africa will be using up most of its surface water resources. The most significant impacts of climate change on water resources are the potential changes in the intensity and seasonality of rainfall. While some regions may receive more surface water flow, future problems are likely to include water scarcity, increased demand for water, and water quality deterioration. Climate change may also alter the magnitude, timing, and distribution of storms that produce flood events. Arid and semi-arid regions, which cover nearly half of South Africa, are particularly sensitive to changes in precipitation, and desertification, which is already a problem in South Africa, could intensify.
- In the light of the above challenges that face South Africa's water sector, it becomes clear that

tourism will also be affected, particularly water-based tourism, sport and attractions. Flooding may also have a negative impact on tourism infrastructure and increase the cost of operating a tourism business. The spread of diseases such as diarrhoea is at times associated with poor water quality, which may make some places unattractive to potential tourists. Destinations whose attractions rely on substantial water resources will be affected, as well as specific forms of tourism, such as golf tourism or visits to botanical gardens.

More generally, threats for tourism associated with climate change are seen in the fragmented and uncoordinated implementation of adaptation, lack of knowledge and assessments of vulnerabilities, conflicts with growth and development strategies, and thus the overall contribution of the sector to GDP and employment. Opportunities, on the other hand, are seen in the possibility of capitalising on the raised awareness of issues related to climate change to deal with water shortages (Republic of South Africa, 2010).

Turkey

Overall climate change strategy in Turkey is led by the Ministry of Environment and Forestry which is the co-ordinating body and the national focal point on climate change. As of 26 August 2009 Turkey is a party to the Kyoto Protocol. The country attaches great importance to combating climate change and its negative effects, and hosted several major conferences in 2009 contributing to the implementation of the United Nations Convention to Combat Desertification (UNCCD) ten-year strategy.

Turkey has implemented various projects relating to climate change adaptation and mitigation. On the former, a project entitled Enhance Turkey's Capacity to Adapt to Climate Change began in 2008. On the latter, a project entitled Sectoral Mitigation Potential of GHG Emissions Reduction and Related Costs is to be finalised in 2012. Another project, Developing the Capacity of Turkey to Participate Efficiently in the International Climate Change Negotiations and Voluntary Carbon Markets, started in 2009. A project to establish synergy between the three Rio Conventions – the UNCCD, the UNFCCC and the Convention on Biological Diversity

- was to be finalised that same year, when implementation also started on the Climate Change Action Plan.

COUNTRY	ADAPTATION STRATEGIES IDENTIFIED	POLICY IN PLACE	THREATS AND OPPORTUNITIES
AUSTRALIA	K (ONLINE WEB MAPPING TOOL); EI, AC, C	UNDER DEVELOPMENT	WILL INCREASE COSTS
AUSTRIA	R	–	WILL AFFECT WINTER, SUMMER, LAKE, AND CITY TOURISM, INCREASE RISK IN ALPS.
ESTONIA	NONE EXISTING	NONE EXISTING	UNIDENTIFIED
FRANCE	R, K	–	CLIMATE COMFORT IN SUMMER WILL DECLINE, WINTER SPORTS WILL BE AFFECTED
GERMANY	R, C, ACT	WATER FRAMEWORK DIRECTIVE, FLOODS DIRECTIVE (EC)	CHANGING TRAVEL FLOWS, LOST WINTER TOURISM OPPORTUNITIES, WATER AVAILABILITY AND QUALITY
GREECE	R	–	DROUGHTS, MORE INTENSE RAINFALL, FLOODS AND SOIL EROSION, ACCELERATING DESERTIFICATION, SEA LEVEL RISE, SALT-WATER INTRUSION IN COASTAL AQUIFERS, DECLINING FRESHWATER RESOURCES AND WATER QUALITY
HUNGARY	K, RISK	–	SUMMER, CULTURAL, ACTIVE, AND ECOTOURISM VULNERABLE, INCREASING COSTS FOR HEATING, AIR-CONDITIONING, IRRIGATION
IRELAND	ACT, K,	URBAN WASTEWATER DIRECTIVE, WATER FRAMEWORK DIRECTIVE, AWARD SCHEMES	CHANGING TOURIST FLOWS, PHYSICAL IMPACTS MODERATE, DRIER AND WARMER SUMMERS, ALTERED HABITATS AND BIODIVERSITIES, FLOODING, INUNDATION OF BEACHES, INVASIVE SPECIES, WATER POLLUTION
ISRAEL	–	WATER TARIFFS INCREASED	WATER AVAILABILITY, DROUGHTS, THREATENED DESTINATIONS (DEAD SEA)
JAPAN	NONE EXISTING	NONE EXISTING	–
MEXICO	R	–	WILL AFFECT BEACHES AND SHORELINES; LACK OF AWARENESS
NEW ZEALAND	R	–	–
NORWAY	R	–	–
PORTUGAL	K, C, ACT	NATIONAL ADAPTATION PLAN	WILL AFFECT IN PARTICULAR COASTLINES (SEA LEVEL RISE), RISK OF HEAVY RAINFALLS, DESERTIFICATION
SOUTH AFRICA	AC	–	BIODIVERSITY, COASTAL ZONES AND BEACHES, RAINFALL, FLOODING, DISEASES

Table
08

ADAPTATION ACTION IN SELECTED COUNTRIES

ABBREVIATIONS:

K: CREATING KNOWLEDGE AND AWARENESS AMONG STAKEHOLDERS / EI: RESEARCH ON THE ECONOMIC IMPACT OF CLIMATE CHANGE ON KEY TOURISM ACTIVITIES / AC: ANALYSIS OF ADAPTIVE CAPACITY OF THE TOURISM INDUSTRY / C: COMMUNICATE GOVERNMENT POLICY AND RELEVANT INFORMATION / R: RESEARCH ON ADAPTATION NEEDS /ACT: ADAPTATION ACTION PLAN / RISK: IDENTIFICATION OF RISKS

Source: Information based on OECD Survey, 2010.

PRIORITY AREAS IDENTIFIED BY THE TOURISM INDUSTRY ■ ■ ■

World Travel and Tourism Council (WTTC)

The WTTC (2010) suggests identifying climate change hotspots and supporting the adaptation efforts of communities. Tourism is seen to have the potential to contribute to a low carbon future, “combining initiatives which promote energy efficiency with the need to secure clean water supplies while protecting biodiversity”. Moreover, it says, “travel and tourism could be one of the most coherent, non-extractive, economic activities for forest communities and can act as a major tool for Reducing Emissions from Deforestation and Degradation (REDD)” (WTTC,

2010:9). In this regard it proposes various actions. For governments, these include integrating mitigation and adaptation policies in tourism planning, considering tourism in national climate vulnerability assessments, promoting collaboration between national and local governments and the private sector to communicate the benefits of adapting to a low-carbon economy, considering poverty reduction as a tourism development goal, and combining REDD actions with small-scale, high-value nature-based tourism in forest communities to provide alternative sources of income.

ACTION BY INTERNATIONAL ORGANISATIONS ■ ■ ■

OECD

The OECD has been working on climate change economics and policy since the late 1980s. The OECD works closely with governments to help them to identify and implement least-cost policies to reduce GHG emissions in order to limit climate change, as well as to integrate adaptation to climate change into all relevant sectors and policy areas (OECD, 2007). As OECD countries are the major international donors, OECD has a critical role in tracking climate finance, and in examining how public finance can be scaled-up and best targeted to help leverage private financial flows. In the wake of the economic crisis, the OECD is also looking at how measures that governments are taking to spur economic growth can best be formulated so that they support – and do not work against – the objectives of moving towards a green, low-carbon economy. Given the global nature of the climate change challenge, and its widespread economic, social and environmental impacts, the OECD is in a unique position to help countries put climate policy on a solid economic footing consistent with frameworks for development. Work on climate change is under way across the OECD, engaging government representatives from a range of ministries.

UNEP

UNEP considers climate change in several divisions as well as through collaborations with other international bodies. Within the Global Partnership for Sustainable Tourism, recognising the need to raise awareness on the topic of climate change among tourism industry actors and consumers, UNEP has developed a series of capacity building and communications materials. These are designed to facilitate adaptation to the existing and expected effects of climate change, and to help anticipate and mitigate future impacts. Thus, in relation to the tourism industry, UNEP developed from 2007 and 2009 several seminars on climate change adaptation and mitigation in the sector, with the University of Oxford as academic partner and UNWTO as co-host, on frameworks, policies and practices targeting government and industry experts. Additionally, UNEP in partnership with the Caribbean Alliance for Sustainable Tourism produced in 2009 a handbook to support climate change adaptation efforts in tourism destinations and communities. This handbook aims to reduce the impacts of natural disasters on local coastal tourism communities. The handbook’s approach builds on UNEP’s Awareness and Preparedness for Emergencies at the Local Level (APELL) process, designed to create public awareness of hazards and to ensure that communities and emergency services are adequately trained and prepared to respond.

