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Material Footprint of low-income households in Finland – is it sustainable?

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Abstract: The paper presents the material footprints of households living on a minimum level of social benefits in the Finnish welfare state. The data was collected in a questionnaire on the consumption habits and lifestyles of 18 single households belonging to the lowest income decile in Finland. The results are compared to the results of a study on the material footprints of households with varying income levels as well as of an average Finn. In addition, the results are compared to the material footprint of decent minimum reference budgets defined consensually in a cooperation of experts and a consumer panel. The results show that the low-income households have a lower material footprint than average. Thus, a decrease in material footprint by a factor of 2 - 4 from present average can already be achieved. However, the resource consumption of all the households studied is still higher, in most cases by a factor of 2 and more, than long-term ecological sustainability would require although it is in most cases lower than the material footprint of the social and economic minimum defined for a decent life.

Keywords: consumption, household, sufficiency, lifestyle, natural resource use, MIPS, material footprint.

1. Introduction

Concern about unsustainable development of private consumption has raised its head during the past few decades in the western countries. Household consumption has grown tremendously: the consumption expenditure in the EU-15 increased by almost one third per person between 1990 and 2002. At the same time households are becoming smaller and tend to use more living space, energy and water, in addition to generating more waste per person (see European Environment Agency, 2005). This development increases the material footprint, i.e. the consumption of natural resources, of private households. The material footprint based on the MIPS concept (material input per unit of service, see Schmidt-Bleek et al., 1998; Ritthoff et al., 2002) can be used as an indicator for comparing present consumption to long-term targets for ecological sustainability.

The ecologically sustainable level of material consumption requires dematerialisation and a huge increase in absolute resource efficiency. One target for sustainable production and consumption has been the reduction of material flows in the industrialised countries by a factor of 10 up to the middle of this century (Schmidt-Bleek, 1993; 2009). This would allow a worldwide cut in material flows by half, while doubling worldwide prosperity, i.e. it would lead to an increase in worldwide resource productivity by a factor of four (von Weizsäcker et al., 1997).

The factor 10 discussion (e.g. Schmidt-Bleek, 1993; 2009) emphasizes that the consumption level of natural resources should not exceed the long-term carrying capacity of nature. The discussion about environmental justice has highlighted also the need for a more equal distribution of natural resources among the inhabitants of the globe (e.g. Agyeman et al., 2003). Thus, the estimations of an ecologically sustainable resource use always take into account the needs of future generations as well as present generations living in extreme poverty.

From this perspective, Bringezu (2009) has substantiated the sustainable level of resource use for the total material consumption (TMC) of European countries by calculating that an acceptable level of abiotic resource consumption would be appr. 6 tonnes per capita in a year. In addition, the present consumption of 4 tonnes of biotic resources could probably be maintained "under conditions of sustainable cultivation", whereas erosion should be reduced by a factor of 10 to 15 from the present 3 tonnes per capita (Bringezu, 2009, 168-171). Thus, a sustainable level of total material consumption (TMC) for a European economy would amount to a maximum of appr. 10 tonnes per capita in a year. This means a reduction by a factor of 4 to 11 from recent TMC levels of Western European countries according to Bringezu et al. (2009, 71). For Finland, a factor 5 to 6 reduction of the recent Finnish TMC level (see Hoffrén, 2010; Bringezu et al., 2009; Mäenpää, 2005) is required.

TMC includes household consumption as well as public consumption and capital formation. Public consumption and capital formation recently amounted to 61 % of the Finnish TMC (see Mäenpää, 2005, 74) and to 45 % of the German TMC (see Bringezu et al., 2009, 143). In a sustainable economy, this share might drop from present because household consumption could be seen more essential than

public consumption and capital formation. Thus, if the share of public consumption and capital formation drops to 20-40 % in the future, a sustainable level of natural resource consumption from private household activities would amount to 6 to 8 tonnes per person in a year. With a consumption level of an average Finn at 30 (Nurmela and Mäenpää, 2009) to 40 (Lähteenoja et al., 2007) tonnes per year, Finnish households obviously exceed this sustainable level by a factor of 4 to 7.

However, not all households are equal in their material consumption. Previous research shows that there is a connection between the income level and the environmental impacts of consumption (Wadeskog and Larsson, 2003; Kleinhückelkotten, 2005; Kotakorpi et al., 2008). The material footprint of people living in low-income households can thus be assumed to be closer to the ecologically sustainable level of resource use. Therefore, households already having a low material footprint are especially interesting. Kotakorpi et al. (2008) reported several households with a material footprint of "only" factor 2 of the sustainable level shown above. To achieve radical reduction of resource consumption in the future, we need to understand better how people with relatively small material footprint consume today: How do they manage to get along with less material resources and which aspects of their consumption do most affect the material use?

This paper presents the material footprints of households living on a minimum level of income in the Finnish welfare state, the so called "basic social security"[1]. The income of these social security recipients is below 600 euros per month plus some means-tested allowances for housing or rehabilitation. Due to the insufficient level of social benefits, recipients receiving basic benefits are often, relatively speaking, poor; and they lack the necessities or consumption habits that are presently regarded as socially acceptable (Perusturvan…, 2011). Since social sustainability means that everybody has a right for a 'decent life', the adequate standard of living needs to be taken into account (see Druckman and Jackson, 2010; Lettenmeier et al., 2011) – although in this paper we are mainly concerned with ecological sustainability. A decent life has been defined previously in the Finnish Decent minimum reference budgets (Lehtinen et al., 2011) that describe the level of consumption regarded as necessary for all members of society, excluding commodities that are regarded "aspirational". Budgets illustrate a consensus-based standard on the commodities a person should be able to afford in the society (Bradshaw et al., 2008).

In this study we compare the material footprints of low-income households to the material footprints of decent minimum reference budgets (Lettenmeier et al., 2011), to the resource consumption of 27 different households (Kotakorpi et al., 2008) as well as to the average Finn (Kotakorpi et al., 2008). In addition, we compare these footprints to the level of ecologically sustainable resource use (Bringezu, 2009).

