The sustainability potential of work with consumption and green lifestyles

Paper B: This document intends to serve as a background material for the Workshop on sustainable consumption and green lifestyles of the Nordic Council of Ministers. The aim is to provide an overview of the sustainability potential related to work with consumption and lifestyles based on a survey of mainly quantitative studies. The report will serve as background for the discussion in the workshop session 2.

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1 INTRODUCTION

This background paper outlines some of the work made to investigate the sustainability potential related to measures concerning consumption and lifestyles based on a survey of quantitative studies. This means that the paper examines some of the main literature, academic as well as other publications, which is relevant for discussing this sustainability potential. Sustainability will in this context have a limited scope as the literature in question is predominantly focusing the environmental impacts and how these can be limited, at least when it comes to quantitative studies. The time frame of the study did not allow a comprehensive study of available literature in such a, at least potentially, vast area. Instead the approach has been to talk to experts in the area and to use their advices as a starting point for identifying relevant studies. References lists in publications have also proven to give good leads to other important work. The main emphasis has been to look for recent studies, with an absolute restriction to studies published in 2005-2010. A set of studies published in 2010 have been used as main input for the report and as a way to secure that the information is up-to-date.

The report is about consumption and lifestyles and has, consequently, chosen a particular perspective when examining and describing the environmental impacts. The consumption perspective, as we will name it, is viewing the various activities in society as part of the goal to allow us, the human beings, the opportunity to

consume various products and services. This means that all environmental impacts will be traced and allocated to the particular consumption activities. This perspective is essentially the same as the life cycle perspective. In life cycle assessments of products and services, a major initial decision is to identify and define the appropriate functional unit, that is, the unit of consumption that the impacts in the life cycle should be allocated to.

Overall, the consumption perspective is just one of several possible ways of describing and analysing the impacts on the environment.[1] It is, however, a very important perspective as it puts the needs and wants of the human beings in the centre, that is, fundamental driving forces of the human beings. The result of these can also be described as the lifestyles that we are having. To better understand how our lifestyles can be influenced and what results that could lead to for the environment impacts has become an important focus for the environmentally and sustainability related policies world-wide.

2 METHODS TO MEASURE IMPACTS

In order to measure the impacts of various activities on the environment, a number of methods have emerged. Some of these have been used to estimate the environmental impacts with a consumption perspective, while others are more restricted to other perspectives. As already mentioned, life cycle assessment (LCA) has a natural connection to the consumption of products and services and it was introduced as an assessment tool with exactly this perspective. It is also the commonly used tool when it comes to assessing the environmental impacts of a specified product or service. However, to cover a wider number of products would mean to perform and number of LCAs and would soon become too resource-demanding.

The today leading methods when discussing the impacts of consumption overall and various types of consumption have instead become environmentally extended Input-Output Analyses and Ecological Footprints, or assessments related to these methods. While the methods built on Input-Output Analyses allows us to identify the environmental impacts of various consumption activities and thus start to prioritise areas for action, they do not relate to the ecological limits in the same way as Ecological Footprints and related methods as Carbon Footprints. The latter thus have certain advantages when it comes to raising awareness and explaining the urgency of action.

A limitation for all of these studies is the availability of information and the level of detail of such information. In order to be able to get an overview of the total consumption, the researchers are having to start with information which is gathered originally as economic statistics and then to convert this information to environmental impacts with the help of factors calculated/estimated for parts of the economy. To determine these factors well is a challenge and we will likely see advancements in the coming years. In the same way, we need to further develop the systems for accounting of environmental impacts in various countries. Such work is ongoing on a European level. A higher level of standardisation between countries would, in particular, allow for better dealing with the flows of products and materials over borders.

The possibilities to estimate the environmental impacts will vary for the different impact categories. Questions related to chemicals and toxicity, as well as, biodiversity belong to the ones that are very difficult to assess well in this type of studies. The same is true for impacts that are differing significantly because of local conditions, while the more global effects are often easier to deal with. Ecological footprints are typically focusing only on those aspects of resource consumption and waste production for which the Earth has regenerative capacity.