With regard to consumer communication materials, UNEP has designed the Green Passport Campaign. This provides information for tourists to help them prevent some of their impacts by avoiding certain behaviours that greatly affect the environment and the society. The green travel tips address the whole cycle of a holiday, from travel planning and packaging to the way back home, and include a special session on climate change. The campaign presents, in an accessible language, the knowledge gained from current scientific research on measures that tourists and the tourism industry can take to minimise their impacts on climate change.

UNWTO

UNWTO (2010) states that the organisation has been working to raise awareness on climate change issues in the tourism sector since 2003, when the first International Conference on Climate Change and Tourism was organised by UNWTO and several other United Nations agencies in Djerba, Tunisia. The conference resulted in the *Djerba Declaration on Climate Change and Tourism*, which highlighted the obligation of the tourism industry to reduce its greenhouse gas emissions and recognised the two-way relationship between tourism and

climate change, *i.e.* that tourism both contributes to climate change and is affected by it. A second International Conference on Climate Change and Tourism was held in Davos, Switzerland in 2007, in co-operation between UNWTO, UNEP and WMO, resulting in the Davos Declaration. The Declaration includes “firm recommendations and a clear commitment for action to respond to the climate change challenge including the urgent adoption of a range of sustainable tourism policies” (UNWTO, 2010:4).

Commission of the European Communities

The Commission (CEC, 2010:5,11) mentions climate change twice as an issue in its policy framework document for tourism development in Europe. It states, as a challenge for tourism policy, that “the supply of tourism services must in future take into account constraints linked to climate change, the scarcity of water resources, pressure on biodiversity and the risks to the cultural heritage posed by mass tourism”. It also outlines, as planned action, the need to “facilitate identification by the European tourism industry of risks linked to climate change in order to avoid loss-making investments, and explore opportunities for developing and supplying alternative tourism services”.

ANALYSIS AND CONCLUSIONS: Climate adaptation objectives and action in OECD countries ■ ■ ■

The analysis of documents and survey results shows that only about a quarter of the countries (12 out of 44) have considered adaptation strategies for tourism, with two concluding that no adaptation is necessary. Virtually none of the countries has planned or implemented adaptation policies for the sector. Exceptions are Germany and Israel, which have implemented policies with regard to flooding and water use respectively, but in neither case are these specific either to climate change or to tourism. Guidelines for intensifying work on adaptation may be sought from international organisations including OECD, UNEP and UNWTO, which encourage an intensification of work on adaptation and sustainable tourism policies more generally.

Overall, the results indicate that countries are generally focusing on already

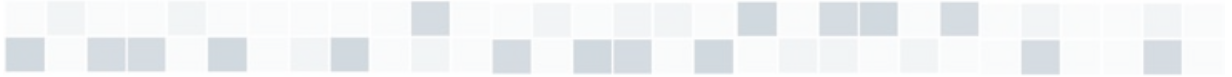
pressing issues, such as fresh water availability, or reduced snow cover. Key vulnerabilities are linked to increases in weather extremes, flooding, drought and water shortages (also affecting water-related tourism activities), declining water quality, changes in snow reliability, and coastal erosion, as well as conditions less suitable for tourism in already warm countries (increasing heat stress). Even though some countries have started to identify impacts and to discuss adaptation, recommendations are usually generic in character (*e.g.* “greater role for research”, “restructuring to non-tourism economic activities”). Countries stress both the importance of awareness raising and developing better knowledge through research. Overall, there is thus a lack of impact assessments, with regard to changing physical conditions for holiday-making as

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well as their economic consequences, and a lack of analyses of capacity to adapt to these impacts. Adaptation policy development itself is in its earliest stages. As outlined by Haas *et*

al. (2008) for Austria, this may be a result of prevailing key research gaps that need to be addressed before adaptive measures can be implemented.





Chapter
05

PROPOSED AGENDA FOR FURTHER RESEARCH AND DEVELOPMENT

A number of key policy actions seem to emerge from the findings in this report. Strong growth in emissions from aviation is unavoidable if no stronger regulatory environment is implemented. Aviation industry groups and tourism organisations maintain that emission reduction strategies need to consider “social and economic” dimensions, as well as the principle of “common but differentiated responsibilities” (CBDR). It is unclear whether growth in tourism emissions can be compensated for by greater emission reductions in other sectors – maintaining a 2°C objective – and whether further growth is possible even under the CBDR principle, given that for instance many tourism-dependent island states already exceed sustainable per capita emission levels (Gössling, 2010). Policy development and research will need to address both the ethical and economic implications of exceeding the 2°C objective, based on i) the argument of poverty alleviation, and ii) burden sharing between sectors, based in part on the argument that aviation’s options for reducing emissions will be better in the longer-term future.

It has been argued that an open trading scheme for aviation could lead to a situation where there is a risk of economic disruptions (Scott *et al.*, 2010). This is because, in a system such as that currently envisaged by the European Union, aviation could continue to grow due to cheaply available credits in global (uncapped) carbon markets. Further research on modelling would be needed to understand whether a global agreement on caps could lead to rather rapid increases in prices of carbon permits in the medium-term future, which could add to world market price rises of aviation fuels. This research should also consider various scenarios for biofuels, which may or may not be able to make a significant contribution to meeting fuel demand. Conversely, research on modelling is needed to show how emissions from aviation might grow in the absence of capped carbon markets, and how emission growth and aviation would be affected under the alternative scenarios of a closed aviation trading scheme, or an open trading scheme with limited options for aviation to buy permits from other sectors.

Tourism and airline organisations have called for funds raised from levies to be earmarked for green investments. Usually, this has focused on the development on biofuels or technology more generally. As it is unclear whether biofuels will be able to make a significant contribution to meeting future fuel demands, it should be investigated whether part of the funds could be used to develop alternative transport systems, such as high-speed rail.

Knowledge of transport policies, as a key strategy to reduce tourism-related emissions, needs to improve. In particular, this would include a review of local and regional policies that have sought to reduce emissions related to mobility. Based on this review, more strategic decisions could be made as to which policies have proved to be successful in reducing emissions and these could then be implemented on a wider basis.

Most studies of changing transport systems have focused on industrialised countries, discussing, for instance, how politics should be designed to reduce emissions from air travel, foster purchases of fuel-efficient cars, achieve modal shift, or create preconditions for low-carbon transport systems more generally. There is a notable absence of research, however, with regard to developments in India, China and other countries, where largely sustainable transport systems that have existed for long periods of time are currently being transformed in favour of individual motorised transport (predominantly by car) and mass participation in air travel. Paradoxically, China and India may thus be engaged in converting the very transport systems that urban planners seek to establish in European cities, *i.e.* systems with a high share of bicycle traffic and efficient public transport. A question that deserves discussion is what the preconditions would be, under which sustainable transport systems in China and India could be maintained.

More generally, there should be further research into and exploration of perceptions and understanding of climate change and climate change mitigation, the identification

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of best practice approaches to mitigation and adaptation, and the challenges of mitigation and adaptation for tourism. There should be a focus on Asia and India, regions that will dominate world tourism in the medium-term future (Mayor and Tol, 2010a), but also on so far under-researched regions such as Africa and South America.

More strategic research is needed to address adaptation-related research gaps, for instance with regard to tourist perceptions of changing environments. Very little is known in this regard, but these insights would constitute an important basis for developing strategic adaptation plans for destinations.





