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Leisure travel distribution patterns of Germans: Insights for climate policy

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ABSTRACT

Transport accounts for an estimated 23% of energy-related global CO_2 emissions, a large share of this for leisure and tourism purposes. Despite national and sector-specific pledges to reduce global emissions of greenhouse gases, there are no consistent policies for the transport sector, which is characterized by continued strong growth. Against this background, this paper investigates holiday travel patterns of one of the most important tourism markets worldwide, Germany, based on data from annual travel surveys ('Reiseanalyse', with n = ~7500). Data on trip numbers, transport modes and travel distances are evaluated, indicating that emissions of greenhouse gases related to holiday travel (including trips lasting 5 days and longer) are significant at an average 320 kg CO_2 per trip and person. Findings also show that the distribution of holiday travel emissions is highly skewed among the population and heavily depending on trip type. While about a quarter of the population does not participate in holiday travel at all, a small, highly mobile and wealthier share of travellers, 4% of the German population, engages in five or more holiday trips per year. These travellers are also more likely to participate in the most carbon-intense trips, long-haul flights and cruises, which generate 2 t CO_2 and more per trip. Findings are discussed in the context of national climate policy.

1. Introduction

Emissions of anthropogenic greenhouse gases (GHG) totalled 49 ± 4.5 $GtCO_2eq$/yr in 2010. Transport is contributing 23% (6.7$GtCO_2$) of total energy-related CO_2 emissions (IPCC, 2014a). On global average, 72.1% of total direct emissions from transports are road-related, followed by aviation (10.6%), and international and coastal shipping (9.3%) (IPCC, 2014a). Aviation deserves special attention, however, because a considerable share of this transport subsector's emissions are short-lived, and hence not comparable in terms of their global warming impact (Lee et al., 2009). In the future, emissions from transport are expected to grow, with the IPCC (2014a: 637) noting that without policy interventions, transport related CO_2 emissions could double by 2050, and triple by 2100. Most of this will come from aviation, with Boeing (2015) and Airbus (2015) anticipating growth in revenue passenger kilometres in the order of 4.9% per year. The International Energy Agency suggests that this may lead to a tripling of energy use for aviation by 2050 compared to 2005, and that the sector will by then account for 19% of all transport energy (IEA, 2009, high baseline scenario).

Emission growth in the transport sector is consequently in conflict with IPCC (2014a) conclusions that drastic reductions in emissions will be necessary in the short-term future if humanity is to stay within the 'safe' guardrail of a 2 °C global average temperature increase, compared to pre-industrial levels. To limit global warming to this level is the declared policy goal of 196 countries that are parties to the United Nations Framework Convention on Climate Change , and has recently been strengthened to 'well below 2 °C' in the Paris Agreement of the 21st Convention of Parties (COP21) in December 2015. This translates into a global emissions budget from all anthropogenic sources of approximately 1000 GtC, of which some 65% have already been spent (IPCC, 2014a). Countries have made a range of unconditional and conditional pledges to limit GHG emissions (UNFCCC, 2016), but analysis indicates that current pledges will not be sufficient to meet the 2 °C objective (Reilly et al., 2015). Given current emission trajectories, it appears more likely that the CO_2 emission budget for staying within the 2 °C limit will be exhausted within 30 years (Friedlingstein et al., 2014). All economic sectors, including tourism and transport, will thus have to make contributions to emission reductions.

Within this broader context, there is evidence that contributions to

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transport emissions are highly skewed between countries and individuals (Brand and Boardman, 2008; Brand and Preston, 2010; Gössling et al., 2009a,b; Lassen et al., 2006; Schäfer et al., 2009). To better understand these interrelationships, and in particular the role of travel frequency (the number of trips per traveller per year) and trip energy intensity (as a measure for emissions associated with a single holiday), this paper analyses holiday travel patterns, which have received more limited attention in the literature. Focus is on Germany, one of the most important tourism markets worldwide, based on data from the national annual travel survey ("Reiseanalyse"). The purpose is to identify the most emission-intense leisure trips, as well as traveller segments making more significant contributions to climate change.

2. Climate policy and passenger transport emissions

The IPCC suggests that by 2050, reductions in transport CO_2 emissions in the order of 15–40% (against a 2010 baseline) could be achieved through a range of mitigation measures, including "fuel carbon and energy intensity improvements, infrastructure development, behavioural change and comprehensive policy implementation" (IPCC 2014b: 21). The design of "comprehensive" transport policies to significantly reduce emissions remains however unclear with regard to the focus of interventions (producer/consumer) as well as the type of policy (e.g. command-and-control, market-based, voluntary).

