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Compensating for Compactness? Consumption and Leisure Travel of City Dwellers vs. Small Town Dwellers in Denmark

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COMPENSATING FOR COMPACTNESS? CONSUMPTION AND LEISURE TRAVEL OF CITY DWELLERS VS. SMALL TOWN DWELLERS IN DENMARK

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Abstract
The following article summarises the first results of a two-part study on consumption patterns in Denmark and leisure travel in Greater Copenhagen in particular. The study aims to map direct (e. g. free time travel) and indirect (e. g. goods and services) energy use related to different types of spatial structure ("urban" vs. "rural" settlement structure) and investigates possible explanations for differences in the use of energy.

The study is on the one hand based on nationwide Danish household consumption data of Statistics Denmark and on the other hand on the results of an online questionnaire survey, which was conducted specifically for this study in May and June 2016 in an inner district of Copenhagen and a small town in the commuter belt of Copenhagen.

The results indicate some sort of compensatory activities among city dwellers and suggest thereby, particularly in an urban context, including leisure travel and indirect energy use more in energy efficiency considerations.

Keywords
Urban structure – rebound effect – free time – travel behavior – sustainability – urban planning

Ausgleich für Kompaktheit? Konsum und Freizeitreisen von Großstadtbewohnern vs. Kleinstadtbewohnern in Dänemark

Kurzfassung
Der folgende Artikel fasst die ersten Ergebnisse einer zweiteiligen Studie zum Konsumverhalten in Dänemark und zur Freizeitmobilität im Großraum Kopenhagen im

speziellen zusammen. Ziel der Untersuchung ist, direkten (z. B. Freizeitmobilität) und indirekten (z. B. Waren oder Dienstleistungen) Energieverbrauch in Hinblick auf raumstrukturelle Unterschiede (städtische vs. ländliche Siedlungsgebiete) abzubilden und mögliche Erklärungen für bestehende Unterschiede im Energieverbrauch zu erarbeiten.

Die Studie basiert einerseits auf den Daten einer jährlichen dänemarkweiten Verbraucherumfrage der Statistik Dänemark sowie andererseits auf den Ergebnissen einer Onlineumfrage, die eigens für die gegenständliche Studie im Mai und Juni 2016 in einem Innenstadtbezirk Kopenhagens sowie einer kleinstädtischen Pendlergemeinde im Großraum Kopenhagen durchgeführt wurde.

Die Ergebnisse geben Hinweise auf bestimmte Formen eines Kompensationsverhaltens seitens der Städter und legen damit nahe, dass insbesondere im städtischen Kontext Freizeitmobilität sowie indirekter Energieverbrauch vermehrt in Energieeffizienzüberlegungen einbezogen werden sollte.

Schlüsselwörter
Stadtstruktur – Rebound-Effekt – Freizeit – Mobilitätsverhalten – Nachhaltigkeit – Stadtplanung

1 Introduction

The Climate and Energy Package 2020 marks the cornerstone and target course of the European Union's (EU) climate change policy. The implemented so-called 20-20-20 targets include 20% reduction of the greenhouse gas levels, 20% increase of the share of renewables and 20 % reduction of energy consumption – until 2020. As shown in Figure 1, we are on the right track regarding the first two targets, however, regarding reduction of energy consumption we are behind schedule.

Cities play a major role in energy consumption. They are core consumers on the one hand, but provide high potential for improving energy efficiency on the other hand. Transforming energy use in cities is therefore a major challenge of urban development. Urban planning has an important task in framing the geographical location of urban functions and the density of the urban fabric in an urban structure appropriate for energy efficient connections between residents, workplaces, centres and leisure.

Compact urban structure facilitates efficient energy use as for instance less daily commuting (Fertner/Große 2016; Große et al. 2016). However, people living in urban areas might consume more energy for other activities, such as non-work related travel (e. g. more extensive leisure mobility at weekends or on holidays), or as so-called embodied or indirect energy in the form of material, food or services (Chitnis et al. 2014). This is conceptualised as so-called "compensation hypothesis" (Holden/Norland 2005; Næss 2016, 2006; Vilhelmson 1990), which suggests that "compensatory activities" might (partly) offset the achieved efficiency gains of sustainable urban structure (Holden/Norland 2005; Ottelin et al. 2014).