REFERENCES



- AGD (Aviation Global Deal) Group. (2009), "A sectoral approach to addressing international aviation emissions", Discussion Note 2.0, 9 June 2009, retrieved 22 December 2009, www.agdgroup.org/pdfs/090609_AGD_Discussion_Note_2.0.pdf.
- Allison, I., *et al.* (2009), *The Copenhagen Diagnosis, 2009: Updating the world on the Latest Climate Science*, The University of New South Wales Climate Change Research Centre (CCRC), Sydney, Australia.
- Anderson, K. and A. Bows (2008), "Reframing the Climate Change Challenge in Light of Post-2000 Emission Trends", *Philosophical Transactions of the Royal Society*, Vol. 366, No. 1882, pp. 3863-3882.
- AOSIS (Alliance of Small Island States) (2009), "AOSIS Declaration on Climate Change", www.sidsnet.org/.../AOSIS%20Summit%20Declaration%20Sept%2021%20FINAL.pdf.
- Ariza-Montobbio, P. and S. Lele (2010), "Jatropha plantations for biodiesel in Tamil Nadu, India: Viability, livelihood tradeoffs, and latent conflict", *Ecological Economics*, Vol. 70, No. 2, 15 December 2010, pp. 189-195.
- Arnell, N.W. (2004), "Climate change and global water resources: SRES emissions and socio-economic scenarios", *Global Environmental Change*, 14, pp. 31-52.
- Barker, N. and C. Robert (2008), "Attitudes to and Preferences of Divers Toward Regulation", in Garrod, B. and S. Gössling (eds.), *New Frontiers in Marine Tourism: Diving Experiences, Sustainability, Management*, Elsevier, Amsterdam.
- Becken, S. and J. Hay (2007), *Tourism and Climate Change – Risks and Opportunities*, Channel View Publications, Clevedon.
- Behringer, J., R. Buerki and J. Fuhrer (2000), "Participatory integrated assessment of adaptation to climate change in Alpine tourism and mountain agriculture", *Integrated Assessment*, Vol. 1, pp. 331-338.
- Bigano, A., *et al.* (2008), "Economy-wide impacts of climate change: a joint analysis for sea level rise and tourism", *Mitigation and Adaptation Strategies for Global Change*, Vol. 13, pp. 765-791.
- BMU (Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit) (2007), Report on the implementation of the key elements of an integrated energy and climate programme adopted in the closed meeting of the Cabinet on 23/24 August 2007 in Meseberg, www.bmu.de/files/pdfs/allgemein/application/pdf/gesamtbericht_iekp_en.pdf.
- BMWFJ (Bundesministerium für Wirtschaft, Familie und Jugend) (2010), Neue Wege im Tourismus. www.bmwfj.gv.at/Tourismus/TourismuspolitischeAktivitaeten/Documents/Broschüre%20Tourismusstrategie.pdf.
- Bodhanowicz, P. and I. Martinac (2007), "Determinants and benchmarking of resource consumption in hotels – Case study of Hilton International and Scandic in Europe", *Energy and Building*, Vol. 39, pp. 82-95.

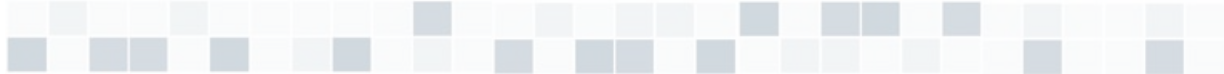


- Bows, A., K. Anderson and A. Footitt (2009), "Aviation in a low-carbon EU", in Gössling, S. and P. Upham (eds.), *Climate Change and Aviation*, Earthscan, London, pp. 89-109.
- Breiling M., P. Charamza and O. Skage (1997), "Klimasensibilität österreichischer Bezirke im Bezug auf Wintertourismus", research report prepared for and under submission to the Austrian Federal Ministry of Economic Affairs and the Austrian Federal Ministry of Environment, Youth and Family Affairs, Vienna, Austria.
- Bruijn, K., *et al.* (2010), *Travelling Large in 2008: The carbon footprint of Dutch holidaymakers in 2008 and the development since 2002*, www.cstt.nl/images/file/travelling%20large%20in%202008_final.pdf.
- Bundesregierung (2010), Luftverkehrssteuer, 1 September 2010, www.bundesregierung.de/nn_774/Content/DE/Artikel/2010/09/2010-09-01-luftverkehrssteuer.html.
- CEC (Commission of the European Communities) (2010), "Europe, the World's No. 1 Tourist Destination – A New Political Framework for Tourism in Europe", European Commission, Brussels, http://ec.europa.eu/enterprise/sectors/tourism/files/communications/communication2010_en.pdf.
- CEDEFOP (European Centre for the Development of Vocational Training) (2010), "Skills for green jobs", Country report: France, www.cedefop.europa.eu/EN/.
- Center on Ecotourism and Sustainable Development (2006), *Cruise Tourism in Belize: Perceptions of Economic, Social and Environmental Impact*, www.responsibletravel.org/projects/documents/Belize%20Executive%20Summary.pdf.
- Chakravarti, S., *et al.* (2009), "Sharing Global CO₂ Emission Reductions Among One Billion High Emitters", PNAS early edition, www.pnas.org/cgi/doi/10.1073/pnas.0905232106, accessed 14 July 2009.
- Chapagain, A.K. and A.Y. Hoekstra (2008), "The global component of freshwater demand and supply: an assessment of virtual water flows between nations as a result of trade in agricultural and industrial products", *Water International*, Vol. 33(1), pp. 19-32.
- CIDA (Canadian International Development Agency) (2005), *Adapting to climate change in the Caribbean. Final Report*. Global Change Strategies International and de Romilly and de Romilly Ltd., Halifax, Canada.
- Clarke, R. and J. King (2004), *The Atlas of Water: Mapping the World's most Critical Resource*, Earthscan, London.
- CLIA (Cruise Lines International Association) (2009), *2009 CLIA Cruise Market Overview: Statistical Cruise Industry Data Through 2008*, CLIA, Florida.
- Downward, S.R. and R. Taylor (2007), "An Assessment of Spain's Programa AGUA and its Implications for Sustainable Water Management in the Province of Almería, Southeast Spain", *Journal of Environmental Management* 82, pp. 277-289.
- Dubois, G. *et al.* (2011), "The Future Tourism Mobility of the World Population: Emission Growth Versus Climate Policy", *Transportation Research Part A*, in press, doi:10.1016/j.tra.2009.11.004.
- Dwyer, L., *et al.* (2010a), "Estimating the carbon footprint of Australian tourism", *Journal of Sustainable Tourism*, Vol. 15(5), pp. 1-18.
- Dwyer, L. *et al.* (2010b), *Megatrends Underpinning Tourism to 2020: Analysis of key drivers for change*, Sustainable Tourism Co-operative Research Centre, Australia, www.crctourism.com.au/WMS/Upload/Resources/bookshop/80046%20Dwyer_TourismTrends2020%20WEB.pdf.
- Ecotourism Society (1998), *Meeting the Global Challenge of Community Participation in Ecotourism: Case Studies and Lessons from Ecuador*, The Nature Conservancy, Arlington, Virginia, www.ecotourism.org/atf/cf/%7B82a87c8d-0b56-4149-8b0a-c4aaced1cd38%7D/1998_TNC_COMMUNITY-TOURISM-ECUADOR.PDF.

- Eijgelaar, E., C. Thaper and P. Peeters (2010), "Antarctic cruise tourism: The paradoxes of ambassadorship, last chance tourism and greenhouse gas emissions", *Journal of Sustainable Tourism*, Vol. 18 (3), pp. 337-354.
- Ernst and Young (2010), *Action Amid Uncertainty: The Business Response to Climate Change*, [www.ey.com/Publication/vwLUAssets/Action_amid_uncertainty:_the_business_response_to_climate_change/\\$FILE/Action_amid_uncertainty.pdf](http://www.ey.com/Publication/vwLUAssets/Action_amid_uncertainty:_the_business_response_to_climate_change/$FILE/Action_amid_uncertainty.pdf).
- Euractiv (2009), "EU Carbon Tax on New Commission's Agenda Early Next Year", www.euractiv.com/en/climate-change/eu-carbon-tax-new-commission-agenda-early-year/article-187029, accessed 25 February 2010.
- European Parliament and Council (2009), "Directive 2008/101/EC of the European Parliament and of the Council of 19 November 2008 amending Directive 2003/87/EC so as to include aviation activities in the scheme for greenhouse gas emission allowance trading within the Community", *Official Journal of the European Union*, 13 January 2009.
- Fáilte Ireland (2010), Environmental Guidelines, www.failteireland.ie/Business-Supports/Environmental-Guidelines.
- Fáilte Ireland (n.d.), Tourism and the Environment, Fáilte Ireland's Environmental Action Plan 2007-2009, www.noticenature.ie/files/Tourism-and-the-Environment.pdf.
- Fáilte Ireland and the Heritage Council (2009), *Climate Change, Heritage and Tourism – Implications for Ireland's Coast and Inland Waterways*, www.heritagecouncil.ie/fileadmin/user_upload/Publications/Marine/ClimateReportWeb_version_june_09FINAL.pdf.
- Federal Government of Germany (2008), "German Strategy for Adaptation to Climate Change", www.bmu.de/english/climate/downloads/doc/42841.php.
- Font, X., J. Cochrane and R. Tapper (2004), *Tourism for Protected Area Financing: Understanding tourism revenues for effective management plans*, Leeds Metropolitan University, Leeds.
- Garrod, B. and J. C. Wilson (2003), *Marine Ecotourism: Issues and Experiences*, Multilingual Matters Limited, Clevedon.
- GBEP (Global Bioenergy Partnership) and FAO (Food and Agriculture Organization) (2008), *A Review of the Current State of Bioenergy Development in G8 +5 countries*, FAO, Rome.
- Giddens, A. (2009), *The Politics of Climate Change*, Polity Press, Cambridge.
- GISS (Goddard Institute for Space Studies) (2010), "GISS Surface Temperature Analysis", <http://data.giss.nasa.gov/gistemp/>, accessed 22 January 2010.
- Global Humanitarian Forum (2009), *The Anatomy of a Silent Crisis*, Global Humanitarian Forum, London.
- Gössling, S. (2001), "The consequences of tourism for sustainable water use on a tropical island: Zanzibar, Tanzania", *Journal of Environmental Management*, Vol. 61(2), pp. 179-191.
- Gössling, S. (2002), "Global environmental consequences of tourism", *Global Environmental Change* Vol. 12(4), pp. 283-302.
- Gössling, S. (2005), "Tourism's contribution to global environmental change: Space, energy, disease and water", *Tourism Recreation and Climate Change: International Perspective*, Hall, C. M. and J Higham, Channel View Publications, Clevedon, pp.286-300.
- Gössling, S. and C. M. Hall (eds.) (2006), *Tourism and Global Environmental Change: Ecological, Social, Economic and Political Interrelationships*, Routledge, London.

