Proceedings : Refereed Sessions III

Sustainable Consumption and Production: Opportunities and Challenges

Launch Conference of the Sustainable Consumption Research Exchange (SCORE!) Network

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Edited by: Martin Charter (The Centre for Sustainable Design) and Arnold Tukker (TNO)
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Organised by The Centre for Sustainable Design, Farnham, UK, and TNO, Delft, Netherlands, with support of the UNEP-Wuppertal Institute Collaborative Centre on Sustainable Consumption and Production (CSCP) and endorsed by IHDP-IT

The conference is organized in support of the UN’s Ten Year Framework of Programs on Sustainable Consumption and Production, back to back with an invite-only policy meeting on SCP organized by UNEP and the CSCP.
Authors were provided a format and clear instructions for lay-out. Most authors followed these instructions very good, leading to a consistent presentation of most of the individual papers. Due to the large number of papers, the editors were unable to embark on the time consuming process of adjusting any lay-out errors in papers submitted. Papers had to be reproduced here in the lay-out in which they were submitted, and where authors did - or could - not follow our instructions this may have lead to slight inconsistencies in presentation.

Not all presentations made at the Conference are available as papers.

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They can also be received (free of charge in electronic form) from:

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CBL III Segmenting for Sustainability

A review of UK typology segmentation models to influence sustainable behaviours

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1 Introduction

This paper is based on the research report Segmenting for Sustainability (Darnton and Sharp, 2006). The paper was commissioned and entirely funded by The Social Marketing Practice, and is being made publicly available as a contribution to the field of Sustainable Development research.

The stimuli for the research included recognition among Sustainable Development researchers that robust segments are needed for work in pro-environmental contexts, and increasing talk about ‘sustainable lifestyles’ and social marketing in the context of sustainability, both of which require robust segments to be identified.

The research was designed to assess the value of applying segmentation models in environment-related contexts, and to identify which models might be best suited to which purposes.

2 Methodology and Scope

2.1 Methodology

This research study adopted a three-stage approach. First, environment-specific segmentation models and related source material were identified within the UK. Contacts were drawn from central government, delivery agencies, consultancies, academia, the environmental voluntary and community sector, the commercial world and the market research industry. In total, 22 individuals were interviewed.

Approximately 20 environment-related models were identified, and 9 were selected to be the subject of detailed summaries; taken together, the selected models exemplify the diverse approaches adopted in different segmentations.

In the final phase, the nine selected segmentation models were summarised under a consistent set of headings: description of the model and
the segments; methodology; application and limits; further developments. Each summary was reviewed and agreed by their owner to ensure accuracy.

2.2 Selected models

The criteria by which the specific models were selected included:
1. a principally environmental basis to the model;
2. the frequency with which a model had been applied in environment-related contexts;
3. the availability of detailed evidence on the creation and application of the model.

Thus the majority of known environment-related models produced for use in the UK were featured. The models summarised in depth are:

- ENCAMS’ Geo-demographic Model
- ENCAMS’ Waste Segmentation
- Central Office of Information’s Synthesis Model
- Mosaic
- Energy Saving Trust’s Consumer Segmentation Model
- Barr’s ‘Sustainable Lifestyles’ Cluster Model
- Anable’s ‘Car Traveller Typology’ model
- National Consumer Council’s ‘Shades of Green’ segmentation model
- Co-Operative Bank's ‘Ethical Consumers’ segmentation model

It can be noted that there are very few of these models and that most are behaviour-specific, or at least relate to a specific behavioural domain (e.g., waste, recycling or car use). Very few of these environment-related models are cross-behavioural, which underlines the assertion that most segmentations are context-specific, and developed for particular practical applications. By extension, it should be noted that there is no one ‘winning’ model which has applicability across many areas of sustainability. Other models referred to in the research include:

- ACORN, CAMEO, PRIZM
- The Census Output Area Classification
- Dunlap et al’s ‘New Ecological Paradigm’ (NEP)
- Young & Rubicam’s 4Cs (the Cross-Cultural Consumer Classification)
- Dade & Rose’s ‘Motivation Based Tool’
- Prochaska & Velicer’s Transtheoretical Model of Health Behaviours

2.3 Model scarcity

There are relatively few environment-related models, and very few are cross-behavioural. A number of reasons could be suggested in order to explain their relatively limited availability; these include:

1. It is hard to define all the environment-related behaviours which could apply to an individual, and the same point can be made regarding all the factors that impact on those innumerable behaviours; without these two measures in place, it is hard to create cross-behavioural models. No single list of ‘sustainable behaviours’ is currently available, although efforts are being made to address this (e.g., by the Resolve project team at Surrey University).
2. ‘Green’ attitudes are traditionally regarded as ‘fuzzy’ and hard to identify through ‘hard’ survey questions; in any case, the relationship between pro-environmental attitudes and pro-environmental behaviours is recognised as tenuous and indirect.