[1] It is important to remember that there are a number of other commonly used perspectives when it comes to describing the environmental impacts of human activities. A traditionally important perspective was to allocate the impacts to production units or other objects with a clear and limited geographical scope. This is an important perspective when it comes to deciding on licenses for industries or the building of roads, dams, etc. A similar geographically oriented approach is seen in studies focussing the impacts of various regions, countries, etc. Such studies can also be aggregated to emphasise the impacts of a certain type of industry, a bigger geographical area etc. We also see a number of studies focusing materials and the impacts related to extraction, refining, use and disposal of selected materials.

Data should also be possible to be presented in terms of productive area. Toxics substances are thus not covered in ecological footprint calculations.

3 STUDIES OF THE IMPACTS AND THEIR RESULTS

Studies like the Living Planet Reports give a clear message that the overall environmental impacts from today's society are much too high and that they have risen substantially over the decades. In the 2010 Report it is stated the implications are clear and that the rich nations much sharply reduce their footprints, but also that the "rapidly-growing emerging economies must also find a new model for growth." This and other reports are estimating that the global ecological footprint is surpassing the world biocapacity already since the mid-1970s and are today well over 60% of that capacity. In other worlds, we need a second planet already today to maintain present forms of production and consumption.

A number of studies have presented overall results for three main areas of consumption: food and drinks, private transport and housing. A typical result of such studies is exemplified by the EIPRO (Environmental Impact of Products) study for the European Union. It reports that these three areas stand for 70-80% of the total environmental impact of private consumption. Several other studies conclude very similar results, for instance EEA & ETC/SCP (2010a).

Food is often pointed to as the somewhat bigger of these three areas. In the food and drink consumption the most important impacts are connected to the production and processing. Among such impacts can be mentioned the emissions from livestock, agriculture and industry on water, soil and air. Mentioned is also overuse of resources in fishing. Among household waste, food waste and food packaging waste are a substantial proportion. More and more emphasis has been put on the food wasted from the shops because the date of use has expired or it has otherwise been spoilt, as well as the amounts of food that are wasted in the homes.

Housing includes in particular energy for heating/cooling, light and various electrical and electronic equipments, water and the generation of waste. The trend is that the living area per person is increasing, which is important as the heating is the largest household energy end-use in the European Union. But the homes are also equipped with a growing amount of household appliances and electronics. Haunstrup Christensen et al. (2007) points out that though the rise of the final energy consumption (including heat and electricity) in Danish households was clearly interrupted in the very beginning of the 1980s and reduced by some 20% from the peak year 1980, it has remained on the same level through the 25 year period following. In the same period the water consumption was decreased some 30%.

The third area is private transport, which has continued to grow as a source of greenhouse gas emissions. Among the most important purposes for such transports, we find commuting, transports to leisure activities, vacation, and shopping, as well as visits to family and friends. While greenhouse gas emissions from private transportation are increasing, air emissions of pollutants local with local and regional effects, such as NO_X, VOCs and particulates, have decreased because of technological improvements.

UNEP (2010) points in their results to the group of manufactured products, in particular electrical appliances, as an important contributor to the carbon footprint of "rich countries". They stress the importance of analysing and identifying this group also because its contribution to emissions is increasing with wealth (as also the share related to private transport), but in particular because the problems of correctly assessing the imported emissions, that is the emissions taking place in other countries than the one where the products are consumed, as outlined in the following.

A complication for these studies is how to deal with imports and exports of materials, components and products. It is clear that the environmental impacts of the European countries are significantly higher if we include the impacts of the products imported in a life cycle perspective. In Sweden the estimate is that the greenhouse gas emissions are 25-35% higher if including the emissions from the life cycle of products imported as compared to just looking at the domestic emissions. In a similar way, it is estimated that the total land use for food products consumed in Sweden is to 30-50% outside of the borders. Though such studies including imports/exports are done, they are uncertain and complex depending on lack of reliable information for main countries and problems to determine the countries of origin for substantial parts of the import. In a series of articles published in 2005, Peters & Hertwich look at the influence on trade for Norwegian greenhouse gas emissions and comes to the conclusion that the CO_2 emissions embodied in imports was 67% of Norway's domestic emissions. They also show that a large part of these emissions, disproportionate to the value of imports, takes place in developing countries. Weidema et al. (2006) comes to a figure of about 25% for the imports to the total environmental impacts of consumption in Denmark, that is, the emissions from imports are about 33% of the Danish domestic emissions (minus export). Note that in the Danish study, the calculations go beyond CO_2 emissions.