- Gössling, S. and P. Upham (2009), "Introduction: Aviation and Climate Change in Context", in Gössling, S. and P. Upham (eds.), *Climate Change and Aviation*, pp. 1-23, Earthscan, London.
- Gössling, S., P. Peeters and D. Scott (2008), "Consequences of climate policy for international tourist arrivals in developing countries", *Third World Quarterly*, Vol. 29(5), pp. 873-901.
- Gössling, S., et al. (2008), *Climate Change Adaptation and Mitigation in the Tourism Sector: Frameworks, Tools and Practices*, UNEP, University of Oxford, UNWTO, WMO, Paris.
- Gössling, S., et al. (2009), "Hypermobility Travellers", in Gössling, S. and P. Upham (eds), *Climate Change and Aviation*, pp. 131-148, Earthscan, London.
- Gössling, S., et al. (2010), *Carbon Management in Tourism: Mitigating the Impacts on Climate Change*, Routledge, London.
- Goulder, L.H. and R. N. Stavins (2010), "Interactions Between State and Federal Climate Policies", discussion paper prepared for the Harvard Project on International Climate Agreements <http://belfercenter.ksg.harvard.edu/files/StavinsGoulderFinal-3.pdf>.
- Government of Anguilla (2008), "The Anguilla National Energy Policy: 2008-2020", www.gov.ai/documents/Final%20Public%20Draft%20Anguilla%20National%20Energy%20Policy%20July%2018%202008%20DRAFT%20_2_.pdf.
- Government of Australia (2010a), "Adapting to Climate Change in Australia: An Australian Government Position Paper", www.climatechange.gov.au/en/government/~media/publications/adaptation/190210-dcc-positionpaper.aspx.
- Government of Australia (2010b), "Industry Resilience Working Group, www.ret.gov.au/tourism/tmc/workinggrps/industry/Pages/default.aspx.
- Government of France (2009), "Annual Report to Parliament on Implementing France's Environment Round Table Commitments", Commissariat Général au Développement Durable, Ministère de l'Écologie, du Développement durable, des Transports et du Logement de la France, www.legrenelle-environnement.fr/IMG/pdf/rapport_Grenelle_ang.pdf.
- Government of Ireland (2007), *Ireland National Climate Change Strategy 2007-2012*, www.environ.ie/en/Environment/Atmosphere/ClimateChange/NationalClimateChangeStrategy/PublicationsDocuments/FileDownload,1861,en.pdf and www.change.ie.
- Government of Japan (1998), "Law Concerning the Promotion of Measures to Cope with Global Warming", www.env.go.jp/en/laws/global/warming.html.
- Government of the United Kingdom, "Climate Change Act 2008", Chapter 27, Carbon Target and Budgeting: The Target for 2050, www.legislation.gov.uk/ukpga/2008/27/contents.
- Haas, W., et al. (2008), "Identifikation von Handlungsempfehlungen zur Anpassung an den Klimawandel in Österreich: 1. Phase, 2008", report on behalf of Lebensministerium. Lebensministerium, Wien.
- Haites, E. (2009), "Linking emissions trading schemes for international aviation and shipping emissions", *Climate Policy*, Vol. 9, pp. 415-430.
- Hall, C.M. (2008), "Tourism and climate change: Knowledge gaps and issues", *Tourism Recreation Research*, Vol. 33, pp. 339-350.
- Hall, C.M. and J. Higham, J. (eds.) (2005), *Tourism, Recreation and Climate Change*, Channel View Publications, Clevedon.
- Hall, C.M. and T. Härkönen (2007), *Lake Tourism: An Integrated Approach to Lacustrine Tourism Systems*, Channel View Publications, Clevedon.


- Hansen, J., *et al.* (2006), "Dangerous human-made interference with climate: A GISS model E study", *Atmospheric Chemistry and Physics*, Vol. 7, pp. 2287–2312.
- Heggie, T.W. (2010), "Swimming with death: Naegleria fowleri infections in recreational waters", *Travel Medicine and Infectious Disease*, Vol. 8, Issue 4, July 2010, pp. 201–206, Elsevier.
- HM Revenue and Customs (2008), "Air Passenger Duty – Introduction", http://customs.hmrc.gov.uk/channelsPortalWebApp/channelsPortalWebApp.portal?_nfpb=true&_pageLabel=pageExcise_InfoGuides&id=HMCE_CL_001170&propertyType=document.
- Hoekstra, A.Y. and A K Chapagain (2007), "Water footprints of nations: Water use by people as a function of their consumption pattern", *Water Resources Management*, Vol. 21(1), pp. 35–48.
- Hoekstra, A.Y. and P. Q. Hung (2002), "Virtual water trade: A quantification of virtual water flows between nations in relation to international crop trade", *Value of Water Research Report Series No.11*, UNESCO-IHE, Delft.
- IEA (International Energy Agency) (2009), *Transport Energy and CO₂: Moving towards Sustainability*, OECD Publishing.
- IEA (2010), Press release World Energy Outlook 2010, www.worldenergyoutlook.org/docs/weo2010/press_release.pdf.
- IMO (International Maritime Organization) (2009a), "Prevention of Air Pollution from Ships", Second IMO GHG Study 2009, www.imo.org/includes/blastDataOnly.asp/data_id%3D26047/INF-10.pdf.
- IMO (2009b), "Climate change: A challenge for IMO too!", Background Paper, World Maritime Day 2009, www.imo.org/includes/blastDataOnly.asp/data_id%3D26316/backgroundE.pdf.
- IPCC (Intergovernmental Panel on Climate Change) (2007), *Fourth Assessment Report: Climate Change* 2007, Cambridge University Press, Cambridge.
- IPCC (2008), *Climate Change and Water*, Cambridge University Press, Cambridge.
- IATA (International Air Transport Association) (2009), *The IATA Technology Roadmap Report*, www.iata.org/NR/rdonlyres/8FC59023-919D-4719-8CEE-F20FF1BAB181/O/Technology_Roadmap_May2009.pdf.
- ICAO (International Civil Aviation Organization) (2010), "Assembly – 37th session", Working Papers by number, www.icao.int/cgi/a37.pl?wp:EX.
- Johansson, Bengt (2000), "The Carbon Tax in Sweden", *Innovation and the Environment*, OECD Publishing, Paris, pp. 85–94.
- Jopp, R., T. DeLacy, and J. Mair (2010), "Developing a framework for regional destination adaptation to climate change", *Current Issues in Tourism*, Vol. 13:6, pp. 591 – 605, first published on 28 May 2010 (iFirst), Routledge.
- Köhler, J., *et al.* (2009) "A transitions model for sustainable mobility", *Ecological Economics* Vol. 68/12, pp. 2985–2995.
- Lebensministerium (2007), *Anpassung der Klimastrategie Österreichs zur Erreichung des Kyoto-Ziels 2008-2012*, www.klimawandelanpassung.at/.
- Lebensministerium (2008), "Identifikation von Handlungsempfehlungen zur Anpassung an den Klimawandel in Österreich: 1. Phase, 2008", <http://umwelt.lebensministerium.at/article/articleview/71921/1/7073/>.
- Lebensministerium (2010), "Mobilitätsmanagement für Tourismus und Freizeit", available at www.klimaaktiv.at/article/archive/16147/.