3. Segmentation is a practical tool often associated with targeted marketing. There are ongoing doubts about the relevance of targeted marketing to encouraging pro-environmental behaviour change, but there is potential for the role of branding in Sustainable Development-related policy interventions to be further explored. Current evidence suggests community-based, networked and face to face approaches may be most effective, especially in behavioural contexts where habits dominate (see Sharp 2005, and Darnton 2006).

4. Segmentation is a costly technique, not undertaken without hopes of payback in the short-term; pragmatism dictates that one does not segment without good cause. For instance, a commercial marketer may offset the cost of building the model against the cost savings to be accrued from the more efficient targeting it offers.

2.4 Classification of models

Segmentation is a term used to describe a wide variety of methods for sub-dividing a broad audience. Accordingly, it is helpful to define the different types of segmentation, in order to analyse what possibilities they provide. However, no agreed classification of segmentation models exists, and the models can be defined by a number of different means. This is another corollary of models being built for a specific purpose, such that they do not follow rules of construction. However, in order to understand better what types of models are available, three different ways of classifying models are suggested here.

1. by causal factors – the socio-psychological determinants of behaviours;
2. by type of variable – the ‘input variables’ upon which the segmentation is constructed;
3. by attributes – the features that distinguish one model from another.

2.4.1 By causal factors

In a paper analysing the New Ecological Paradigm (NEP – a ratings scale for measuring environmental perceptions), Paul Stern provides a “causal schematic” representing the multi-layered factors which influence pro-environmental behaviour (Stern, Dietz and Guagnano 1995). The factors are shown as a hierarchy, and although the flow of causality tends to be from top to bottom, no arrows are added, as causality (or ‘feedback’) back up the levels is also possible (eg. behaviour change can lead to attitude change). While the schema is directly relevant to theories of encouraging pro-environmental behaviours it can also serve as a visual explanation of the levels on which segmentation models can work. A central premise of segmentation is that models should be based upon those variables which impact upon the end behaviour in question; Stern’s schema thus shows the multiple levels on which segmentations can be constructed.
Figure 1: Paul Stern’s ‘Schematic Causal Model of Environmental Concern’
(Stern et al 1995)

This simple schema can bear a considerable weight of interpretation, but two points that Stern makes are particularly relevant:

1. Most pro-environmental theory is behaviour-specific (to varying extents); more theoretical models of environmental concern are available at the bottom levels of the schema.
2. Factors higher up the schema (ie. non-behavioural) tend to be more stable and to remain more constant over time.

Both these points are pertinent to environment-related segmentations, especially that most models tend to be behaviour-specific. As this paper has found, more of the environment-related segmentation models are based on behavioural variables, or on attitudes connected to those specific behaviours. Few higher-level (values or worldview-based) segmentation models have been applied in environmental contexts.

2.4.2 By type of variable

A more common method of classifying different types of segmentation model is by the types of variable (ie. items of data) upon which they are based. Unlike using Stern’s schema, this method of classification is common to segmentation models in all behavioural areas. However, it is also subject to a degree of debate, as individual models will test the boundaries of each category, combining as many of them do variables of diverse sorts.

It is vital to establish that there are two types of variable used to describe a segmentation model. The first are ‘input variables’, being those items of data on which the segments are constructed (eg. behaviours undertaken, or
attitudes to a behaviour), the second are ‘output variables’, being those items of data which are used to describe the segments once they have been constructed (e.g. socio-demographic variables, such as age). It can be hard to distinguish between the two types of variable when looking at a finished segmentation model: both types of variable tend to be used to describe the segments, but it is the nature of the ‘input variables’ which determines what the model is expressing, and how effective it may be in predicting other attributes of a population. For instance, if we segment on levels of behaviour (input variables) we may then wish to explore their relationship with attitudes, or with socio-demographic variables such as age (output variables). It is important that these differences are understood, not least as the most common means of classifying segmentation models is by the ‘input variables’ on which they are based (thus a ‘behavioural model’ is one solely based on items of data relating to behaviours).

