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Environmental impact of long distance travel

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Abstract

This paper presents an analysis of the CO_2 emission resulting from long distance travel by Danes. The emissions are analysed as the Danes' footprint the whole way from Denmark to the final destination. International travel represents 31% of the Danes' CO_2 emission from passenger travel and the climate burden from long overseas distances is especially high even though only few travel overseas. The travel activity is furthermore increasing much more for long distances than for European destinations. Domestic travel activity with overnight stay is nearly stagnating. The study furthermore shows that the Danish development is not especially outstanding compared to other countries.

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Keywords: long distance travel; climate foot print; development long distance travel; air travel; Europeans' holiday activity

1. Introduction

Long distance travel is the fastest growing passenger mobility segment with an annual growth rate for Denmark over 3% above a 10-year period (Knudsen 2015). As long distance travel is close to 100% motorised this has a substantial and increasing environmental impact and is challenging the European policy for a reduced climate impact from the transport sector according to the White Paper (European Commission 2011). The mode choice furthermore challenges the policy to change modal-split for medium distance travel towards more transport by rail.

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According to a Danish long distance travel survey conducted in 2010–11 each Dane has on average 5.5 low--frequent journeys with overnight stay(s) per year. These represent 7,777 km corresponding to 2 return trips from Copenhagen to Milan. Roughly one third of the trips are international, one third goes to second homes and one third goes to other domestic destinations. However, 90% of the kilometres are bound for international destinations and 2/3 of the kilometres are related to long duration journeys (at least 5 overnight stays).

The purpose of this paper is to present the effect this travel activity has on the climate measured as the overall footprint of the Danes' travel activities. Data for the year 2010 is analysed. The results are shortly compared with the development in other European countries.

2. CO_2 emission and climate burden from long distance travel

Several references point to the fact that aviation only represents 2% of the global CO_2 emission, e.g. (Loo et al. 2014; Postorino and Mantecchini 2014). However, (Peeters and Dubois 2010) find that the overall tourism activity including both travel to the destination and the travel activity at the location represents 4.4% of the global CO_2 emission in 2005 with an annual growth rate of 3.3% forecasted up to 2035.

Various authors have shown the effect of long distance travelling from the aviation point of view by calculating the entire CO_2 emissionnes from e.g. European aviation (Alonso et al. 2014) or a certain airspace or airport, e.g. (Loo et al. 2014; Postorino and Mantecchini 2014). (Alonso et al. 2014) present three projections of a development in CO_2 emission from Europeanss air travel from 2010 to 2030. In a central projection the CO_2 emission will increase from 216 to 293 megatonnes or 1.8% per year on average. The lower and upper projections are 207 megatonnes (0.2% decrease per year) and 334 tonnes (2.7% increase per year).

In this paper we intend to relate the emission and wider climate burden directly to the travel activity. Only by understanding the climate effect directly as a result of the travel activity in general is it possible to assess the long term development and eventually try to influence the effect in a more sustainable direction by policy and other means without affecting the fundamental demand for mobility.

Unfortunately, only few survey based studies exist about long distance travelling in Europe. For Norway, Sweden, Finland, Great Britain, Switzerland and France a long distance travel survey is part of the NTS. However, the British survey, even though it is well documented (Dargay and Clark 2012), only includes domestic travel. Finland and France have not published analyses of the development in journals but smaller unpublished analyses of travel behaviour exist. Results from the Swiss survey are not known to the author. For Sweden (Frändberg and Vilhelmson 2011) analyse the development in domestic and international Swedish long distance travel activity and report stagnating domestic travel, but a 50% increase in kilometres internationally from 1995 to 2006. More than half of the kilometres for domestic and international long distance travel all together were by air. For Norway (Vågane, Brechan, and Hjorthol 2011) report an increase in number of journeys per Norwegian by 33% from 1998 to 2009. International trips even increased by 53% from 2001 to 2009. 52% of the climate impact of all Norwegian passenger travel stems from air travel (Aamaas, Borken-Kleefeld, and Peters 2013).

Most of the European-wide research literature is methodological as in the case of the two European Union projects MEST carried out from 1996–99 (Axhausen et al. 2003) and Kite from 2007–09 ("Kite – A Knowledge Base for Intermodal Passenger Travel in Europe" 2009). Two cross-country databases collected by Eurostat exist, Dateline (Gomes and Santos 2004; Madre et al. 2007) from 2001/02 covering Switzerland and 15 member states and the continuous Tourism Demand Survey. The latter has been collected mandatorily from the actual member states since 1996 and some indicators are reported to Eurostat (see http://ec.europa.eu/eurostat/web/tourism/data/ main--tables). Data from the Tourism Demand Survey is unfortunately not analysed at a cross-country level based on micro-data. However, for Denmark a full micro-dataset collected since 1996 is available and has been used by the author for some of the results in this paper.

3. Method

3.1. Data

Calculation of CO_2 emission from air travel is based on data from two passenger databases, the international ticketing database Sabre for scheduled air travel and a Danish Airport database for all air travel from Danish