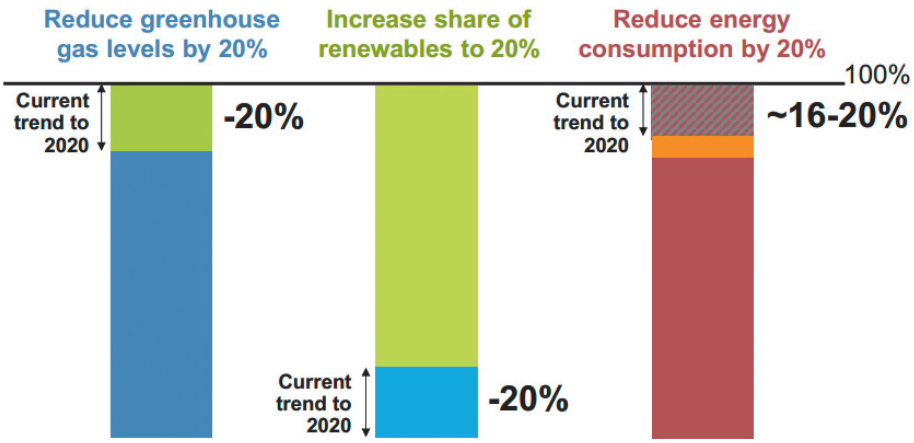

Figure 1: European Climate and Energy Package 2020, targets and state / Data sources: Gray-Donald/ Kennedy (2014)

Existing studies, e. g. from Finland, associate urban living with more Greenhous Gas (GHG) intensive lifestyles (Heinonen et al. 2013a, 2013b) and suggest that indirect emissions require higher attention in urban mitigation efforts (Ala-Mantila et al. 2014). Similar results have been observed in Sweden: In the bigger cities, like Stockholm, the ecological footprint of transport activities is only half of that in many other places. However, for other activities, such as recreation and culture, the average Stockholmer has a much bigger ecological footprint than the average Swede (Axelsson 2012). A further study from Finland shows that people living in dense urban settings without garden access tend to have a high use of summer houses (Strandell/Hall 2015). Thus, improvements in a city's energy efficiency imply the risk of rebound effects.

2 Methods and study design

We conducted a two-part study that investigates potential compensatory activities in terms of direct and indirect energy consumption, i. e. we include consumption of goods and services – where the energy might be consumed indirectly as embodied energy – as well as travel behaviour.

The first part of the study is based on nationwide Danish household consumption data[1] and takes stock of the current development in terms of energy use in Danish municipalities related to the spatial structure of the municipalities (level of "urbanity"). We look at the development over time (2007, 2010, 2014) of the internal shares of different kinds of energy use (e. g. transport for commuting, air travel) and discuss potential compensatory activities.

1 Statistics Denmark (2016): Forbrugsundersøgelsen [Household consumption survey]. Accessed through DST project 705889.

In the second part of the study we investigate more specifically the leisure travel behaviour (weekend and holiday trips, air travel) of people living in Østerbro, a dense urban district in Copenhagen (“urban case”) with that of people living in Borup, a small town in the commuter belt of Copenhagen (“peri-urban case”). The inquiry is done by means of a questionnaire survey, which was conducted in May and June 2016 among the residents of the two case areas. The questionnaire investigates people’s habits and routines in terms of daily travel, their motives and preferences for spending free time in daily life, at weekends and on holidays, and finally characteristics of and personal satisfaction with the respondents’ living environment.

The overall aim of the two-part study is to investigate ‘hidden’ or less obvious energy consumption in order to achieve a more comprehensive picture of the total energy consumption, specifically in urban areas, which are supposed to facilitate efficient use of energy.

3 Compensatory activities in Denmark and Greater Copenhagen

3.1 Trends and counter-trends in Danish cities

Denmark has the ambition of being CO_2-neutral by 2050, only powered by renewable resources. Already by 2035 all energy consumption for electricity and heating is planned to be CO_2-neutral. The goals are highly challenging (Meibom et al. 2013). Copenhagen is actively branding itself being a green capital and is internationally well-known for its ambitions, e. g. to be the first carbon neutral capital in the world by 2025 (City of Copenhagen 2012).

Since the 1990s Denmark is reducing its carbon emissions (see Figure 2, left), while the gross domestic product (GDP) increases simultaneously, which indicates a real decoupling of the Danish economy from CO_2-emissions. However, at the same time Danes drive more and use more space (see Figure 2, right). While the population increased with about 4 % since 2007, floor space increased by 6 % and the number of cars registered in Denmark increased by even 16 %. These numbers reveal some trends that compromise efforts towards increasing energy efficiency.

Transport energy use is typically mainly associated with car use, which is very much considered as a problem caused by residents of peri-urban or rural areas. However, a closer look into Danish consumption data reveals a “counter” consumption of, e. g., airplane tickets by metropolitan dwellers (see Figure 3, left). Also, expenditures in services such as restaurants and hotels are comparably higher in metropolitan compared to rural areas (Figure 3, right).