- Lee, D. S., *et al.* (2009), "Aviation and global climate change in the 21st century", *Atmospheric Environment*, Vol. 43, pp. 3520-3537.
- Mangone, G.J. (2010), "American beach laws and policies", *Ocean and Coastal Management*, Vol. 53, Issue 8, p454-467.
- Mayor, K. and R.S.J. Tol (2007), "The impact of the UK aviation tax on carbon dioxide emissions and visitor numbers", *Transport Policy*, Vol. 14, pp. 507-513.
- Mayor, K. and R.S.J. Tol (2008), "The impact of the EU-US Open Skies agreement on international travel and carbon dioxide emissions", *Journal of Air Transport Management*, Vol. 14, pp. 1-7.
- Mayor, K. and R.S.J. Tol (2009), "Aviation and the environment in the context of the EU-US Open Skies agreement", *Journal of Air Transport Management*, Vol. 15, pp. 90-95.
- Mayor, K. and R.S.J. Tol (2010a), "Scenarios of carbon dioxide emissions from aviation", *Global Environmental Change*, Vol. 20, pp. 65-73.
- Mayor, K. and R.S.J. Tol (2010b), "The impact of European climate change regulations on international tourist markets", *Transportation Research Part D*, Vol. 15, pp. 26-36.
- McAller, M., R. Shareef and B. da Veiga (2005), "Managing daily tourism tax revenue risk for the Maldives", www.mssanz.org.au/modsim05/papers/mcaleer.pdf.
- Meinshausen, M., *et al.* (2009), "Greenhouse-gas emission targets for limiting global warming to 2° C", *Nature*, Vol. 458 (7242), pp. 1158-1162.
- Miljövarsberedningen (2007), "Vetenskapligt underlag för klimatpolitiken – Rapport från Vetenskapliga rådet för klimatfrågor", Rapport 2007:03.
- Mintel (2008), *Cruises International*, June 2008, Mintel Oxygen.
- Nature Conservancy (2001), *Sustainable finance for protected areas: visitor use fees and concession systems in protected areas*, Galapagos National Park, The Nature Conservancy, Arlington, Virginia www.parksinperil.org/files/csp_c_20_4_sustainable_finance_for_protected_areas_visitor_use_fees_galapagos.pdf.
- New York Times (2010), "U.S. Steps Up Its Effort Against a European System of Fees on Airline Emissions", www.nytimes.com/2010/09/10/business/energy-environment/10emit.html, 9 September 2010.
- Nilsson, J.H. (2009), "Low-Cost Aviation", in Gössling, S. and P. Upham (eds), *Climate Change and Aviation*, Earthscan, London, pp. 113-129.
- OECD (2007), *Climate Change in the European Alps: Adapting Winter Tourism and Natural Hazards Management*, OECD Publishing.
- OECD (2009), *The Economics of Climate Change Mitigation: Policies and Options for Global Action Beyond 2012*, OECD Publishing.
- OECD (2010a), *OECD Tourism Trends and Policies 2010*, OECD Publishing.
- OECD (2010b), *Taxation, Innovation and the Environment*, OECD Publishing.
- OECD (2011), *OECD Environmental Performance Reviews: Portugal 2011*, OECD Publishing.
- Orams, M. (1998), *Marine Tourism: Development, Impacts and Management*, London, Routledge.
- Owen, B., D. S. Lee and L. Lim (2010), "Flying into the Future: Aviation Emissions Scenarios to 2050", *Environmental Science and Technology*, Vol. 44, pp. 2255-2260.

- Parry, M., *et al.* (2009), *Assessing the Costs of Adaptation to Climate Change: A Review of the UNFCCC and Other Recent Estimates*, International Institute for Environment and Development and Grantham Institute for Climate Change, London.
- Parry, M., J. Lowe and C. Hanson (2008), "The consequences of delayed action on climate change", www3.imperial.ac.uk/pls/portallive/docs/1/53345696.PDF.
- Peeters, P. M. and G. Dubois (2010), "Exploring tourism travel under climate change mitigation constraints", *Journal of Transport Geography*, Vol. 18, pp. 447-457.
- Perch-Nielsen, S., A. Sesartic and M. Stucki (2010), "The greenhouse gas intensity of the tourism sector: The case of Switzerland", *Environmental Science and Policy*, Vol. 13, pp. 131-140.
- PricewaterhouseCoopers (2010), *Appetite for Change: Global business perspectives on tax and regulation for a low carbon economy*, www.pwc.com/appetiteforchange.
- Republic of South Africa (2010), "Effects of climate change", <http://soer.deat.gov.za/174.html#3561>.
- Research Council of Norway (2008), "Revised Programme Plan 2008-2013", www.forskningsradet.no.
- Reuters (2010), "Islands warn rich nations' emissions pledges fall short", www.reuters.com/article/idUSTRE6722XX20100803.
- Rico-Amoros, A.M., J. Olcina-Cantos and D. Sauri (2009), "Tourist land use patterns and water demand: Evidence from the Western Mediterranean", *Land Use Policy*, Vol. 26, pp. 493-501.
- Rodriguez Diaz, J.A., J.W. Knox and E.K. Weatherhead (2007), "Competing demands for irrigation water: Golf and agriculture in Spain", *Irrigation and Drainage*, Vol. 56, pp. 541-549.
- Rogelj, J., *et al.* (2009), "Halfway to Copenhagen, no way to 2 °C", *Nature Reports Climate Change*, Issue 7, July 2009, pp. 81-83.
- Sausen, R. and D.S. Lee (2000), "New directions: Assessing the real impact of CO₂ emissions trading by the aviation industry", *Atmospheric Environment*, Vol. 34, pp. 5337-5338.
- Schafer, A. and D. G. Victor (2000), "The future mobility of the world population", *Transportation Research - A*, Vol. 34, pp. 171-205.
- Schiff, A. and S. Becken (2010), "Demand elasticity estimates for New Zealand tourism", *Tourism Management*, Vol. 32(3), pp. 564-575.
- Scott, D. and C. Lemieux (2009), *Weather and Climate Information for Tourism*, WMO, Geneva and UNWTO, Madrid.
- Scott, D., J. Dawson and B. Jones (2008), "Climate change vulnerability of the US Northeast winter recreation - tourism sector", *Mitigation and Adaptation Strategies for Global Change*, Vol. 13, pp. 577-596.
- Scott, D., P. Peeters and S. Gössling (2010), "Can tourism deliver its 'aspirational' greenhouse gas emission reduction targets?", *Journal of Sustainable Tourism*, Vol. 18(3), pp.393-408.
- State of Israel (2010), "Potential Impacts of Climate Change on Water Use in the Tourism Industry", State of Israel, Ministry of National Infrastructures Planning Division.
- STCRC (Sustainable Tourism Co-operative Research Centre) (2009), "Australian Tourism Futures: Redefining the Future", communiqué, 2009, www.tourismfutures.com.au/Publications/2009Communique.pdf, accessed 18 February 2010.
- Stern, N. (2006), "The economics of climate change", *The Stern Review*, Cambridge University Press, Cambridge.
- Stern, T. (2007), "Fuel taxes: An important instrument for climate policy", *Energy Policy*, Vol. 35, pp. 3194-3202.