In the following, we describe the methodology of this study and the MIPS concept for measuring the material footprint. After showing and discussing the results we conclude with considerations about the sustainable consumption level for the future.

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[1] In the Finnish welfare state everyone has a right for a minimum income in case of a social risk like old age, sickness, unemployment, maternity etc. These universal social benefits together are called "basic social security".

2. Methods

In this study, we have calculated the material footprint of 18 single households in Southern Finland. All households were living on disability pension or basic unemployment allowance; they belong to the lowest income decile of the society. The resource consumption of the participating low-income households was calculated on the basis of two interviews of each household, and from consumption and lifestyle questionnaires the participants filled in during an approximately two-week period between the interviews. The participants were asked to report their income and consumption expenditures, food, housing, household appliances, energy use, transport, tourism and leisure. The categories were adapted from decent minimum reference budgets (Lehtinen et al., 2011). In the interviews, we were able to complete missing information of questionnaires and even observe the household appliances of participants. Interviews, then, improved the reliability of data collection. The data for tourism was collected for the previous year in order to have a common and standardized time scale.

The natural resource consumption of the households was calculated as material footprint (see Lettenmeier et al., 2009). The material footprint is based on the MIPS concept (Schmidt-Bleek, 1993; Schmidt-Bleek et al., 1998; Ritthoff et al., 2002). It considers the whole life cycle of products and activities and includes direct resource use (used extraction) as well as indirect resource use (unused extraction, see Gliljum et al., 2009; Aachener Stiftung, 2010). Thus, it can provide a rough indication of the long-term ecological sustainability of lifestyles when compared to the level of natural resource consumption that is estimated sustainable (see section 1). The method has proved to function as a holistic, useful, reliable and understandable measure for natural resource consumption, thus serving also as a central indicator for ecological sustainability (see Schmidt-Bleek, 2009; Gliljum et al., 2009; Aachener Stiftung, 2010; Rohn et al., 2010).

In this paper, the resource consumption is given in mass units of TMR (total material requirement). TMR is the sum of abiotic and biotic resource consumption plus the topsoil erosion in agriculture and forestry (see Ritthoff et al., 2002). Material footprint calculation is done by multiplying the direct resource consumption or other input (e.g. electricity or transportation) with a material intensity factor (MIT factor) specific for each input (see Lettenmeier et al., 2009). Most of the material intensity factors used for the calculation were taken from previous research conducted by Kotakorpi et al. (2008), Lähteenoja et al. (2006) and Lettenmeier et al. (2009). In addition, some MIT factors (e.g. for health care and hairdressing) were estimated during this study.

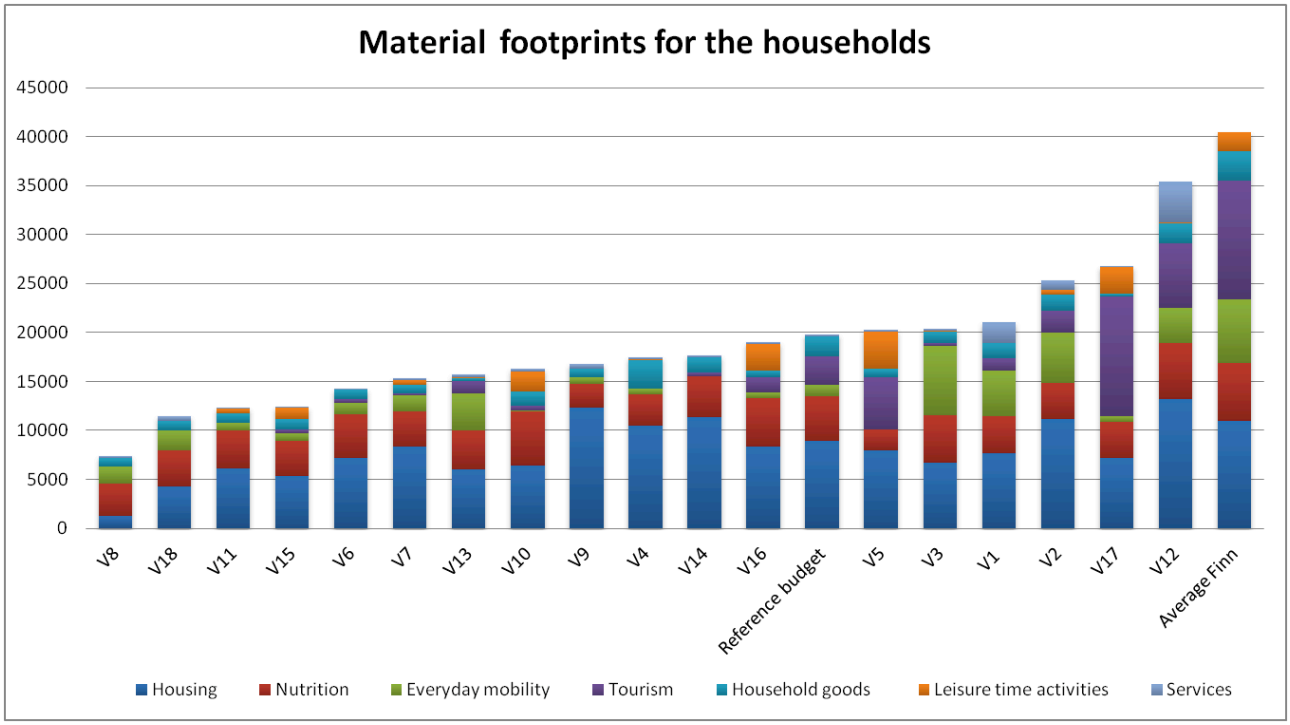
We also compare the material footprints of low-income households to the material footprints calculated for decent minimum reference budgets (Lettenmeier et al., 2011). These budgets were established in a consensual process involving both consumers (n=53) and experts. They were built for four types of households (see Lehtinen et al., 2011). In this study we used the budget of a single woman below 45 years of age for comparison.