While no one classification of segmentation models by variable has become the common standard, it is possible to fit all the environment-related models identified in this study into a simple five-part classification, with the last type allowing for overlapping methods, as follows: Socio-demographic; Geo-demographic; Behavioural; Psychographic; Hybrid:

**Socio-demographic** segmentations divide the audience up according to commonly-identified characteristics such as gender, age, or socio-economic grade. When used as input variables, socio-demographic factors offer a good example of an ‘a priori’ segmentation method, in which a user knows beforehand that socio-economic groups will be an important variable to apply to the dataset. The evidence gathered for this paper suggests that socio-demographic variables tend not to be effective at discriminating between audience groups in the environmental sphere. For example, similar levels of recycling have been found among people of different socio-economic grades. Anable’s work on car travel (Anable 2005) has found that socio-demographic factors were evenly distributed across all seven of her ‘Car Traveller’ segments, which themselves were based solely on attitudes. Anable concluded that attitudes were a better predictor of car travel choices than socio-demographic variables.

**Geo-demographic** segmentations divide the audience up according to socio-demographic variables, and combine these with geographic variables giving a population’s physical location. This method results in clusters based on socio-demographic attributes which can also be identified by their physical location. Thus geo-demographic segmentation models are perfect for targeting audience groups where they live, through marketing techniques such as Direct Marketing. A number of geo-demographic classification tools are available, and most are commercial. All geo-demographic tools are based on census data, and as such technically profile local areas not people. However, they are commonly used both ways round, to describe an area or a type of population that lives there. All geo-demographic tools are predictive, based on probability, and involve processes of inferring and modelling to extrapolate from known area level data to lower level data (such as street or household) data. It is thus unsurprising if a geo-demographic tool does not correctly match a given individual to his/her type, as the aim of the tool is to identify people as like types based on probability. Finally, it should be noted

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that geo-demographic classifications are generic tools, based predominantly on socio-demographic variables; it is very hard to judge their validity without their being applied to a problem; a more realistic criterion is how well such a tool performs in context. Geo-demographic classifications can be massively rich in terms of data, but they are designed as the bases for further data modelling, not as standalone tools; their power to predict related factors (e.g. behavioural outcomes) depends not on the generic ‘input variables’ on which they are constructed, but on the context-specific datasets to which they are linked by users. Such context-specific datasets could include customer databases, or survey responses; in order to link the datasets to the geo-demographic tool, all that is needed are individuals’ postcodes. In this way a geo-demographic tool can unlock potentially powerful data which enriches the knowledge of marketers adopting targeted approaches to public engagement. The chief benefit of such tools is that they allow the user to take an informed guess at where someone might live, based on their characteristics. Examples of geo-demographic classification tools which have been applied in environment-related contexts include: Mosaic; ACORN; CAMEO; PRIZM and The Census Output Area Classification.

Unlike the four previous commercial tools, the Census OAC is a freely-accessible geo-demographic tool, produced in 2005 (Vickers 2005) and is available as a national statistic on the ONS’ Neighbourhood Statistics website. The Census OAC is solely based upon Census data; using the lowest level of Census data available. The advantages of the Census OAC over commercial tools is that it is free, and that it is entirely transparent: researchers can easily interrogate the clusters, and merge the clustered data with their own datasets by means of matching postcodes. The downside is that it does not incorporate so many other datasets and thus provide so many variables as commercial tools.

Census OAC has been applied in a research project to model the material demand (and consequent waste arisings) of typical OAC super-group areas (Druckman et al 2006). In this project, average household expenditure for the seven OAC super-groups is found by combining Census data with data from the Family Expenditure Survey. Expenditure data are then converted into material demand using price/weight conversion data. It is important to note that this methodology is based on matching socio-economic variables and not on matching postcodes. Druckman’s project exemplifies the benefits of transparency using the Census OAC tool, especially when combined with robust and accredited national datasets.