- Taylor, T, *et al.* (n.d.), "Sustainable Tourism and Economic Instruments: The case of Hvar, Croatia", www.bath.ac.uk/cpe/workingpapers/economic-instruments-taylor-fredotovic-povh_Markandya.pdf
- Tol, R.S.J. (2007), "The impact of a carbon tax on international tourism", *Transportation Research Part D*, Vol. 12, pp. 129-142.
- Trung, D. N. and S. Kumar (2004), "Resource use and waste management in Vietnam hotels", *Journal of Cleaner Production*, Vol. 13, pp. 109-116.
- Umweltbundesamt (2010), "National Inventory Report for the German Greenhouse Gas Inventory 1990 – 2008", www.umweltbundesamt.de/uba-info-medien/mysql_medien.php?anfrage=Kennnummer&Suchwort=3958.
- Umweltbundesamt Österreich (2010), policy paper Auf dem Weg zu einer nationalen Anpassungsstrategie, www.klimawandelanpassung.at/nationale-anpassungsstrategie/schritte-zur-nationalen-anpassungsstrategie/policy-paper/.
- UN (United Nations) (1995), *Guidebook to Water Resources, Use and Management in Asia and the Pacific*, Volume One: Water Resources and Water Use, Water Resources Series No. 74, UN, New York.
- UN Global Compact (2010), 259 Investors Representing USD 15 Trillion Call for International Action on Climate Change, www.unglobalcompact.org/news/83-11-16-2010.
- Underwood, M.R., F. L. Peterson and C. I. Voss (1992), "Groundwater Lens Dynamics of Atoll Islands", *Water Resources Research*, Vol. 28(11), pp. 2889-2902.
- UNEP (United Nations Environment Programme) (2007), *Tourism and Mountains – A Practical Guide to Good Practice*, The Tour Operator Initiative and UNEP, Paris.
- UNEP (2009), *Towards Sustainable Production and Use of Resources: Assessing Biofuels*, www.unep.fr/shared/publications/pdf/WEBx0149xPA-AssessingBiofuelsSummary.pdf
- UNESCO (United Nations Educational, Scientific and Cultural Organization) (2009), *Water in a Changing World, The United Nations World Water Development Report 3*, UNESCO Publishing, Paris and Earthscan, London, www.unesco.org/water/wwap/wwdr/wwdr3/pdf/WWDR3_Water_in_a_Changing_World.pdf.
- UNFCCC (United Nations Framework Convention on Climate Change) (1998), Kyoto Protocol to the UNFCCC, <http://unfccc.int/resource/docs/convkp/kpeng.pdf#page=20> Accessed 14 January 2010.
- UNFCCC (2010a), "Article 2: Objective", http://unfccc.int/essential_background/convention/background/items/1353.php.
- UNFCCC (2010b), Report of the Conference of the Parties on its 15th session, held in Copenhagen from 7 to 19 December 2009, <http://unfccc.int/resource/docs/2009/cop15/eng/11a01.pdf>.
- UNFCCC (2010c), "UNFCCC receives governments' climate pledges", http://unfccc.int/files/press/newsroom/press_releases_and_advisories/application/pdf/pr_accord_100201.pdf.
- UNFCCC (2010d), "UNFCCC Economy-wide Targets for 2020", <http://unfccc.int/home/items/5264.php>.
- UNWTO (United Nations World Tourism Organization) (2001), *Tourism 2020 Vision*, Volume 7. Global forecasts and profiles of market segments, UNWTO, Madrid.
- UNWTO (2009), "Discussion paper on climate change mitigation measures for international air transport", August 2009, UNWTO, Madrid www.unwto.org/climate/support/en/pdf/docu_aviation_GHG_Emissions.pdf.
- UNWTO (2009), *From Davos to Copenhagen and Beyond: Advancing Tourism's Response to Climate Change*, UNWTO, Madrid.
- UNWTO (2010a), "Statement Regarding Mitigation of Greenhouse Gas Emissions from Air Passenger

- 
- Transport", August 2010, UNWTO, *Madrid*, www.unwto.org/climate/support/en/pdf/UNWTO_GHG_Aviation_Policy_2010.pdf.
- UNWTO (2010b), "Historical perspective of world tourism", www.unwto.org/facts/eng/historical.htm, accessed 24 February 2010.
- UNWTO (2010c) UNWTO, *World Tourism Barometer, Volume 8, No 1, January 2010*, www.unwto.org/facts/eng/pdf/barometer/UNWTO_Barom10_1_en_excerpt.pdf.
- UNWTO-UNEP-WMO (World Meteorological Organization) (2007), "Davos Declaration: Climate change and tourism, responding to global challenges", Second International Conference on Climate Change and Tourism, Davos, Switzerland.
- UNWTO-UNEP-WMO (2008), *Climate Change and Tourism: Responding to Global Challenges*, UNWTO, Madrid, Spain.
- Van der Meulen, F. and A.H.P.M. Salman (1996), "Management of Mediterranean coastal dunes", *Ocean and Coastal Management*, Vol. 30 (2-3), pp. 177-195.
- Vera-Morales, M. and A. Schäfer (2009), "Fuel-Cycle Assessment of Alternative Aviation Fuels", Final report, University of Cambridge Institute for Aviation and the Environment, Cambridge, www.omega.mmu.ac.uk/Downloads/Final-Reports/10%20Final%20Report%20Sustainable%20Fuels%20for%20Aviation.pdf.
- Vörösmarty, C.J., *et al.* (2000), "Global Water Resources: Vulnerability from Climate Change and Population Growth", *Science*, Vol. 289, pp. 284-288.
- WBGU – German Advisory Council on Global Change, (2009), *Solving the climate dilemma: The budget approach*, WBGU, Berlin.
- WEF (World Economic Forum) (2009), *Climate Policies: From Kyoto to Copenhagen*, WEF, Geneva, www.weforum.org/en/knowledge/Themes/Environment/ClimateChange.
- Worldwatch Institute (2004), "Rising Impacts of Water Use", State of the World 2004, Worldwatch Institute, Washington D.C., www.worldwatch.org/topics/consumption/sow/trendsfacts/2004/03/03/.
- WTTC (World Tourism and Travel Council) (2009), *Leading the Challenge on Climate Change*, WTTC, London, www.wttc.org/bin/pdf/original_pdf_file/climate_change_final.pdf.
- WTTC (2010), *Climate change – A joint approach to addressing the challenge*, www.wttc.org/bin/pdf/original_pdf_file/climate_change_-_a_joint_appro.pdf.
- WWF (World Wide Fund for Nature) (2004), *Freshwater and Tourism in the Mediterranean*, www.panda.org/downloads/europe/medpotourismreportfinal_ofnc.pdf.

QUANTIFIED ECONOMY-WIDE EMISSION TARGETS FOR 2020, ANNEX I PARTIES

EMISSIONS REDUCTION IN 2020		BASE YEAR
AUSTRALIA	5% up to 15% or 25% Australia will reduce its greenhouse gas emissions by 25% on 2000 levels by 2020 if the world agrees to an ambitious global deal capable of stabilising levels of greenhouse gases in the atmosphere at 450 ppm CO ₂ -eq or lower. Australia will unconditionally reduce its emissions by 5% below 2000 levels by 2020, and by up to 15% by 2020 if there is a global agreement which falls short of securing atmospheric stabilisation at 450 ppm CO ₂ -eq and under which major developing economies commit to substantially restrain emissions and advanced economies take on commitments comparable to Australia's.	2000
BELARUS	5-10% This reduction is premised on the presence of and access of Belarus to the Kyoto flexible mechanisms, intensification of technology transfer, capacity building and experience enhancement for Belarus taking into consideration the special conditions of the Parties included in Annex I undergoing the process of transition to a market economy, clarity in the use of new LULUCF rules and modalities.	1990
CANADA	17% To be aligned with the final economy-wide emissions target of the United States in enacted legislation.	2005
CROATIA	5% Temporary target for Croatia. Upon the accession of Croatia to the European Union, the Croatian target shall be replaced by arrangements in line with and part of the European Union mitigation effort.	1990
EU	20-30% As part of a global and comprehensive agreement for the period beyond 2012, the EU reiterates its conditional offer to move to a 30% reduction by 2020 compared to 1990 levels, provided that other developed countries commit themselves to comparable emission reductions and that developing countries contribute adequately according to their responsibilities and respective capabilities.	1990
JAPAN	25% This is premised on the establishment of a fair and effective international framework in which all major economies participate and on agreement by those economies on ambitious targets.	1990
KAZAKHSTAN	15%	1992
LIECHTENSTEIN	20-30% Liechtenstein commits itself to reduce greenhouse gas (GHG) emissions 20% below 1990 levels by 2020. If other developed countries agree to comparable reductions and emerging economies contribute according to their respective capabilities and responsibilities within a framework of a binding agreement, Liechtenstein is prepared to raise its target up to 30%.	1990
NEW ZEALAND	10-20% New Zealand is prepared to take on a responsibility target for greenhouse gas emissions reductions of between 10% and 20% below 1990 levels by 2020, if there is a comprehensive global agreement. This means: <ul style="list-style-type: none"> • the global agreement sets the world on a pathway to limit temperature rise to not more than 2° C; • developed countries make comparable efforts to those of New Zealand; • advanced and major emitting developing countries take action fully commensurate with their respective capabilities; • there is an effective set of rules for land use, land-use change and forestry (LULUCF); and • there is full recourse to a broad and efficient international carbon market. 	1990
NORWAY	30-40% As part of a global and comprehensive agreement for the period beyond 2012 where major emitting Parties agree on emissions reductions in line with the 2°C target, Norway will move to a level of 40% reduction for 2020.	1990
RUSSIAN FEDERATION	15-25%	
USA	20-30% In the range of 17%, in conformity with anticipated U.S. energy and climate legislation, recognising that the final target will be reported to the Secretariat in light of enacted legislation. ¹ <small>¹The pathway set forth in pending legislation would entail a 30% reduction in 2025 and a 42% reduction in 2030, in line with the goal to reduce emissions 83% by 2050.</small>	2005

Source: UNFCCC, 2010d.