3. Results and Discussion

3.1. Natural resource consumption of the households

The material footprint of the participating single households ranges between 7 and 35 tonnes per year, which means a factor 5 of difference between the least and the most consuming households (Fig. 1). Without these two extremes the material footprints would have ranged from 11.4 to 26.8 tonnes per year, which means a maximum difference of a factor 2.5 only. 14 of the 18 households studied have a material footprint from 11 to 21 tonnes. Both persons at the very lowest and highest end of the range were exceptional households. V8 was homeless, which explains the low material footprint. V12 received regular financial support from family members. The analysis revealed that the persons with the highest material footprints were not living solely on the minimum income provided by society. These persons have a higher resource consumption for traveling and other special activities, because relatives or other persons sponsor it.

Figure 1. Material footprints of the households.



From all the consumption components, housing has the greatest share of the total, ranging from 1.3 to 13.3 tonnes per person in a year. Housing is followed by nutrition (between 2.1 and 5.7 tonnes), daily mobility (from 0 to 7.2 tonnes) and tourism (from 0 to 12 tonnes). The order of the consumption components is similar to previous studies (Kotakorpi et al., 2008; Nurmela and Mäenpää, 2009). This is understandable since both housing and nutrition are essential in physical terms: every person needs food and a place where to live. The other interesting notion of the results is that the higher the natural resource consumption of the households grows, the smaller the share of housing and nutrition becomes. With the least consuming households, housing and nutrition cover two thirds of their total material footprint whereas this share drops to below half with the households consuming most.

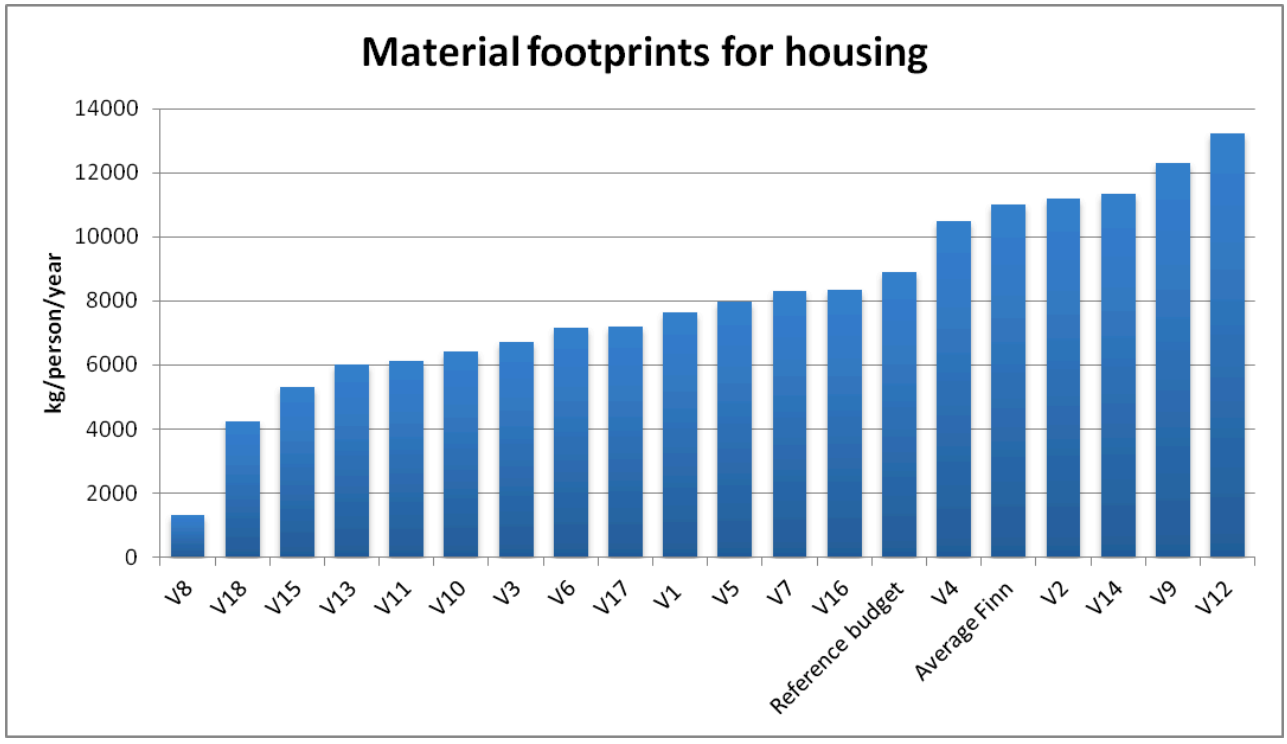
The differences between material footprints of the households are bigger with daily mobility, tourism and leisure time activities. In each of the areas of daily mobility, tourism and leisure time activities, there are households with a material footprint of zero. This means that these households are not travelling, do not have special leisure activities and/or only walk during their daily activities – mainly as a result of their very low income. In consequence, the results indicate that these components are less essential aspects of consumption and that they are easier to compromise.

In the following we provide a closer insight into the each consumption component. In addition, we compare the material footprints displayed with material footprints from other studies.

First, the results show that decent **housing** in present Finland requires at least four tonnes of natural resources per person in a year (Fig. 2) as the lowest material footprint of 1.3 tonnes was a result of homelessness. The presently homeless participant was staying with friends, so that instead of resources needed for housing we calculated the material footprint of daily energy consumption and a storage room for the goods. In all other cases, the TMR of housing consists of the living space, its heating and electricity use.

The differences in the material footprints for housing can mainly be explained with the varying apartment size of the participants. Most of the participants were living in studios or one-bedroom apartments, but one was living in a shared apartment and one in a service house. The average apartment size was 41 square meters. The amount of living space influenced the TMR of housing most. This is partly due to the data used for the calculation: living space was also the basis for the calculation of the heat consumption because data on the actual heat consumption was not available.

Figure 2. Material footprints for housing.



