Tourism Management 46 (2015) 203–212

Contents lists available at ScienceDirect

Tourism Management

journal homepage: www.elsevier.com/locate/tourman

# Inter-market variability in $CO_2$ emission-intensities in tourism: Implications for destination marketing and carbon management

Stefan Gössling [a, b, *], Daniel Scott [c, 1], C. Michael Hall [d, 2]

[a] Department of Service Management and Service Studies, Lund University, Box 882, 25108 Helsingborg, Sweden
[b] School of Business and Economics, Linnaeus University, Kalmar, Sweden
[c] Department of Geography and Environmental Management, University of Waterloo, Waterloo, Ontario N2L 3G1, Canada
[d] Department of Management, Marketing and Entrepreneurship, University of Canterbury, Private Bag 4800, Christchurch 8140, New Zealand

## HIGHLIGHTS

- The gap between observed and sustainable emissions from tourism is widening.
- Market analysis for eleven countries shows huge differences in emission intensities.
- Destination carbon management and marketing can help reduce emissions.
- Proposes demarketing as a means of destination carbon management.
- Policy frameworks are needed for destinations to work with carbon management.

## ARTICLE INFO

*Article history:*
Received 7 February 2014
Accepted 30 June 2014
Available online

*Keywords:*
Air travel
Carbon management
Climate change
Demarketing
Destination marketing
Destination management

## ABSTRACT

There is a growing gap between tourism's rapidly growing greenhouse gas emissions and the sector's 'aspirational' emission reduction targets as well as the international policy consensus to reduce emissions from this and all other sectors of the economy. The transport component is the largest GHG contributor to the global tourism system. In the absence of supranational policy agreements to curb emissions from international aviation and cruise tourism, as well as limited national policy initiatives, there has been a recent shift in research to the potential role of market-based carbon management for destinations to reduce emissions. Air travel is the most important subsector generating GHGs in international tourism. This article analyses the composition of international tourism markets arriving by air and their respective contribution to emissions at 11 selected countries with distinctly different tourism economies. The implications of changes in the market composition of these countries between 1995 and 2010 for average tourist carbon intensity and total emissions are examined. Results indicate variations in inter-market emission intensities of up to a factor 30 (127–3930 kg $CO_2$/tourist) if comparing individual markets for the whole range of destinations, and up to a factor 5 (370–1830 kg $CO_2$/tourist) if comparing average emission intensities between destinations. Findings are discussed with regard to the potential for destinations to reduce emissions from tourism by strategically fostering specific markets.



## 1. Introduction

Global tourism is growing rapidly, with the United Nations World Tourism Organization (UNWTO) projecting an average increase in international arrivals of 3.3% per year in the period 2010–2030. By 2030, the UNWTO mid-range forecast includes 1.8 billion international tourist arrivals, up from 808 million in 2005 (UNWTO, 2013) and, should the current ratio of domestic to international trips continue (UNWTO-UNEP-WMO, 2008), a number of domestic tourists approximately four times the international tourism volume. A sector involving such a movement of people over long distances, as well as their accommodation and activities, can be expected to generate considerable growth in emissions of greenhouse gases. The global tourism sector is estimated to have contributed to 5% of global carbon dioxide ($CO_2$) emissions in 2005 and about 8% of the contribution to radiative forcing (i.e. including

* Corresponding author. Tel.: +46 70 4922634.
*E-mail addresses:* stefan.gossling@ism.lu.se (S. Gössling), daniel.scott@uwaterloo.ca (D. Scott), michael.hall@canterbury.ac.nz (C.M. Hall).
[1] Tel.: +1 519 888 4567x35497.
[2] Tel.: +64 3 364 2606.

http://dx.doi.org/10.1016/j.tourman.2014.06.021
0261-5177/

the impact of both short- and long-lived greenhouse gases to global warming) (UNWTO-UNEP-WMO, 2008). Given the sector's projected growth, UNWTO-UNEP-WMO (2008) suggest that due to changes in travel frequency, length of stay and the average distances travelled, emissions from tourism are anticipated to grow 135% by 2035 (over the 2005 baseline), despite considerable efficiency gains across the sector. A similar scenario has also been presented by the World Economic Forum (WEF, 2009), although it is important to note that neither analysis considers full lifecycle emissions or rebound effects (Gössling, Scott, & Hall, 2013; Hall, Scott, & Gössling, 2013; for the importance of rebound effects see Barker, 2009; Santarius, 2012).

More than half of all international tourists arrive by air (UNWTO, 2012a). These international tourist trips are the most energy consuming aspect of global tourism (UNWTO-UNEP-WMO, 2008). As an example, a single flight from Europe to Australia will result in emissions of more than 2 t of $CO_2$, which can be compared to the global average tourist trip at 250 kg $CO_2$, or average annual global per capita emissions of 4.4 t $CO_2$ in 2010 (IEA, 2012; United Nations Department of Economic and Social Affairs, 2012). Aviation's share in global $CO_2$ emissions is increasing, as air travel is growing faster than other transport: Airbus (2012) and Boeing (2012) estimate that over the next 20 years, growth in passenger numbers will be in the order of 4.9% per year, and the International Energy Agency (IEA, 2009) suggests that air travel will almost quadruple between 2005 and 2050, with a tripling of energy use and emissions. These trends imply considerable growth in emissions from air travel in particular, about 80% of which is tourism (Scott, Peeters, & Gössling, 2010; UNWTO-UNEP-WMO, 2008).