Australia

Policy on the Identification and Promotion of Sustainable Tourism Businesses by Tourism Victoria, Australia

From 1 September 2009, to be eligible to be identified and promoted as part of Tourism Victoria's responsible travel marketing activities, a Victorian tourism business or event must demonstrate that they meet the following criteria:

- implementing initiatives to reduce energy consumption
- implementing initiatives to reduce water consumption
- implementing initiatives to reduce waste sent to landfill
- commitment to continual improvement through measuring and monitoring the impacts/ effects of the initiatives implemented
- educating and communicating with consumers on the environmental practices implemented
- adhering to an environmental management plan/environmentally sustainable policy
- independent assessment of the business' environmental practices by a qualified environmental consultant/assessor

Tourism businesses and events participating in the following initiatives will be deemed to have met these criteria and automatically eligible for inclusion:

- Earth Check (silver, gold and platinum)
- Climate Action Australia (leader and innovator)
- EcoCertification (nature, ecotourism, advanced ecotourism)
- ISO 14001
- Gumnut Awards (silver and gold)
- Victorian Tourism Awards – Excellence in Sustainable Tourism Award (winner and finalists)

Tourism Victoria reserves the right to offer priority participation in marketing programs to businesses and events participating in these initiatives.

Individual businesses, event organisers, hotel chains and programme managers may also submit to Tourism Victoria evidence that they meet the criteria.

Operators would need to have met these criteria by the time of the release of any marketing initiatives.

This policy will be reviewed annually or as required.

Tourism Victoria will continue to actively encourage businesses to participate in appropriate environmental improvement/entry level initiatives such as "Grow Me the Money" managed by the Victorian Chamber of Employers and Industry and Climate Action Australia (Business) managed by Ecotourism Australia.


PROGRAMME	DESCRIPTION/OBJECTIVE
ENERGY SAVER INCENTIVE	Energy efficiency companies provides households and small to medium-sized businesses with free or subsidised services to reduce carbon emissions such as offering discounts to upgrading appliances to more energy efficient models. <i>Website: www.LivingGreener.gov.au</i>
GROW ME THE MONEY	This programme is designed for small to medium sized businesses, operating in regional or metropolitan areas. It guides businesses through the steps necessary to become more sustainable and benefit from their efforts. Grow me the money is a 12 step online plan that helps businesses identify areas where they can save money and reviews their progress after 12 months. <i>Website: www.growmethemoney.com.au</i>
RESOURCESMART BUSINESS	ResourceSmart online is a website designed for Victorians who want to take the hard work out of shrinking their impact on the environment. Among the range of solutions, ideas and advice on the site, there is also information on rebates for energy and water-saving devices, how and where to recycle things, and useful tools to inform businesses about how to reduce greenhouse gas pollution. <i>Website: www.resourcesmart.vic.gov.au</i>
SMART WATER FUND	The Smart Water Fund provides funding for innovative projects in water recycling, water conservation and bio-solids management in metropolitan and regional urban Victoria. <i>Website: www.smartwater.com.au</i>
TOURISM EXCELLENCE	Tourism Excellence is a free self development programme that has been designed to help tourism businesses and destinations get the best from their workforce, deliver the best possible visitor experience, grow tourism by working together, and ensure a sustainable industry. The Sustainability in Tourism module provides practical advice, tools and case studies to assist tourism businesses to become more environmentally sustainable. <i>Website: www.tourismexcellence.com.au</i>
SUSTAINABILITY FUND	The Sustainability Fund is designed to support projects that foster sustainable resource use and have economic and social benefits for Victorians. Projects supported by the fund are working to reduce greenhouse gas emissions from dairy farms, establish recycling systems in high-rise apartments, create parklands from old landfill sites, conduct research into solar powered rail, deliver sustainability workshops for small business and reduce energy use from domestic water heating and air-conditioning. <i>Website: www.sustainability.vic.gov.au</i>
CARBON INNOVATORS NETWORK	EPA Victoria has established the Carbon Innovators Network - a network for business leaders and climate change experts. EPA helps organisations strategically and practically address their carbon emissions, and in doing so transform climate change from a business cost to a business opportunity. The aim of the network is to stimulate debate and innovation in carbon management and provide the support and tools businesses require to develop appropriate carbon management strategies. <i>Website: www.epa.vic.gov.au/projects/carboninnovators/default.asp</i>
ENVIRONMENTALLY SUSTAINABLE TOURISM STRATEGIC PLAN 2009 - 2012	Released in September 2009, the Environmentally Sustainable Tourism Strategic Plan aims to provide leadership and direction to the Victorian tourism industry in the area of sustainable tourism (including the associated issue of climate change). The plan sets out sustainable tourism activities in which Tourism Victoria will be taking a significant/lead role during 2009-2012. It includes Tourism Victoria's obligations under the National Climate Change and Tourism Taskforce's Framework for Action, Tourism Victoria's Business Plan 2007-2010, and the Regional Tourism Action Plan. Key challenges/opportunities as set out in the Plan are: <ul style="list-style-type: none"> • reducing the tourism industry's carbon footprint; • meeting growing consumer demand for sustainable practices; • improving business performance through sustainable tourism and marketing the Victorian tourism industry's environmental credentials; • developing partnerships and frameworks; • minimising resource use and the production of waste; and • assisting the tourism industry to adapt to climate change. <i>Website: www.tourism.vic.gov.au</i>

Austria

Initiatives for sustainable tourism:

Alpine huts: there are approximately 1 000 Alpine huts which form a considerable part of infrastructure for hiking tourism, which is very popular. Due to the increasing quality requirements of the guests and in order to fulfil building standards, reconstructions and modifications of many huts have been necessary. Since 1991, the ministry has financially supported sustainable reconstructions of Alpine huts (www.vavoe.at)

Austrian Ecolabel for Tourism: introduced by the Federal Ministry of Agriculture, Forestry, Environment and Water Management (<http://lebensministerium.at> and www.umweltzeichen.at)



Sustainable Building in Tourism: In 2006, the ministry published guidelines for sustainable building in tourism, which were elaborated by a team consisting of experienced tourism and financial experts, planners, and building utility system experts. These guidelines, published in a manual, will assist entrepreneurs in making decisions concerning sustainable buildings solutions for new tourist operations, and extensions and modifications to existing facilities (www.bmwfi.gv.at/NR/rdonlyres/9659D5D6-C7C8-42C2-B115-8A4BB86DC5E1/0/NachhaltigesBauenimTourismusLeitlinien.pdf)

National Award for Tourism: introduced in 2009 for energy efficiency in hotels and restaurants.

Some federal states have introduced legislation on emission limits for road traffic (e.g. www.tirol.gv.at/en/; www.umwelt.steiermark.at/cms/beitrag/11185844/47281199/)

Ireland

Fáilte Ireland

- Carbon Strategy – www.failteireland.ie/Information-Centre/Publications/Environment/Carbon_Strategy_Brochure_2009
- Climate Change, Heritage and Tourism – Implications for Ireland's Coast and Inland Waterways – www.failteireland.ie/Word_files/PUBLICATIONS-NEW-BUILD/Climate_Change_Waterways
- Managing your Environmental Costs 2010 – www.failteireland.ie/FailteCorp/media/FailteIreland/documents/Business%20Supports/Environmental%20Guidelines/FIR_Business_Tourism_Organogram.pdf

Environmental Protection Agency (EPA), Ireland

- Green business website – www.greenbusiness.ie/ – inter-linked suite of resource efficiency projects, developed by the EPA as part of the National Waste Prevention Programme, specifically aimed at helping small to medium enterprises save money and help to reduce their environmental impacts through reducing the wastage of materials, consumables, water and energy.