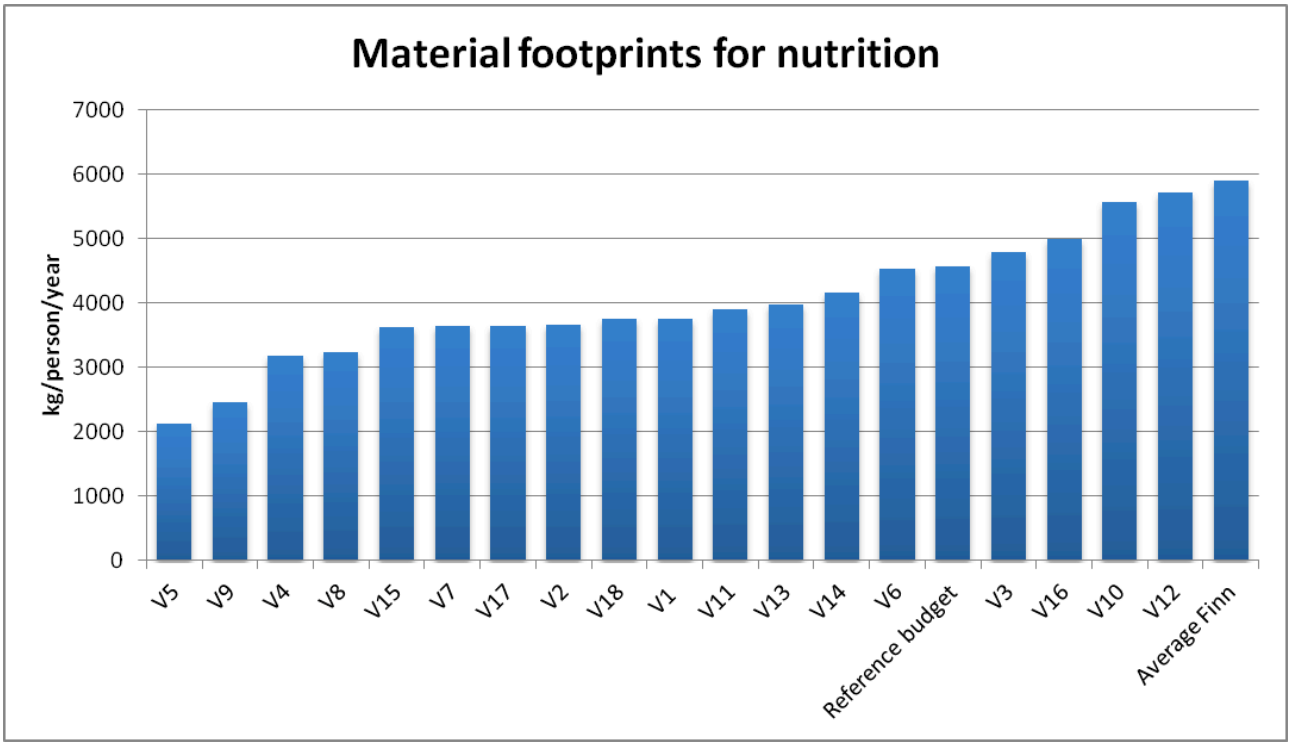
The material footprints for housing obtained in this study, were in the same range as with most of the 27 households from different income levels studied by Kotakorpi et al. (2008). Only four households of that study had a material footprint for housing of more than 13 tonnes per person in a year, with a maximum of 39 tonnes. However, 21 of the households in Kotakorpi et al. (2008) were not

single households, which tends to decrease the material footprint per person of housing. The material footprints of the decent minimum reference budget and the average Finn are within the range of the households of this study.

Second, the material footprints of **nutrition** ranged between 2.1 and 5.7 tonnes per person in a year (Fig. 3). The footprints vary due to differences in diet. For example one participant with a low material footprint (V5) was vegan, whereas all other participants were meat-eaters. The highest material footprint belongs to a participant who suffered from several diseases so that he had to eat more often than normal: he had a special diet and used food supplements. Since several participants ate the same meals during several days until they were eaten up, the results may be affected if someone has eaten repeatedly a meal of especially high or especially low resource intensity.

When comparing the material footprints for nutrition to the material footprint of the decent minimum reference budget, we notice that the results are within the same range – whereas the average Finn's material footprint for nutrition is slightly higher (6 tonnes). The material footprint for the nutrition of the households studied by Kotakorpi et al. (2008) ranged between 2.6 and 7.7 tonnes but only four of them are higher than with any of the households studied here. Hence, the households studied here appear to consume a relatively low amount of natural resources for their nutrition. However, many of the material footprints resulted in this study can be seen as maximum values because, due to the impossibility of quantification within the time restraints of the study, we did not take into account that many of the households ate food that might otherwise have become waste, e.g. food sold out less expensive because of the expiration day approaching or donated leftover food from food handouts.

Figure 3. Material footprints for nutrition.