While such information about the main areas of environmental impacts from consumption gives an overall picture, it needs to be complemented with more detailed studies to identify where improvements can be made, what measures could be taken and how big the improvement potential is. This means that the above-mentioned types of impacts assessment methods are supplemented by a number of other types of studies in order to guide the decision-makers about what measures should be taken and what policy instruments should be implemented to promote the wished for changes.

4 THE SUSTAINABILITY POTENTIAL

That substantial reductions in environmental impacts need to be achieved is hardly a controversial statement in the Nordic countries today, and it is also clearly stated on the European level, as well as in global institutions. However, how this should be achieved is a considerably more complex question. Figure 1 shows relative environmental pressure intensities of important private consumption categories in nine EU countries for 2005 per Euro of spending. It shows that there is considerable theoretical potential for environmental gains by changes in consumption patterns.

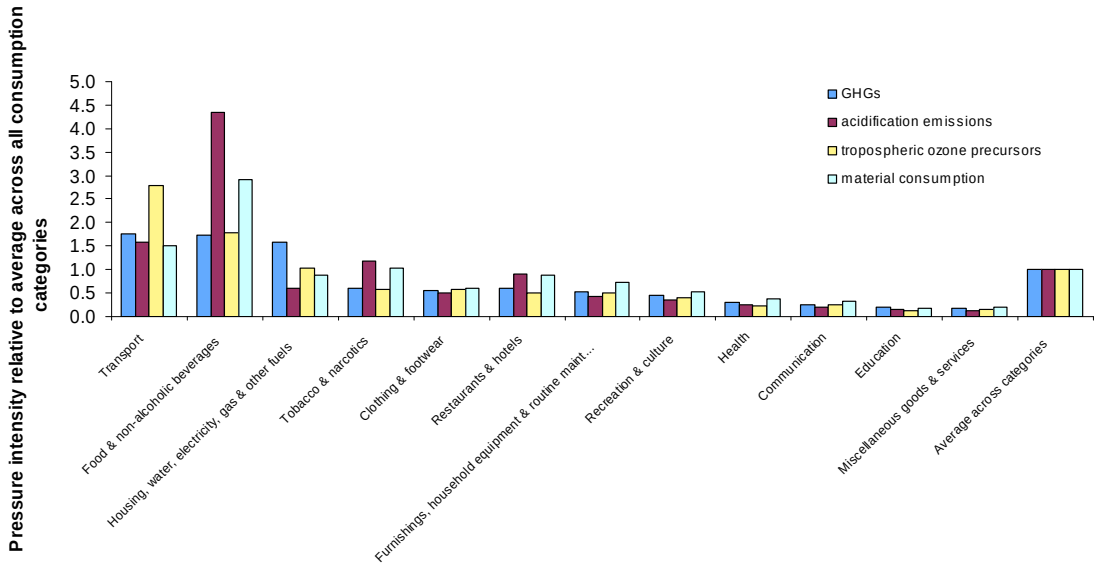

Figure 1 – Relative environmental pressure intensities – indexed pressure caused per Euro of spending – of private consumption categories in nine EU countries, 2005 (Source: EEA & ETC/SCP (2010a))

Decoupling environmental pressures from growth in private consumption can be achieved by reducing the pressure intensities within individual consumption categories – through improvements in housing energy efficiency, switching transport expenditure from private cars to public transport, or a shift from spending on quantity to quality in food, furniture, clothing, etc.