Transport behaviour is primarily influenced by cost and time (Schäfer et al., 2009), and effective transport policies could simply raise the cost of energy and/or GHG emissions, or remove fossil fuel subsidies and other sector-specific state aid (OECD, 2009,2012). As an example, the UK has maintained a long-standing duty on air travel, while national governments continue to extend a range of significant subsidies to aviation (Gössling et al., 2017). As emissions from shipping and car traffic remain equally unaddressed by legislation on both international and national levels (UNFCCC, 2016; OECD and UNEP 2011), there is broad academic consensus that current policy measures are insufficient to achieve emission reductions necessary for the transport and tourism sector to be consistent with international climate policy goals (e.g. Anable et al., 2012; Banister, 2008, 2011; Chapman, 2007; Creutzig et al., 2015; Marsden and Rye, 2010; Peeters and Eijgelaar, 2014).

Global policy approaches to reduce emissions are based on national per capita averages. This was the basis for the Kyoto Protocol in 1997, as well as the Paris Agreement in 2015 with its focus on 'common but differentiated' mitigation goals (UNFCCC, 2016). Table 1 shows distributions in CO_2 emissions in countries that are major contributors to global emissions. Transport emissions account for between 6% (China) and 35% (France) of national CO_2 emissions, and vary in absolute terms between less than 0.1 t CO_2 (India) and 4.5 t CO_2 (USA) per person and year. These relationships are of importance, as they illustrate that in countries such as the USA, averaged annual emissions from transport are higher than those emitted on global average in total.

Differences in individual contributions to global emissions of greenhouse gases, irrespective of country, are relevant for climate policy. With regard to international air travel, estimates of 3.5 billion passengers in 2015 (IATA, 2015a) suggest that a large share of humanity is traveling by air. However, as passengers are counted multiple times (arrival/departure, transfers) or engage in multiple trips per year, it has been estimated that only 2–3% of the world population participate in international air travel on an annual basis (Peeters et al., 2006). A distinction also needs to be made between business and leisure travel, as business travellers are generally more mobile than leisure travellers, perhaps with the exception of long-term backpackers (Cohen, 2011). There are both business and leisure travellers for whom frequent flying is a norm, sometimes involving hundreds of individual flights per year (ssling et al., 2009a,b; ssling et al., 2009a,b; Hall, 2005). Travel intensity consequently varies: Ummel (2014) highlights this for the USA, where the top 2% income takers have emission footprints four times larger than those in the bottom quintile. UNWTO (2015) suggests that with regard to international travel, 14% of all trips are made for business and professional reasons, 27% for visiting friends and relatives, health or religious reasons, and 53% for leisure & recreation. In the future, the relative share of leisure, recreation and holiday related travel is expected to increase (UNWTO, 2011), indicating the significance of leisure-related travel motives in a wealthier and growing world population.

Various studies have investigated business and leisure travel patterns. Lassen et al. (2006) found that the average employee of Hewlett-Packard participated in 3.8 business international trips per year, which virtually always involved air travel, covering 17,000 km on average. While 25% of Hewlett-Packard employees did not participate in any trips at all, the most frequent traveller had participated in 43 trips. A survey of travellers at Landvetter airport, Gothenburg, Sweden (Gössling et al., 2009b) found that the 12% of the most mobile travellers had participated in at least 30 and up to 300 return flights per year, 98% of these for business. The 3.8% of the most frequent flyers (> 50 return flights per year) accounted for 28% of all trips made. These studies indicate highly skewed distributions of 'traveller to trip' and 'traveller to transport distance' ratios.

Studies investigating leisure travel patterns have also found considerable differences between individuals. A study of international leisure tourists in Zanzibar, Tanzania (Gössling et al., 2006), found, for instance, that the average per capita distance flown for leisure in 2002 and 2003 (air travel only) was 34,000 passenger kilometres (pkm), excluding the trip to Zanzibar. The ten most frequent travellers had flown almost 180,000 pkm each over the 22 months covered by the study, visiting up to 24 countries. Together, these ten travellers (3.9% of the sample) accounted for 20% of the overall distances travelled. Similar ratios have been found elsewhere. A study of the French population revealed, for instance, that five per cent of the population accounted for 50% of the distances travelled (Gössling et al., 2009a).

Table 1
Emissions of CO_2 by subsector, 2005.[a]
Source: based on Schäfer et al. (2009), UNESA (2015).

Country	CO_2 emissions (Mt)	Energy-related (Mt CO_2)	Transportation related (Mt CO_2)	Transport as% of total	Passenger travel (Mt CO_2)	Passenger travel per capita (t CO_2)
Australia	393	384	91	23.2	60	2.9
United States	6140	6090	1920	31.3	1340	4.5
Russia	1780	1740	165	9.3	86	0.6
Germany	894	873	184	20.6	132	1.6
United Kingdom	596	558	171	28.7	106	1.8
Japan	1320	1290	281	21.3	170	1.3
France	434	417	154	35.5	85	1.4
China	5300	5170	335	6.3	135	0.1
India	1270	1250	110	8.7	47	< 0.1
World	28,200	27,900	6370	22.6	3890	0.6

[a] Including emissions from international air traffic.