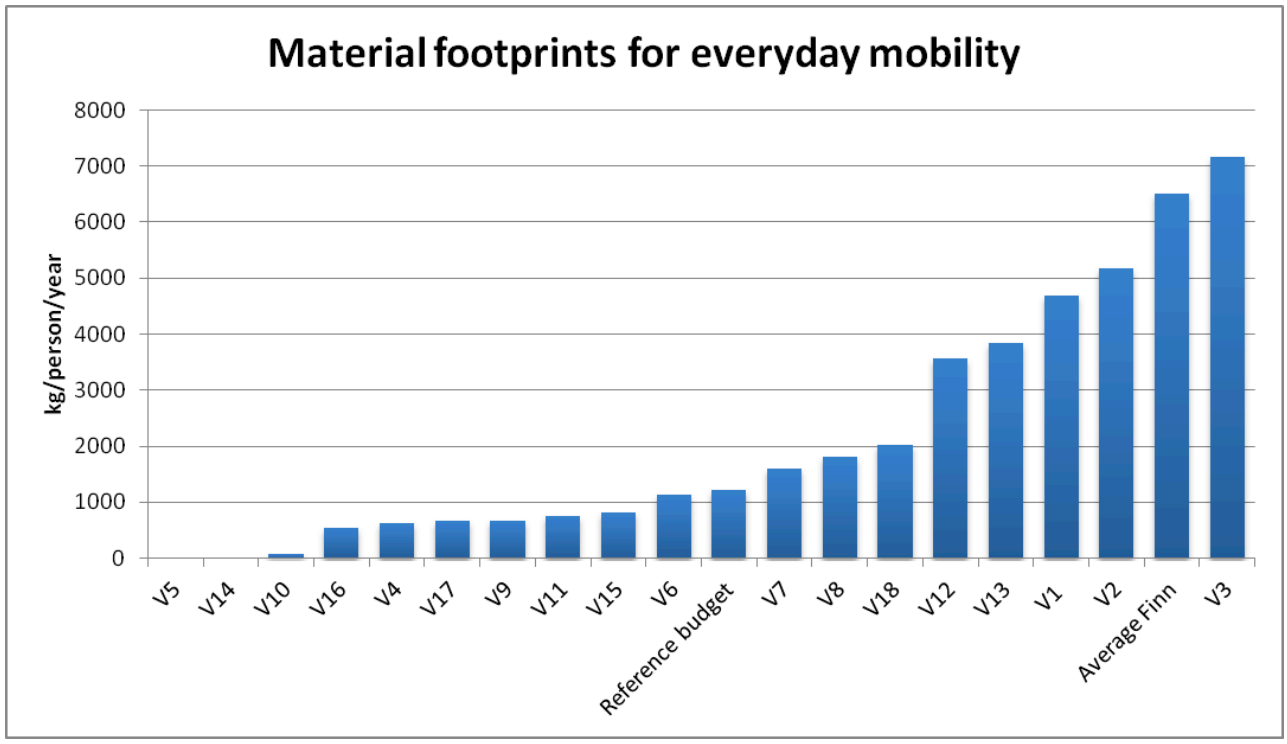


Third, the material footprints for **everyday mobility** were relatively low and ranged from zero to seven tonnes per person in a year (see Fig. 4). This is due to the fact that none of the households participating in the study owned a car. Many participants did not use any motorized means of

transport, therefore they have material footprint of zero or close to that. This was possible because most of the unemployed and retired participants didn't have to commute everyday. Only two of them (V3, V15) were working part-time in subsidized employment and used a taxi to commute. Furthermore, they lived so close to the everyday services that they got along by walking or cycling. Some households still used a car: Either they borrowed a car (V2) or they used a taxi because of their disability (V1, V3, V12). These households show high material footprints for everyday mobility. V13 travelled every day appr. 30 kilometres by public transport, which raised the material footprint.

The results correspond to the results from other studies. Half of the participants had material footprints for everyday mobility above the level of the decent minimum reference budgets. This is because the budgets assumed that single households use only public transportation, only the budget for a family of four persons was assumed to have a car (Lettenmeier et al., 2011). Only one participant of this study had a higher material footprint for everyday mobility than the average Finn. The material footprint of the 27 households of varying income levels studied by Kotakorpi et al., (2008) ranged between 0.6 and 51 tonnes, 11 of them exceeding the range of the households in this study. This is due to car use as well as to the amount of kilometres travelled daily. In general, the slower and less mobile lifestyle of the households studied here caused a lower natural resource consumption in terms of mobility.

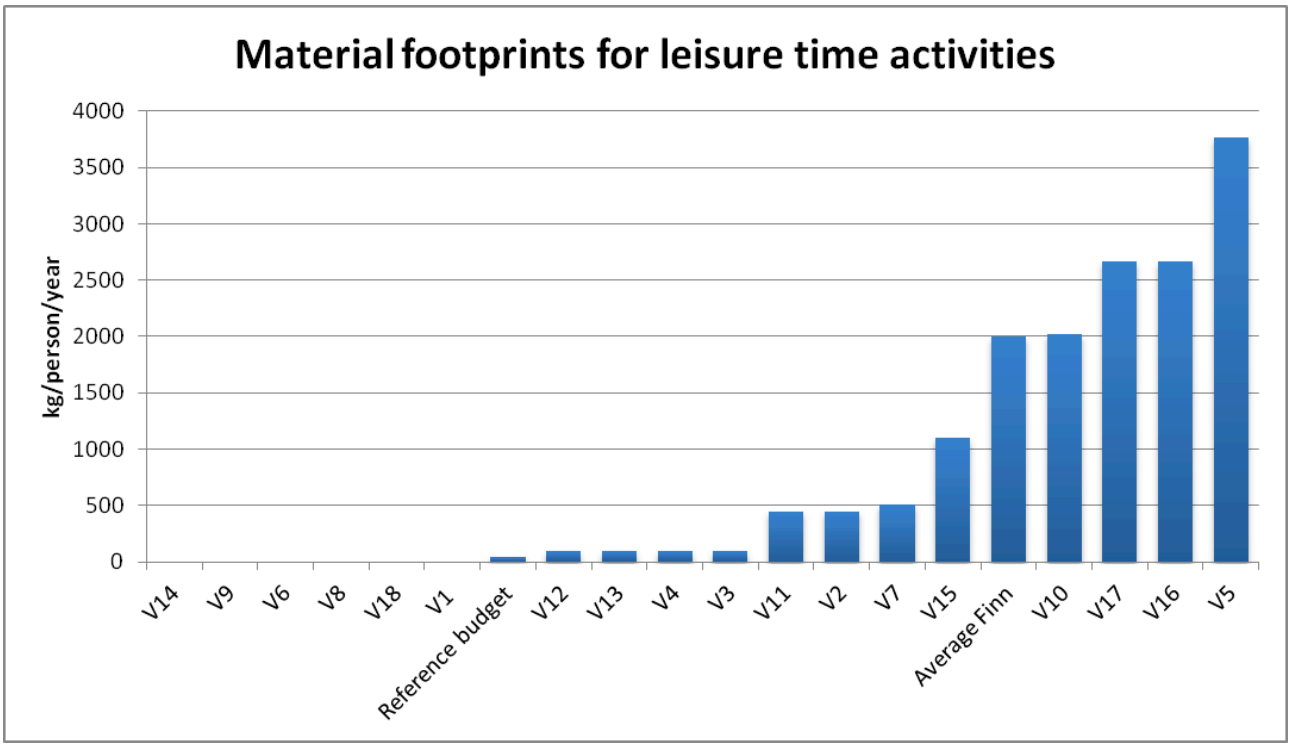
Figure 4. Material footprints for everyday mobility.