However, the large differences in environmental pressure intensities found between private expenditure categories (Figure 1) highlights a second potential for reducing or decoupling environmental pressures from growth in consumption: that of channelling additional expenditure of growing incomes towards low pressure consumption categories such as education, communication, or recreation and culture, except recreation activities involving intensive use of transport (EEA & ETC/SCP, 2010b).

Naturvårdsverket (2008) gives a list of five activities that are contributing with approximately 50% of the carbon emissions from private consumption and are pointing to them as the central for emission reductions:

1. How much and what car we use
2. How much we heat our homes
3. How much electricity is used in the homes
4. How much and what type of meat we eat
5. How far and how often we travel by air.

Below are given some indicative figures for the potentials in three mentioned areas of activities: food, private transport and housing. Finally, the complications related to the so-called rebound effects are raised.

4.1 FOOD

UNEP (2010) gives overall conclusions concerning the most important contributions to the environmental impacts in the three areas; food, housing and mobility (transport), and is thus also pointing to where the most important measures should be directed. When it comes to food they point to the influence on land use (habitat change in particular), water use, overfishing and eutrophication. In this context, they point out animal products, both meat and dairy, as the biggest problem, thus indirectly pointing to the need for reducing such consumption. They also mention non-seasonal fruits and vegetables as an important source of emissions.

There is a number of studies and publications giving indicative figure for the carbon emissions from various types of food products confirming the points given in the UNEP (2010) study, but also providing more details on strategies of how to reduce the emission by avoiding meat products, in particular red meat, etc. Naturvårdsverket (2008) gives a number of estimates for different products. Among these is an estimated that the wasted food in Sweden corresponds to emissions of ca 200 kg CO_2 equivalents per capita.

MacMillan & Durrant (2009) are specifically addressing the role of livestock consumption in the UK. The show that this gives rise to almost half the greenhouse gas emissions from food consumption and ca 8% of total UK emissions. They refer to EU JRC studies showing that all technical abatement measures studied for meat and dairy products would only cut the environmental impact of the sector by about 20%. The conclusion is that it is necessary with changes in consumption patterns to reach long-term goals for impact reductions.

Frey & Barrett (2006) estimate that a healthier diet would reduce the Scottish food footprint by between 15 and 25%, as compared to current diets. In turn, the impact of such a “healthier diet” could be further reduced by 23% through a “healthy vegetarian diet” – a diet that includes moderate amounts of milk and eggs. As an overall average figure they estimate that domestic British food will have 54% lower footprint as compared to imports. The calculated potential for footprint reduction by use of organic food compared to conventional is much more modest – ca 2% – but the authors believe this figure is underestimated. In conclusion the “best diet” (healthy, organic, vegetarian, local) would give a 39% reduction of the Scottish food footprint as compared with present consumption.

The review of the literature dealing with food shows that even if there are important gains to be made from improving the agricultural practices, the most significant changes are related to changes in consumption patterns, both the choice of what food products to consume, how much and how to handle the food products in trade and in the homes.

4.2 PRIVATE TRANSPORT

Habitat fragmentation, greenhouse gas emissions, emissions of acidifying compounds, and particular matter are stressed by UNEP (2010) when it comes to mobility. They point to travel distances as growing with wealth, putting pressure on more use of private transport to save time. Private vehicles are also the most important mode of transport when it comes to emissions, though aviation, while still comparatively small, is increasing rapidly with wealth.

EEA (2010) proposes a number of scenarios for transport development in the European Union, but concludes that none of these scenarios would cut the CO_2 emissions by 80% by 2050 and thus achieve the level regarded as necessary to keep global temperature increase below 2 °C. Overall the best savings potential would be achieved by a combination of lowered fuel consumption through technological improvements and a shift to lower emission modes of transportation. In this case a 44% reduction is estimated from the improvements (engine and vehicle design, electrical cars, low-carbon fuels and technologies encouraging behavioural change) and 20% reduction from a combination of road pricing, car clubs, increasing population density in cities, and travel planning (avoiding and shifting transports). Boverket (2010) points to the fact that car ownership is higher in less dense cities and it concludes that in the less dense cities citizens are using 25% more energy for transports.