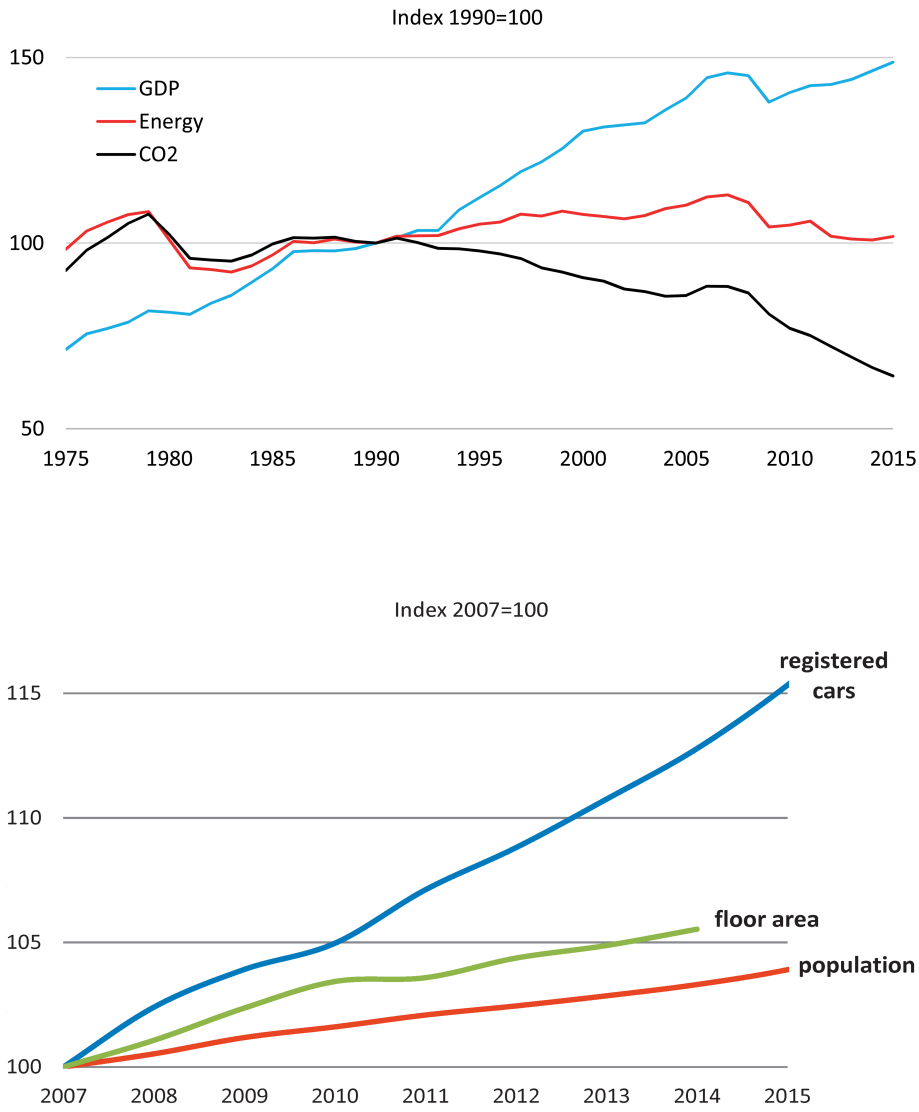

Figure 2: GDP, energy use and CO_2-emissions (corrected) in Denmark since 1975 (up) and development of population, floor area and cars in Denmark, 2007–2015 (down) / Data sources: Statistic Denmark and Danish Energy Agency

These general trends in Denmark indicate the importance to pay higher attention to counter-trends of energy consumption in cities. We took this as starting point for comparing the free time travel behaviour of city dwellers with that of small town dwellers, as the former – according to Figure 3 – appear to travel, for instance, more frequently and/or to more distant places by plane.