Fourth, the material footprints for **leisure time** activities (incl. pets) ranged from 0 to 6.5 tonnes per person in a year, with 17 out of 18 households below 3 tonnes (Fig. 5). Most of the leisure time activities of the participants consumed only a very small amount of resources, like jogging, reading or handicraft. The greatest resource consumption (V5) was caused by the two cats the person owns. Several persons (V7, V11, V15, V16) went swimming in public swimming pools regularly and one (V10) went to gym five days a week. V17 had a boat, which increases his material footprint for leisure.

The decent minimum reference budgets include only one leisure time activity so that the material footprint for that is small. The material footprint for the leisure time activities of an average Finn is calculated 2 tonnes. This is exceeded by only three of the participating households. The material footprints for leisure time activities with the households studied by Kotakorpi et al. (2008) ranged from 0.6 to 16 tonnes per person in a year. Ten of them had a material footprint of more than 2.8 tonnes for leisure activities and none of them was zero. Thus, 13 out of the 18 households studied had a material footprint smaller than with any of the households of Kotakorpi et al. (2008).

Figure 5. Material footprints for leisure time activities.



Fifth, the material footprint for **tourism** (either within Finland or abroad) of the households studied ranged from zero to twelve tonnes (Fig. 6). Only three participants consumed more than 2 tonnes for tourism and five of them had not traveled at all during the previous year. Basically, the households studied could not afford any traveling abroad. However, some persons were able to travel abroad even a few times a year because they either had a relative or friend sponsoring their trips or they borrowed the money from relatives. The material footprint for tourism contains also the resource use of the summer cottage one participant (V17) had rented at a low price.

Only three of the households studied had a higher material footprint for tourism than the decent minimum reference budget shown in Fig. 6. The average Finn's material footprint for tourism (12 tonnes) clearly exceeds the level of all participants of this study. With material footprints of 1.8 to 42 tonnes per person in a year, the households studied by Kotakorpi et al. (2008) mostly exceeded the level of this study in terms of tourism. In the same way as with everyday mobility, it seems that the lifestyle of people living on minimum income requires far less natural resources than the traveling-intensive lifestyle of average consumers.

Figure 6. Material footprints for tourism.

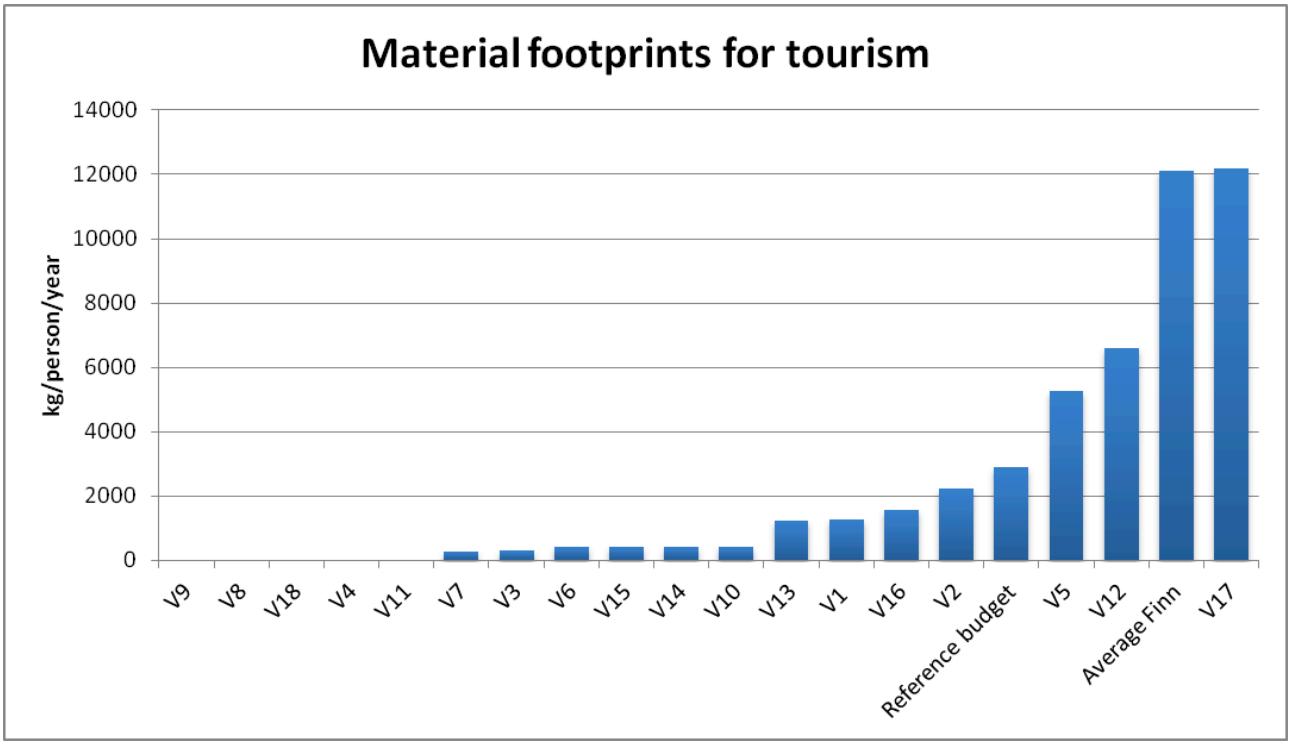
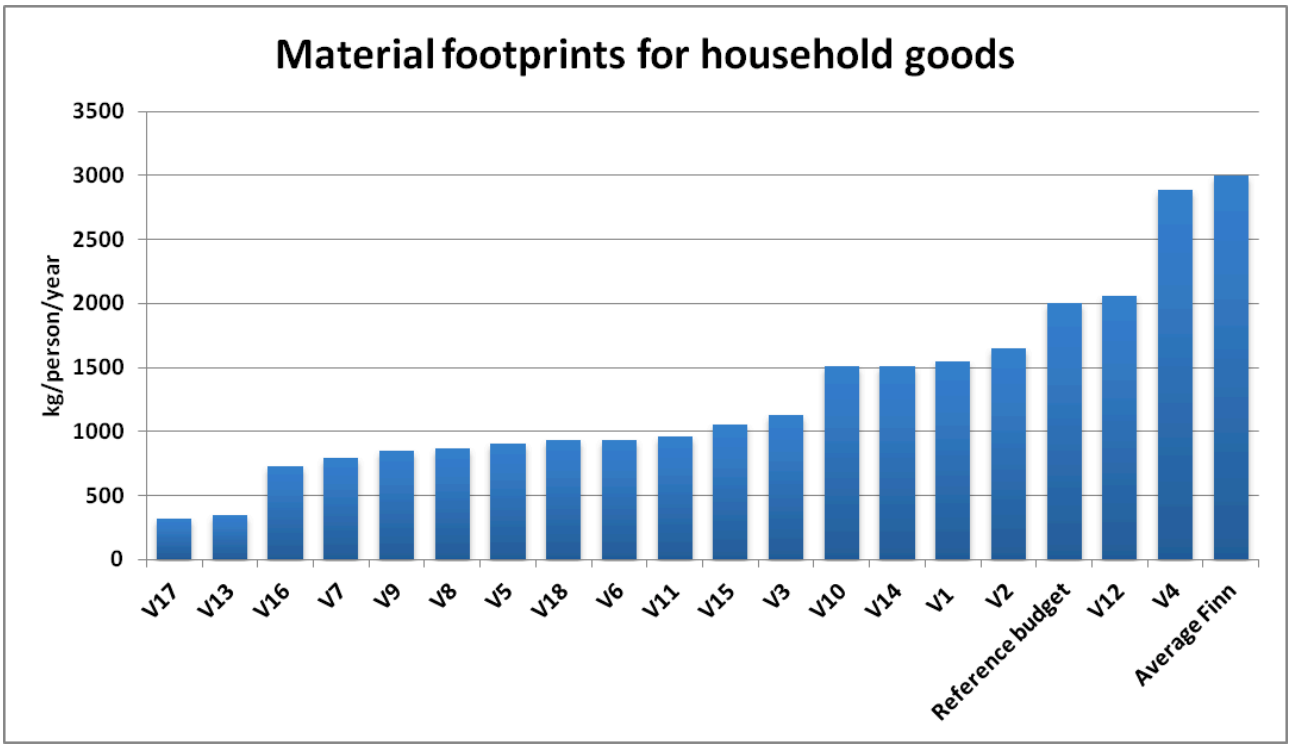