Behavioural segmentations group the public according to the extent to which they undertake a certain behaviour (or combinations); examples could include ‘heavy’ and ‘light’ purchasers, or frequent and occasional recyclers. Such an approach has the benefit of transparency, with the resulting segments representing a scale of behaviour. This method also has its disadvantages. First, using solely behavioural ‘input variables’ tells a user little about the factors influencing the behaviour. Second, behavioural models offer a snapshot of current levels of behaviour, and as such do not isolate those factors that may help project future levels of behaviour. A fair assumption is that levels of behaviour change frequently, and that
behavioural models would thus need frequently updating. Essentially such a segmentation model functions as a behavioural tracker over time. While segmenting on behavioural variables is a common approach, few purely behavioural models exist in the environmental sphere. Most environment-related models combine behavioural ‘input variables’ with attitudinal ones, which ultimately lead to their being classified as ‘hybrid’ models. Examples of models of this type include the Co-operative Bank’s ‘Ethical Consumer’ model, and the Energy Saving Trust’s Consumer Segmentation. The most notable example of a purely behavioural environment-related model is Barr’s ‘Sustainable Lifestyle’ cluster model. The National Consumer Council’s ‘Shades of Green’ segments are also purely based on behaviours.

**Psychographic** segmentation models are those based on internal psychological factors such as attitudes or values. The resulting clusters are then described using other attributes (socio-demographic or behavioural) such that the final outputs could be described as ‘lifestyle segments’. ‘Psychographic’ is a broad term, and segmentation models of this sort can usefully be further subdivided, using terminology that recalls Paul Stern’s ‘causal schema’ into Attitudinal, Worldview and Values-based models.

(i) **Attitudinal models** tend to be based on psychological attitudes and beliefs relating to specific behaviours. They are generated using attitudinal statements in order to identify individuals, and produce quantified segments. Their advantage over the behavioural approach is that they tend to be more stable, however in environmental contexts the attitudes on which they are clustered may not be strong determinants of the end behaviour. Thus it is not always clear how well an attitudinal model is likely to predict a pro-environmental behaviour; for instance, ENCAMS’ attitudinal waste segmentation model does not incorporate the single strongest determinant of recycling, namely infrastructure provision. The leading example of an attitudinal model specific to environmental contexts is Jillian Anable’s Car Traveller typology.

(ii) **Worldview** segmentations do not currently exist in isolation. Stern’s paper offers an analysis of the leading ‘attitude scale’ relating to generic environmental concern, Dunlap and Van Liere’s ‘New Ecological Paradigm’ (NEP); while no single segmentation model has been identified which is purely based on the NEP scale (ie. worldview variables), statements from its battery of 15 items have been incorporated into the variables used by both Jillian Anable (as input variables) and Stewart Barr (as output variables). There is thus considerable evidence of the extent to which key NEP items predict specific pro-environmental attitudes and behaviours.

(iii) **Values-based** segmentations exist in a few models identified in this study, working on the higher level than that of environment-specific beliefs and worldview. Stern’s paper on the NEP concludes that values are at a higher level in the hierarchy of causality as values are present from birth, and not developed during the lifecourse in relation to a particular aspect of living (ie. one definition of a ‘worldview’). An example is the ‘4Cs’ model, which was developed by the Young & Rubicam advertising agency network. The model (which stands for the Cross-Cultural Consumer Classification model) comprises seven segments, each identifying a ‘prepotent’ needs state from Maslow’s seven-stage Hierarchy model. The basis of the model is the innate values held by individuals, although by using a wide range of output
variables, the segments are often expressed in terms of socio-demographic variables such as age and income. The model is inherently not specific to environment-related contexts, although it was adopted at one point by the Energy Saving Trust to profile their priority audience groups. The usefulness of these models is likely to lie in their ability to identify people by their underlying values, and to provide suggestions for how policy and communications staff might best engage those segments, rather than predicting specific behaviours.

Hybrid segmentations combine multiple types of input variable in their clustering process. Most common among these hybrid types are those blending behavioural and attitudinal factors among their ‘input variables’, although the whole process of linking geo-demographic classification tools to other data can also involve generating ‘hybrid’ segments. The benefit of a hybrid model is that all the variables relevant to the behaviour in question have been gathered together in one place; thus in the Energy Saving Trust Model, an energy adviser need only identify an individual as a type in order to infer a good deal about their behavioural, attitudinal and socio-demographic attributes. Similarly this model has allowed the identification of particular audience groups who present appropriate combinations of attitudes and behaviours that mean they can be deemed priority audience groups. However for more inquisitive users, such as researchers, the bundling of variables together in the clustering process removes the possibility of using the resulting segments to explore correlations between variables.