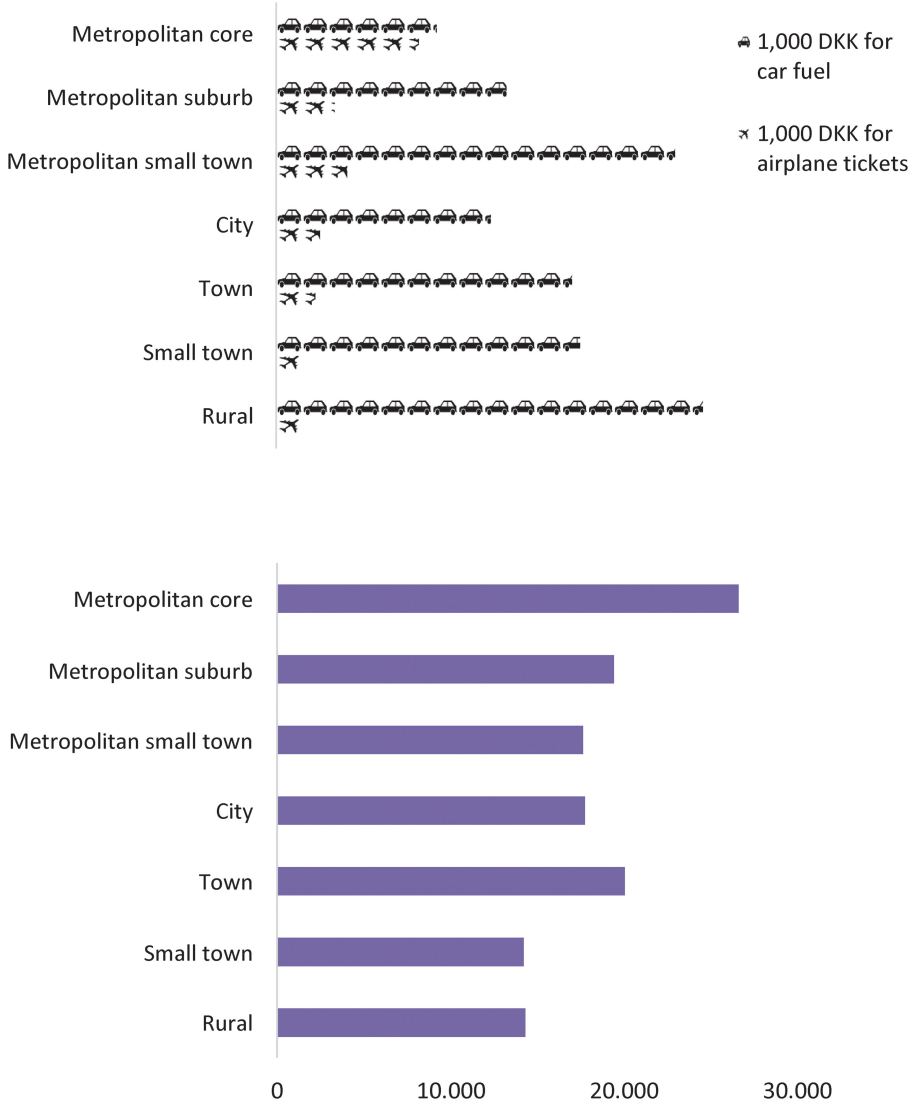

Figure 3: Expenditures for car fuel and flights (up) and restaurants, hotels etc. (down) in Denmark per household and city type, 2014 / Data soure: Statistic Denmark, Consumption survey 2014, N=2,191 households all over Denmark

3.2 Compensatory leisure travel of city dwellers vs. small town dwellers in Greater Copenhagen

The second part of the study investigated more specifically differences in leisure travel behaviour between city dwellers and small town dwellers. By means of an online questionnaire survey we investigated weekend, holiday and plane trips among a sample of 262 residents of an inner district of Copenhagen (Østerbro) and a second sample of 177 residents of a small town in the commuter belt of Copenhagen (Borup).

The results of the survey indicate that city dwellers go more frequently on weekend, holiday and plane trips and also choose more distant destinations (weekend trips outside of Denmark/Skåne, holiday trips outside of Scandinavia and outside Europe) than small town dwellers (see Figure 4, Figure 5 and Figure 6).

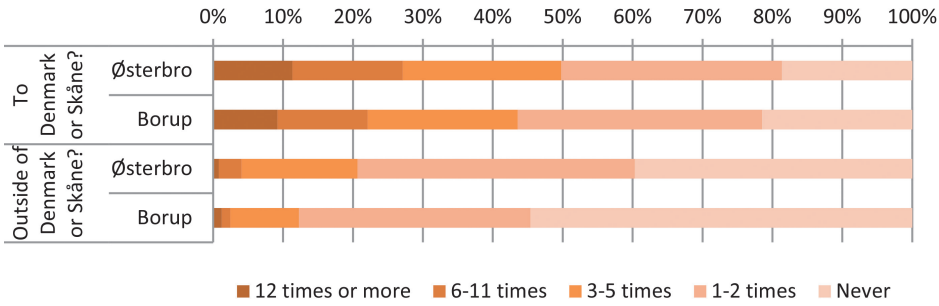

Figure 4: Number of weekend trips in last 12 months / Data sources: Große et al. in review

The results suggest some sort of compensatory leisure travel when it comes to weekend trips, as the share of people who have access to a summer cottage is with almost 50% remarkably higher among the city dwellers than with about 20% among the small town dweller. Typically, a summer cottage is used for weekend leisure; as also confirmed by the study results, people who have access to a summer cottage, go more often on weekend trips.