Despite current difficulties in achieving a new legally binding international emissions reduction framework the global economy is expected to de-carbonize throughout the 21st century, but particularly before 2050, in order to stabilize atmospheric concentrations of GHG at levels required to remain below the international policy goal of no more that 2 °C warming over pre-industrial levels (UNFCCC, 2010, 2013; see also IPCC, 2013 for Representative Concentration Pathway Scenarios; and UNEP, 2013; for emission trends and gaps). In seeking progress toward a low carbon economy the tourism sector has set out significant 'aspirational' GHG emission reduction targets for the sector of −50% by 2035 (from 2005 baseline) (World Travel and Tourism Council, 2009). However, to date no plans have been presented as to how such global emission reductions could be realistically achieved (Gössling, 2013; Gössling et al., 2013). Even tourism's potential contribution towards a green economy still recognises that the overall contribution of tourism to GHG emissions will increase in absolute terms in the foreseeable future (Hall, 2014b; UNEP, 2011).

A similar situation exists among individual countries, as few policies have been developed by countries to address emission growth from tourism and specifically air travel (OECD and UNEP, 2011), even though the sector's significance is increasingly recognized. For instance, a study of 22 countries (Gössling, 2013), including industrialized as well as developing nations, found that tourism contributes the equivalent of between 4% (Suriname) to 150% (Turks and Caicos) of 'official' national emissions as assessed on the basis of the Kyoto Protocol guidelines for national GHG inventories, i.e. a calculation excluding international bunker fuels from shipping/aviation, identifying the sector as one of the most important in terms of emissions in most of the countries studied. In particular Small Island Developing States (SIDS) economies may be much more energy intense when their tourism economy is adequately accounted for, but tourism emissions remain 'overlooked', because bunker fuels are not national responsibilities under the Kyoto Protocol (for a discussion of political implications see Gössling, 2013). Developed countries also expect substantial growth in aviation emissions. As an example, the UK Department of Transport (2007) expects that aviation's 9% contribution to UK emissions in 2005 will grow to 29% in 2050. Similarly, the Australian government's energy white paper estimates that air transport will more than quadruple by 2050 (Department of Resources, Energy and Tourism, 2012). Notably, these figures already include expected efficiency gains due to technology development and management, which are for this reason not separately discussed in the following sections.

## 2. Pathways to de-carbonization: governance, behaviour, marketing

In light of this, various alternative approaches have been discussed to reduce emissions from tourism-related air travel. One approach is the utilization of air passenger carbon levies or taxes. However, studies that have modelled the potential impact of carbon levies on international tourism demand have consistently found that policies and levy structures as currently proposed would have little impact, typically considerably less than a 5% decline in business-as-usual growth, but with some regional differences due to proximity to primary international markets (e.g. Gössling, Peeters, & Scott, 2008; Mayor & Tol, 2007, 2010; Pentelow & Scott, 2010, 2011; Seetaram, Song, & Page, 2013). Similarly, analysis of the UK Air Passenger Duty (APD) revealed that increases in levies did not have a significant effect on outbound travel patterns. A study of the changes to the UK Air Passenger Duty (APD) between 2007 and 2010 and their impact on outbound UK tourism demand concluded that UK outbound tourism was not consistently more adversely impacted than other outbound European markets that did not have APD like departure taxes (Scott et al., in review; see also Seely, 2012), while Seetaram et al. (2013: 1) find that "the effectiveness of APD, however, has been marginal; travellers are prepared to pay more in the main to maintain their demand". These and other studies have thus concluded that unless duties are raised considerably, emissions from aviation will continue to grow rapidly. This policy challenge is well recognized by supranational organizations (OECD, 2013; OECD and UNEP, 2011).

A second approach is to rely on voluntary reductions in GHG emissions from air travel as a result of changed consumer behaviour and/or carbon offsetting, i.e. the practice of "neutralizing" emissions from tourism through emission reduction measures in other economic sectors. However, while attitudes towards environment practices are generally positive among travellers there is a substantial implementation gap in converting concerns into actual behaviour (Araña, León, Moreno-Gil, & Zubiaurre, 2012; Hall, 2014b). Furthermore, although information provided by airlines with respect to their environmental practices and opportunities for carbon offsetting have improved in recent years, such provisions remain limited. Analysis of information provided on IATA member websites in late 2009 and mid-2013 indicates that such information is of increasing importance in influencing consumer behaviours because of the growth in online booking of flights (Little, Williams, & Yost, 2011). However, although over 50% of IATA members now provide information on environmental initiatives, usually relating to technological and management efficiencies, only 14.5% actually provide opportunities to customers to offset (Hall, Zhou, & Wilson, 2015). Even though offsetting opportunities exist even when not offered directly by airlines, studies find that voluntary offsetting rates are chronically low. For instance, several studies (Gössling, Haglund, Källgren, Revahl, & Hultman, 2009; Lu & Shon, 2012; Mair, 2011; McKercher, Prideaux, Cheung, & Law, 2010) found participation to be in the order of 1–2% per flight for international flights and 5–10% for domestic flights. Among the reasons identified are a disbelief in one's own, rather than aircraft manufacturers'