2.4.3 By attributes

In view of the observation that the environment-related models identified in this study tend to test the boundaries of the generic classification of models (based on input variables) it could be more appropriate to depict the diversity of the available models by means of a matrix showing their relative attributes. An attributes matrix is presented in the parent research report (Darnton and Sharp, 2006), but could not be reproduced for this paper. In a sense, it is an attempt to identify the qualities that mark out one model from another, and to that end, the matrix can be regarded as a segmentation of segmentations. The attributes are:

Date created
Model type: Geo-demographic
的行为
心理
行为领域
数量的段落
段落的大小以%?
原始应用
独立模型?
免费访问?
类型的数据和来源的使用
2.5 Guidance on model selection

Providing guidance on model selection is difficult, guidance being generic and segmentation models being context-specific. A more reliable approach would be to identify likely segmentation solutions to specific environment-related problems. This paper has identified a range of existing models and one of the key questions is whether those context-specific models can be applied to new problems. In some cases, it may be that a segmented approach is not appropriate at all. In attempting to provide some generic guidance, this section of the paper matches types of segmentation model to different kinds of user in the Sustainable Development sector, and in so doing it points out the strengths and weaknesses of applying different types of model in different environment-specific contexts.

2.5.1 Guidance for policy makers; behaviour specific

Current thinking on pro-environmental behaviour change suggests that those wishing to change a behaviour first isolate that behaviour, and interrogate it to establish the barriers and drivers relating to different audience groups. In such an approach a clustered model with numerous segments may not help the policy maker get closer to the behaviour in question and the key audience groups. A complex segmentation may not be required, rather a simpler approach based on ‘factor analysis’ of the impacting variables may be preferred; such factors could be socio-demographic and infrastructural (eg. income, type of property lived in, access to a garden etc), the important criterion being that they are known to be impacting factors on the end behaviour. If attitudes are known to be determinants of that behaviour, a psychographic model may be required; existing models may provide useful insights or methodological precedents.

Finally, if the types of intervention suggested for the behaviour change in question involve an element of targeting by location, it may be beneficial to tie existing behaviour-specific data to a geo-demographic tool. By contrast, if a community-based or street level campaign is likely to be required, local knowledge may be more important than big survey-based evidence.

2.5.2 Guidance for policy makers; cross-behaviour

This is perhaps the most difficult area on which to give guidance: segmented approaches which bundle relevant behaviours or their antecedent variables together may have particular value in identifying key audience groups and the effective methods by which to engage them. However, users of this type will need experimental approaches to see how far a model can be ‘stretched’ to perform effectively across a number of behavioural domains. This problem exemplifies a pivotal question for those working on pro-environmental behaviour change: while the theoretical evidence stresses that the only sure way to encourage pro-environmental behaviour change is to work on each behaviour one by one, the scale and pace of environmental degradation suggest that a ‘behaviour by behaviour’ approach could be running to too slow a time scale. The idea of bundling behaviours into repertoires, as different segments of the public see them, therefore offers potential for making quicker inroads into environmentally detrimental public
behaviours. Establishing robust (and, logically, psychographic) segments is one necessary task towards achieving that overarching goal.

For those concerned with carbon-related behaviours, experimenting with cross-behavioural models could begin with the Energy Saving Trust Consumer Segmentation model, and would involve running diverse ‘output variables’ relating to different behaviours across its segments to see if that model effectively discriminated between the levels of behaviour undertaken. For those users with wider concerns, it would appear there are gaps in the current provision of models which may need bespoke solutions if mass audiences are to be divided up into more manageable chunks.

Two potential routes can be suggested here, based on the standard tenet that segmentations should be built upon those variables which most determine end behaviours. One approach is to identify all the variables informing all the behaviours in question, and to segment the public using a cluster process incorporating all those variables. This method is time-consuming and methodologically demanding, not least in terms of the length of questionnaire which the public may well be confronted with. The other method is to identify common variables which are applicable to the full range of behaviours in question; it is likely that such variables would be at a higher level of causality. Thinking back to Stern’s ‘causal schema’, these variables will be above the level of behaviour-specific attitudes, probably addressing an environmentalist worldview (e.g. drawing on the NEP scale), or even motivation-based values (i.e. beyond the environmental sphere).

Depending on the intervention types anticipated, it is possible that a worldview-based segmentation model would need to be linked to a geo-demographic tool, in order to identify the relevant audience groups on the ground.