Figure 7. Material footprints for household goods.



Sixth, the material footprints for **household goods** are at maximum two tonnes per year, except in one case (fig. 7). The equipment of the households studied was rather decent. The participants owned all basic furniture, kitchen equipment etc. In comparison to the average consumers, the persons, however, used most goods as long as possible and purchased many of them second hand, including clothes. Both options decrease the material footprint because the estimated use period of the goods is taken into account and because the material footprint second hand goods is calculated zero due to the

earlier use of the goods. Only some participants buy somehow regularly new items. V4 used mail orders and V2, V10 and V12 had received a lot of new items from relatives.

For a part of the items, the amount was estimated on the basis of the decent minimum reference budgets in order to simplify the questionnaire. Therefore, the values displayed can be considered even slightly higher than in reality because the equipment considered in the reference budgets is more complete than in the households studied. Only one participant had a material footprint for home equipment exceeding the decent minimum reference budgets' footprint. None of the households exceeded the level calculated for an average Finn and only one household consumed more than half of that. The households studied by Kotakorpi et al. (2008) ranged between 0.6 and 4 tonnes for the material footprint of their equipment. Only five of them had a level of below 1.5 tonnes, thus staying within the level of 17 out of the 18 households studied here.

In this study we took into consideration some **services** (like health care and public libraries) the participants were using, and calculated the material footprint of these services. The results show that these services did not contribute highly to the material footprint of the participants. Within a range between 0.2 and 4 tonnes only three households had material footprints for services of more than 0.5 tonnes. However, due to time constraints in this study, it was not possible to take into account all the services the participants were using. This means that the actual material footprints for services are presumably higher than the ones given here.

3.2. Comparison to the ecologically sustainable level of resource use Main text paragraph

Half of the participants in this study have a material footprint of up to 16 tonnes. This means that they exceed the sustainable level by a factor 2 at maximum. Only one household reached the ecologically sustainable level but that person was homeless when the interviews were performed. The households consuming most resources in this study were by appr. factor 5 higher than the sustainable level of 6 to 8 tonnes described above on the basis of Bringezu (2009).

For the households consuming the most of natural resources in this study, the reasons for this can be identified. Five households exceed the material footprint based on the minimum decent reference budget referred to though still not reaching the natural resource consumption of an average Finn (see Fig. 1). With all these households this is due to travelling, a summer cottage and/or car trips. Only three of the households studied have a significantly higher resource consumption level than any of the decent minimum reference budgets (see Lettenmeier et al., 2011). These three households all had a sponsor enabling them to have a lifestyle above the minimum income level.

The difference between the material footprints among the households studied by Kotakorpi et al. (2008) ranged from 13 to 118 tonnes per capita per year, which means a factor 9 difference between the households with the smallest and the greatest material footprint and a factor 3 from average into both directions. Only 7 of them were within or below the level of the decent minimum reference budgets. The material footprint of the households studied here was thus closer to the sustainable level of resource use than with the households studied by Kotakorpi et al. (2008).

Kotakorpi et al. (2008) reported four households with a material footprint of more than 60 tonnes per person per year out of the variety of 27 households studied. For these households, a sustainable resource use on the basis of Bringezu (2009) would require a reduction by factor 10 and more whereas the households of this study consumed at maximum by a factor 5 higher than the sustainable level.

Kotakorpi et al. (2008) reported also four households with a material footprint of not more than 16 tonnes. These households also had a relatively low incomes.