The picture that comes out from the literature points to that development and adoption of technologies for vehicles will play an important role for the future environmental impacts from private transportation, but the choice of mode of transport (cars, trains, buses, planes, bikes, walking, etc.) and when to use transport (selection of residence in comparison to work place, location of recreational activities and shopping, vacation destinations, etc.) has equal potentials for influencing the level of environmental impacts.

4.3 HOUSING

For housing, UNEP (2010) point to the combustion of fuels or the use of fossil-based electricity as the largest contribution to the impacts. However, they also refer to construction and the production of construction materials as the largest source of particulate matter.

In a study by Haunstrup Christensen et al. (2007), it is pointed out that the improvements in insulation of houses in Denmark have been outweighed by the growing area per capita, as well as, the population increase. It is further quoted that there is a one third potential to reduce the heat consumption in Danish homes through economically feasible renovations. It is, however, explained that such measures have been less preferable as compared to spending time and money on improving the general standard of the houses.

Estimates for households and their homes in the United States reported in Gardner & Stern (2008) point to a similar level of improvement potential (30%) through realistic measures. According to an article by Dietz et al. (2009), a national US implementation of 17 household actions would have the potential to save 20% of household direct carbon emissions, or 7.4% of US national emissions, “with little or no reduction in household well-being.”

Naturvårdsverket (2008) makes rough calculations for what it would mean to decrease the living area per capita with some 35-60% (400-500 kg CO_2 equivalents per capita).

These examples illustrate well the dual possibilities for decreased environmental stress from the housing, as we have also seen them for food and private transport. That is, through efficiency improvements (insulation, choice of appliances, etc.), as well as, lifestyle changes (living area, inside temperature, etc.).

4.4 REBOUND EFFECTS

An important consideration when it comes to measures is the so called rebound effects. That is, effects that counteract the primary intended effects. A classical example relevant for this study is that energy efficiency improvements would make the energy-related services cheaper and thus potentially increase the use of these services. This is what is called the direct rebound effect. There are also indirect rebound effects. In the example here, we could assume that use of the energy service in question remains unchanged, but that the money saved are used for other energy-using products or services. A report by the UK Energy Research Centre (2007) gives some estimates on the potential rebound effects for energy savings. The indirect (economy-wide) rebound effects are by some evidence suggested to by at least 10% and often higher. Direct rebound effects are quoted to be less than 30% for household heating, household cooling and personal automotive transport in developed countries, and may be closer to 10% for transport. Logically, the direct rebound effects are expected to be smaller where energy is a smaller proportion of the total costs. EEA (2010) states in their study of transport systems that rebound effects are anticipated in respect of many of the improvements.

5 CONCLUSIONS

The consumption perspective has gained considerable understanding by researchers and policy makers and a number of studies have been presented during the last years that are trying to estimate the contribution of various areas of consumption to the total environmental impacts. Methods used include Input-Output Analyses combined with environmental indicators and various forms of ecological footprints (also carbon and water footprints). All of these meet a number of challenges, but give largely consistent messages when it comes to the importance of the broad areas of food, mobility and housing. Challenges are among others related to access to quality data, comparability between countries, more detailed results and the inclusion of imports and exports.

The literature on improvement potentials is vast, but scattered, and it is difficult to get a comprehensive overview. The estimates are robust in some areas concerning energy use (carbon emissions) from housing and mobility, but it is less clear if we have an equally clear picture of measures in other areas, even though there are clearly a great number of no-regret measures. It should also be observed that rebound effects are likely to occur and that they could be substantial under certain conditions.

It seems clear from this review that we have a good overall view on what the areas for significant environmental impacts are and what main type of improvements we could aim for. A question of special interest for the workshop discussion is whether the information we have today is sufficiently robust and detailed. Should we make further efforts in data collection and, if so, what information should we aim for and where could we benefit from common Nordic efforts? An additional question is what data we need for follow-up activities on measures taken and evaluation of the effectiveness of interventions.

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