2.5.3 Guidance for communicators

Interviews conducted for this study suggest that communicators working in Sustainable Development-related contexts would benefit from a broad, psychographic means of understanding their audiences. Being predominantly interested in people’s underlying motivations and the most effective means of engaging those people, psychographic models based on values (e.g. the 4Cs) or behaviour-specific attitudes (e.g. ENCAMS’ waste segmentation) have particular value for communications applications. However, those who are then concerned with targeting those audience groups may urgently need to know how to identify members of those audience groups – and in many cases this means knowing where to find them. Thus combining a geo-demographic tool with a psychographic model specific to environmental contexts could be very useful for communicators. Again, this is a notable gap in the current coverage of environment-related segmentation models; however, identifying which attitudinal or values-based factors most impact on the behaviours in question will best be established in context.

2.5.4 Guidance for researchers

Researchers, being both expert and rigorous, will be best placed to pick up on some of the points raised in this paper, and to apply them to their specific research problems. In terms of guidance on model selection, it is
anticipated that researchers could benefit from using all the available types of model, even if only to build on the foundations of existing models, and to adapt the methodologies used to meet their own needs. Other researchers may be keen to build new environment-related models from scratch, filling some of the gaps identified in this paper.

One particular type of model – a psychographic one, derived from qualitative research – is seen as almost uniquely helpful to researchers and their tasks. The Central Office of Information’s Synthesis Model shows how a tool of this sort, based on a combination of multiple research insights and common sense, can be valuable in building a better understanding of subgroups of the general public without being quantified or having a geographical dimension. That such a model could easily be dismissed by other users involved in behaviour change interventions, or targeted delivery, simply underlines how different types of user have different needs from different types of segmentation model.

2.6 Potential developments

What are the potential avenues for the development of segmented approaches to public engagement in Sustainable Development-related contexts? Some of the ideas presented here were specifically suggested by those interviewed in this study; others arise more from the limitations of current models, and the possibilities for pursuing interesting solutions to social behavioural problems in the environmental sphere. Some of the suggestions below would involve adapting existing segmentation models, while others identify new projects expanding into the gaps in current environment-related model coverage.

2.6.1 A universal environmentalist mindset model

The need for a single model that could be applied across environment-related behavioural areas has been identified in this paper. No such model exists, nor is there a comparable one which could be readily adapted. However, some existing models include myriad ‘attitude statements’ which could serve as input models in such a pan-behavioural model. The value of such a model is that it would be free from ties to current behaviours; hence it would be more ‘stable’ than behaviour-based models, and potentially more transferable across different behavioural domains. Ideally, such a model would identify different segments of the public according to the extent to which they held ‘environmentalist’ attitudes, beliefs and values. Developing such a model would be no small task. At the least, it would involve:

1. desk research to identify existing statements (eg. from the NEP Scale, from Rokeach’s value survey, and from Maslow-based models, informed by behaviour-related studies such as Barr’s and Anable’s);
2. qualitative research (to validate and potentially extend the battery of chosen statements)
3. quantitative research and analysis (to gather the data which would serve as input variables for the clustering process, and as output variables to describe the segments)

Additionally, a final qualitative stage could be included to explore the extent to which real individuals conformed to type, and saw value in the sets
of psychographic variables selected. If relevant a data-linking process could also be performed to map the new psychographic segments to a geo-demographic tool such as Mosaic.

2.6.2 An expanded ‘Sustainable Lifestyles’ behavioural model

Barr’s behavioural model is based on a specific geographical locale and ‘Sustainable Lifestyle’ clusters based on 40 waste behaviours. He has identified travel and transport as key behavioural domains into which to expand the model. Such a project would be very welcome, and would result in a range of purely behavioural segments showing the different repertoires of ‘sustainable behaviours’ undertaken by different groups of the public.

If this adaptation to the current model were undertaken, it would obviously be beneficial if the new model were based on a national dataset, increasing the representativeness and applicability of the data. Such a dataset could then be linked to a geo-demographic tool with potentially interesting results. The resulting repertoires of behaviours could even be expressed as indexed scores, providing a relative measure of the sustainability of the lifestyles of each of the cluster types.

Ultimately, such a behavioural segmentation would benefit from being based on an agreed set of all the behaviours which contribute to a ‘sustainable lifestyle’ – without such an agreed list, any resulting model could be said to be partial, skewed towards one behavioural area or another. While this would appear to be an ambitious research task, it would pay dividends across the spectrum of behaviour-related research and strategy on sustainability.

For instance, just considering modelled approaches, if such an agreed list of sustainable behaviours were available, it could inform the survey work relating to an ‘environmentalist mindset’ model, such that the attitudinal segments could be described in terms of their current behavioural repertoires, based on a definitive standard.