However, in terms of holiday trips and private plane trips, it is to question, whether those are rather an expression of a certain lifestyle or personal preferences (being a *holidayer,* Dijst et al. (2005)) than compensation for urban living.

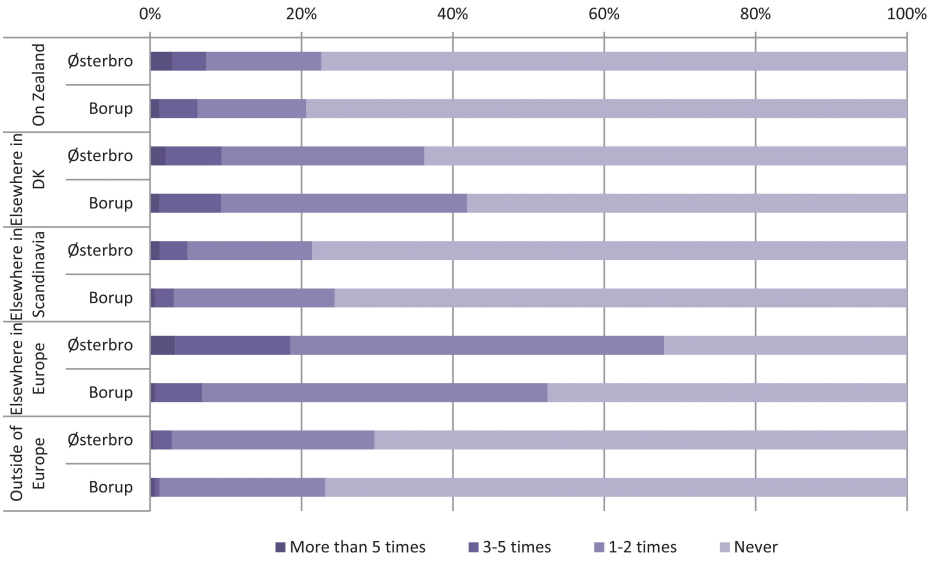

Figure 5: Number of holiday trips in last 12 months / Data source: Große et al. in review

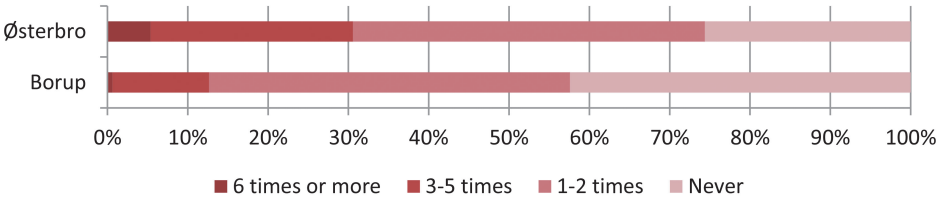

Figure 6: Number of private plane trips in last 12 months / Data source: Große et al. in review

4 Discussion and Outlook[2]

The first results of the two-part study on consumption in Denmark and leisure travel behaviour in Greater Copenhagen suggest that we have to consider a mixture of lifestyle, personal preferences, compensation and also socio-economic parameters when looking for explanatory factors for the observed differences in direct and indirect energy consumption between city and small town dwellers.

2 The detailed results of this study on consumption behaviour in Denmark and compensatory leisure travel in Greater Copenhagen are in preparation for publication in peer-reviewed journals (Fertner/Große in preparation; Große et al. in review). For requests or further interest in our study please contact one of the authors, Juliane Große (jg@ign.ku.dk) or Christian Fertner (chfe@ign.ku.dk), University of Copenhagen.

The detailed study (Fertner/Große in preparation; Große et al. in review) provides an in-depth investigation of the underlying factors and possible explanations for the observed differences in consumption related to spatial structure.

In the light of a more comprehensive picture on energy consumption in urban areas we also have to discuss which role urban planning can play in terms of options to address the observed "hidden" or indirect energy consumption. Especially because some explanatory factors, such as lifestyle or personal preferences, are rather outside the sphere of urban planning and raise general concern how they might be adjustable.

Although our study deals with a very specific topic in the context of compensatory activities, we are convinced that it provides a very valuable contribution to gain more comprehensive knowledge on energy consumption and related differences in specific spatial settings. This allows also to tail cities' planning actions more specifically for future challenges.

Authors

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