Sustainable Energy Authority of Ireland (SEAI)

- Home page at www.seai.ie/
- SEAI Business Guides page – www.seai.ie/Your_Business/
- Managing Energy: Strategic Guide for Hotels – www.seai.ie/Publications/Your_Business_Publications/Energy_Guides/strategic_guide_for_Hotels.pdf
- A Guide to Energy Efficient Transport – www.seai.ie/Publications/Your_Business_Publications/A_Guide_to_Energy_Efficient_Transport.pdf
- Accelerated Capital Allowances for energy-efficient equipment – www.seai.ie/Your_Business/Accelerated_Capital_Allowance/
- Energy Efficiency Retrofit Fund – www.seai.ie/Grants/Retrofit/
- Renewable Heat Deployment Programme (ReHeat) – www.seai.ie/Grants/Renewable_Heat_Deployment_Programme/



Department of Transport – Smarter Travel

“Smarter Travel: A sustainable transport future” is the government’s 2009 transport policy for Ireland that sets out how the vision of a sustainable travel and transport system can be achieved.

- Home page at www.smartertravel.ie
- Smarter Travel policy document at www.smartertravel.ie/download/1/NS1264_Smarter_Travel_english_PN_WEB.pdf

Department of the Environment, Heritage and Local Government

- Home page – www.environ.ie/en/
- All Environment-related publications – www.environ.ie/en/Publications/Environment/
- Carbon Budget 2010 – www.environ.ie/en/Publications/Environment/Atmosphere/PublicationsDocuments/FileDownload,21822,en.pdf
- Climate Change – www.environ.ie/en/Environment/Atmosphere/ClimateChange/
- National Climate Change Strategy 2007-2012 – Overview: www.environ.ie/en/Environment/Atmosphere/ClimateChange/NationalClimateChangeStrategy/
- National Climate Change Strategy 2007-2012 – Strategy Document: www.environ.ie/en/Environment/Atmosphere/ClimateChange/NationalClimateChangeStrategy/PublicationsDocuments/FileDownload,1861,en.pdf
- Framework for Climate Change Bill 2010 – www.environ.ie/en/Publications/Environment/Atmosphere/PublicationsDocuments/FileDownload,21820,en.pdf
- Motor Tax – www.environ.ie/en/LocalGovernment/MotorTax/
- VTR – www.revenue.ie/en/tax/vrt/index.html

Department of Tourism, Culture and Sport

- New Horizons for Irish Tourism: an Agenda for Action 2003-2012. Survival, Recovery and Growth – A Strategy for Renewing Irish Tourism, 2009-2013 (Report of the Tourism Renewal Group, September 2009).



UNEP Biofuels Documents and Tools

Annex C

Global Bioenergy Partnership (GBEP)

GBEP is a partnership with 25 members that initially began as a G8+5 initiative. Its main objective is to help promote the development of sustainable bioenergy sectors at a national level. UNEP is an active partner and is the co-lead of the environmental sub-group of the Sustainability Task Force charged with the development of sustainability criteria and indicators, and is active as well in the Technical Working Group, and Steering Committee (www.globalbioenergy.org/, www.unep.fr/energy/activities/gbep).

Roundtable on Sustainable Biofuels (RSB)

UNEP has been actively engaged with the RSB since its inception, both in the working groups and chamber discussions and on the Steering Board. The RSB has developed a third-party certification system for biofuels sustainability standards, encompassing environmental, social and economic principles and criteria, targeting the project level, through an open, transparent and multi-stakeholder process (<http://cgse.epfl.ch/page65660.html>).

UN Energy Decision Support Tool for Sustainable Bioenergy (DST)

Under the framework of UN Energy, UNEP and FAO have jointly developed the DST. The DST provides stepwise guidance to decision makers in governments to develop sustainable bioenergy policies and strategies, and to assess investment proposals (<http://esa.un.org/un-energy/>). Further documentation is available at www.unep.fr/energy/bioenergy.



About the UNEP Division of Technology, Industry and Economics

The UNEP Division of Technology, Industry and Economics (DTIE) helps governments, local authorities and decision-makers in business and industry to develop and implement policies and practices focusing on sustainable development.

The Division works to promote:

- sustainable consumption and production,
- the efficient use of renewable energy,
- adequate management of chemicals,
- the integration of environmental costs in development policies.

The Office of the Director, located in Paris, co-ordinates activities through:

- **The International Environmental Technology Centre** – IETC (Osaka, Shiga), which implements integrated waste, water and disaster management programmes, focusing in particular on Asia.
- **Sustainable Consumption and Production** (Paris), which promotes sustainable consumption and production patterns as a contribution to human development through global markets.
- **Chemicals** (Geneva), which catalyses global actions to bring about the sound management of chemicals and the improvement of chemical safety worldwide.
- **Energy** (Paris), which fosters energy and transport policies for sustainable development and encourages investment in renewable energy and energy efficiency.
- **OzonAction** (Paris), which supports the phase-out of ozone depleting substances in developing countries and countries with economies in transition to ensure implementation of the Montreal Protocol.
- **Economics and Trade** (Geneva), which helps countries to integrate environmental considerations into economic and trade policies, and works with the finance sector to incorporate sustainable development policies.

UNEP DTIE activities focus on raising awareness, improving the transfer of knowledge and information, fostering technological co-operation and partnerships, and implementing international conventions and agreements.

For more information, see
www.unep.fr

About the OECD Centre for Entrepreneurship, SMEs and Local Development and the OECD Tourism Committee



The OECD Centre for Entrepreneurship, SMEs and Local Development (CFE) acts as a catalyst, increasing synergies between different areas of expertise, and raising the profile of OECD work on entrepreneurship, SMEs, local development and tourism.

The OECD has a long-standing expertise on tourism. The Tourism Committee acts as the OECD forum for exchange, for monitoring policies and structural changes affecting the development of domestic and international tourism, and promotes the sustainable economic growth of tourism. In many ways, its horizontal approach linking tourism to related policies – including those aimed at the economy, trade, employment, innovation, transport, green growth and sustainable development, local development, and SMEs and entrepreneurship – is unique.

The OECD Tourism Committee provides policy-makers with concrete analysis of key challenges and their economic impacts and policy responses that will shape tourism in the future. The Tourism Committee supports Members and, as appropriate, non-Members to:

- maximise the economic, social and environmental benefits of tourism through medium and long-term strategic development, soundly-developed tourism policy and an integrated governmental approach promoting a greater coherence between tourism and other policies (e.g. education, environment, innovation, labour, safety and security, trade or transport taxation or migration);
- promote, in a globalisation and decentralisation context, sustainable tourism development as a source of economic growth, job creation and development, and poverty alleviation in both major centres and regional areas;
- improve the competitiveness infrastructure and the image of destinations to make them more attractive to the local population, visitors and more competitive investors, for the benefit of the whole economy;
- design, adopt and implement policy reforms in tourism to enhance long-run productivity and growth performance;
- contribute to the advancement of international co-operation in the tourism sector.

For more information, see

www.oecd.org/cfe/tourism



This report is concerned with strategies for the sustainable development of tourism in the face of the challenges of climate change. It looks both at mitigation strategies, to limit tourism's impact on climate change, and at adaptation strategies, to cope with the likely consequences. Tourism currently accounts for an estimated 5% of anthropogenic CO₂ emissions, however, on a business as usual projection these emissions would more than double over the next 25 years. With the climate policy stabilisation goals of the international community requiring overall reductions exceeding 3% per year, many governments and tourism organisations favour reducing emissions from tourism in line with the reductions required of other sectors. Others, because of the importance of tourism to their national welfare and their distance from large global markets, will seek to achieve net emissions reductions in the context of balanced initiatives across various sectors. Fundamental changes would be required to reduce them, in line with other economic sectors, to meet climate stabilisation goals that demand overall reductions exceeding 3% per year. Industry initiatives can play a useful role but government policies – including regulation and fiscal incentives – are crucial. However, only a third of the countries studied in this report have even begun to identify policy options to reduce tourism emissions. Similarly, only a quarter of the countries reviewed have considered climate change adaptation strategies for their tourist industries, mainly on pressing issues such as water shortages or unreliable snowfall in ski resorts, and virtually no national policies have been implemented. There is a clear need to engage more thoroughly with regional, national and international strategies for more sustainable tourism. The concluding chapter of this report sets out a proposed agenda for further research and development.



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