2.6.3 A simple ‘carbon emitter’ model

It has been suggested during the research that the composite carbon scores (for energy use in the home, and car use) generated by Energy Saving Trust during the construction of their Consumer Segmentation Model could be of considerable value to those working in the Sustainable Development sector. The principal benefit of the composite carbon scores is that they provide a simple relative measure of the emissions of the whole population, expressed at the level of the 61 Mosaic types.

One option for adapting the current model would be to recluster the 61 generic Mosaic types based on the existing carbon scores (across two dimensions: home and car). Another option would be first to refine the composite carbon scores, perhaps by adding an air travel component, or by investigating any alternative data sources to those currently in place.

2.6.4 Linking existing datasets

For those interested in developing new segmentation models for their own purposes, it should be reiterated that datasets can be relatively easily combined – providing that postcodes are available for each dataset. Users of
all kinds may be interested in a big environment-related survey dataset. Non-survey data could also be a useful source of output variables; for instance, some local authorities hold reliable waste collection data going back a number of years, and it would be an interesting exercise to link this to existing behaviour-specific segmentation models.

3 Overall conclusion

In conclusion, the possibilities for adopting and extending segmented approaches in environmental contexts are endless. However, before proceeding up any attractive avenues, interested readers are advised first to ask themselves the question: “Even if I had the most robust segmentation model in the world, what would I do with it?”

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CBL III Opportunities and Challenges of Sustainable Consumption in Central and Eastern Europe: Attitudes, Behaviour and Infrastructure

The case of Hungary

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1 Introduction

The study focuses on individuals and examines the attitudes, behaviour and infrastructure of household consumption with the focus on food, housing and mobility (tourism/transport) from a sustainability perspective. Our study is the first to draw a general picture about Hungary in this topic, and it is based on an original representative survey on sustainable consumption attitudes, the meta analysis of other surveys, analysis of statistical data from the Central Statistical Office (KSH) and other sources.

While overviewing a great number of studies and data, the study shed light to some of the contradictions a Hungary-like middle-income country might face. A way towards sustainable consumption should be found between traditions and modernization, between conflicting attitudes and changing infrastructure, under the conditions of triumphing globalization and shrinking local markets. The results and the recommendations might be interesting for other countries in the Central and Eastern European region as well.

2 Antecedents

Hungary is preparing its National Development Plan (NDP) which will define the ways the resources from the European Structural Funds will be used. One chapter of the NDP is the Environmental Operative Programme which, among other goals and as a new achievement, aims at focusing on sustainable consumption and production. As part of the NDP planning process, the Ministry of Environmental and Water invited the Association of...
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Conscious Consumers to prepare an analysis on the state of sustainable consumption and production in Hungary. The presented study is built on the results on this analysis and was compiled by the experts of the Association of Conscious Consumers who also work for other research institutions.

The Association of Conscious Consumers was founded in 2002 with the mission of “promoting and supporting conscious consumer behaviour, ethical (environmentally aware and socially responsible) consumption and corporate activity, sustainable consumption and production strategies, the eco-social market sensitiveness and awareness of rights and obligations of consumers.” The main areas of its activity are: independent information services, education, advocacy, consultation, publishing, events and media activities, international and national partnerships, research.

3 Methods, analytical framework

Studies dealing with sustainable consumption generally examine the following dimensions of individual consumption: food consumption, housing (construction and the consumption of energy, water etc. connected to the operation of households); mobility, and tourism, which recently has been handled separately due to its growing importance (e.g. EEA, 2005; Spangenberg and Lorek 2002; Sustainable Consumption Roundtable, 2006). According to the current research trends these consumption segments should indeed receive special attention because they represent a considerable weight in the ‘basket’ of individual consumers; their environmental impact is significant; and alternatives, which can be considered sustainable from both social and environmental aspects, are available on all of these areas. For these reasons we basically follow the above set consumption dimensions in our report, with some minor modifications. First, we do not consider mobility and tourism as separate topics, for very practical reasons. Tourism is still of a minor importance in the purchasing behaviour of Hungarians, on one hand. Though sustainable alternatives exist, these and the ecological effects of tourism are not present in the Hungarian public discourse, on the other. So we merged them to mobility in general. Second, before going into the details of the different consumption fields we start our report with the general trend of sustainable consumption.

For each field and, consumption in general, we present the available data about people’s attitudes towards sustainable consumption patterns, the underlying assumption being that positive attitudes are a necessary (although far not sufficient) condition for any behaviour change. Then we contrast the attitudes with observed behaviour and we provide data about the infrastructure of sustainable consumption patterns. However attitude formation can only be successful if alternatives necessary for behaviour change are available, and the institutional (e.g. legal) and physical infrastructure supporting alternative behaviour is also available.