The results show that low-income households have a lower material footprint than average. Thus, a decrease in material footprint by a factor of 2 - 4 from present average can already be achieved. However, the resource consumption of all the households studied is still higher, in most cases by a factor of 2 and more, than long-term ecological sustainability would require although it is in most cases lower than or equivalent to the material footprint of the social and economic minimum defined for a decent life.

The reference budgets describing the socio-economical minimum illustrate the level of consumption that allows a household to fulfil all basic needs and participate in society. The material footprint due to the decent minimum reference budget is approximately half of that of an average Finn. This means that the present average material footprint of households can be halved while still keeping the possibility of achieving a decent lifestyle. This is a remarkable potential for making consumption more sustainable already today.

In order to operationalize the potential for decreasing the material footprint, one must have a closer look at the different consumption components. Housing is the most resource-consuming consumption component of the households studied here as well as of the decent minimum reference budgets (despite in the reference budget of a family that was dominated by car use, see Lettenmeier et al., 2011). As all households, except the homeless participant, have a material footprint for housing exceeding 50% of the sustainable resource use level in total, the present resource consumption for housing most probably cannot be maintained in the future.

Most of the material footprints for nutrition with the participating households are at maximum half of the sustainable level. With everyday mobility, 13 of the 18 households studied have a material footprint within 25% of the sustainable level. With leisure time activities, only four households are significantly higher than one tonne per person in a year, with tourism four are above two tonnes. With household goods, only one household is significantly above 2 tonnes.

Therefore, a sustainable level of resource use seems to be achievable in the long term for most consumption components on the basis of this study. However, housing will require special efforts in terms of the energy efficiency of heating, the amount of living space and/or the material intensity of buildings.

4. Conclusions

The material footprint of the low-income single households studied here ranged between 7 and 35 tonnes per person in a year. Hence, they all consumed less natural resources than an average Finn. In most cases the material footprints were lower than the material footprints calculated for the decent minimum reference budgets (Lettenmeier et al., 2011) and lower than with many of the households of varying income levels studied by Kotakorpi et al. (2008). Regardless of that, 17 out of the 18 households studied here are still consuming at least factor 2 more resources than an ecologically sustainable level would require in the longer term.

However, this is a promising result: by ensuring the basic needs and living a socially acceptable lifestyle it is possible to reach a factor 2 improvement from average material footprint, which is in the right direction towards a sustainable future. Instead, households in the higher income deciles have a much longer way to go in order to achieve a sustainable level of consumption.

Knowing that low-income households are already living below the official poverty line and low-income households hardly can reduce their private consumption, we are not proposing any reductions in their consumption. The findings indicate that a sustainable level of resource use cannot be achieved solely by choices, decisions and activities of private households but governments and companies must improve the conditions and technologies enabling households to consume in a more sustainable way. Hence, sustainable consumption should be achieved through changes in the supply of products, services and infrastructure, e.g. in housing and in the energy sector.

Therefore, in the following we are considering two questions. Firstly, which aspects should be taken into account when developing supply structure for a less resource-intensive future? Secondly, what can the material footprints of the low-income households studied teach us in terms of a sustainable consumption for all households?

The households studied show that in present Finnish society a decent minimum seems to require approximately a yearly material footprint of 15 tonnes per person in single households. If the value is below this amount, there might occur some deprivations, like lacking decent housing or eating only leftover food.

Housing is the most resource-consuming consumption aspect when regarding low-income households. This is due to the fact that housing always needs some infrastructure and that single households tend to need more living space per capita than bigger households. The material footprint of housing in general could be decreased by a reduction in living space per capita. One way for decreasing individual living space could be an increased use of shared space in housing as well as on a municipal level. Nearly all the households studied used libraries intensively, which is one example of efficient and shared use of building space. Hence, authorities and municipalities should realise that the increase in square metres happening so far does not represent a sustainable trend and rather develop innovative solutions for replacing individual by shared space. In addition, more resource-efficient and longer-lasting houses as well as a decrease in their energy consumption should be developed on the supply side in order to proceed to a sustainable material footprint level for housing.

Nutrition is a basic need that cannot be ever reduced. However, the material footprints for nutrition of the participating households show that material footprints of two tonnes or less for nutrition are possible already today. Most households studied are contributing to preventing food waste and thus decreasing the resource intensity of the food chain by, e.g., buying price-reduced food that otherwise might be thrown away or by utilizing donated left-over food. From a nutritional point of view this is not necessarily a healthy way of increasing the resource-efficiency of the food chain. Therefore, waste reduction should be institutionalized in the food chain (e.g. by innovative ways of selling food out when it is still fresh) in order to decrease the resource intensity of nutrition. If this is developed

together with improvements in technology and less resource intensive (e.g. less animal-based) diets, a sustainable material footprint for nutrition should be achievable for all households.

The material footprint for mobility of the households studied shows that everyday mobility could fit relatively well into the ecological maximum as long as it is based on short distance public and bicycle transport. In the case of households regularly using a car the values rise considerably, even to the magnitude of the ecological maximum in total. Thus, the present infrastructure-intensive, private-car-based mobility system does not seem to fit into a sustainable future. In order to adapt mobility to a sustainable future, car-free lifestyles and neighbourhoods should be promoted. Municipalities and other authorities as well as business should develop sustainable urban structures reducing the dependency on car traffic and offering attractive public transport systems. One requirement for this would be a sufficiently dense network of services like shops and leisure venues in order to decrease daily mobility distances.

Although the material footprint of most households studied was below half of the average material footprint of Finns, it is still about three times higher than the long-term sustainable maximum. This means that a sustainable level of resource use cannot be achieved solely by consumer choices and activities but states, municipalities and companies must improve the conditions and technologies enabling households to consume in a more sustainable way. This includes the need for incremental as well as radical changes in order to facilitate sustainable lifestyles. As there are still several decades to go until 2050, there is still plenty of time for implementing these changes and lifestyles. However, planning and innovating the way towards a sustainable future should be started immediately while remembering that sustainable consumption should be promoted from an ecological as well as from a social sustainability point of view.

Conflict of Interest

The authors declare no conflict of interest.

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