¹ According to the data of the Hungarian Central Statistical Office, in 2003 people on average spent 7.9% of their income on „culture, recreation, entertainment”, out of which only a minor part should be assigned to spending related to tourism. For instance people spent only 1.8% of their income on package holidays. Total spending on tourism should be between the two, but certainly closer to 1.8%. This should then be compared to spending on food (25.5%), housekeeping and house maintenance (23.3%), transport and communication (17.8%). (KSH, 2005b).
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The data we provide come from different sources. First, in 2005 we made a representative survey about people’s attitudes towards ethical and sustainable consumption (referred as ACC, 2005). Second, we use data from other surveys and studies. Third, we rely on official data coming from the Hungarian Central Statistical Office, publications of ministries and other government bodies.

4 General perceptions about consumption and responsibility

4.1 Attitudes, declared consumer behaviour

According to a survey from 2003, half of the population is aware that consumption has environmental impacts, 91 percent of the population agrees (to different extents) that consumption habits contribute to environmental problems, and it was only 6 percent who disagreed with the statement (Valkó, 2003). Similar opinion is reflected in a study from 2005 which shows that 71% agrees that almost everything that people do in modern life is harmful to the environment (HuMuSz, 2005). Economy in general is seen both as the solution and as the cause of environmental problems: 60-60 percent agreed with the statements that (1) economic growth is harmful to the environment in any case, and (2) economic growth is needed to solve environmental problems (HuMuSz, 2005).

While three-quarters of the people share the view that we should return to a simpler lifestyle where there is less emphasis on consumption and economy, 27-30% agrees that instead of limiting the growth of consumption (changing lifestyle) technical development is necessary to live in harmony with nature, according to different researches (HuMuSz, 2005; Sági, 2004).

Another interesting result is that while people recognise that their consumption patterns contribute to environmental problems, 40 percent of them place the responsibility onto the government for maintaining the environmental quality of the country (Valkó, 2003). However 51% are not willing to pay more taxes towards solutions for environmental problems (Sági, 2004). We can conclude that most people do not want changes in their personal lives, though they acknowledge the unsustainable nature of their present lifestyle models. It seems that unsustainable consumption and environmental problems remain someone else’s problems. These results reflect to the inconsistency of attitudes towards sustainability which - as we will see later – seems to be a general phenomenon.

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<tr>
<th>Referred as</th>
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<tr>
<td>ACC</td>
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<td>Capital Research</td>
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<td>HuMuSz</td>
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<td>Puckó</td>
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<td>Sági</td>
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<td>Valkó</td>
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2 Basic data about the frequently referred surveys, see details among the references.

3 In this survey people could choose several answers at the same time. So some respondents were apparently holding two mutually contradictory statement at the same time.
On the other hand analysing the results of different surveys we can find signs of people taking personal responsibility in cases where environmental problems are more visible, more connected to everyday life and the role of the person is much more obvious, for example, in the cases of selective waste collection or fast moving consumer goods (Valkó, 2003; Sági, 2004; ACC, 2005; Capital Research, 2005). We also have to mention that these are the subjects that have already been articulated by civil organisations or by environmental education. For example, there have been several NGO awareness-raising campaigns about the health effects of food additives, about the health and environmental effects of household chemicals or about cost and environmental benefits of selective waste collection.

4.1.1 Perceived role of the corporate sector

The spread of sustainable consumption and production can be a competitive advantage for progressive companies. Thus it is worth taking a look at if this progress is supported by marked demand. According to our survey (ACC, 2005) consumers also express their expectations towards companies, and – as a new phenomenon – beyond environmental aspects, different forms of corporate social responsibility are also becoming important.

The Association of Conscious Consumers conducted a representative survey about ethical consumer attitudes which also asked about expectations of corporate responsibility (in this context environmentally and socially aware business behaviour). Concerning attitudes, strong expectations are articulated and it seems that consumers are also conscious of their market roles: every second person (47%) agreed with the statement, that if consumers preferred the products of environmentally aware and socially responsible companies, those would make efforts to meet these expectations.

We also asked what kind of information would influence consumer choices beyond price and quality. The information whether the company has environmental management programs would be important for 83%, 40% of all consumers would be even willing to pay more for the product of a company with environmental program. A survey from 2003 (Valkó) presented similar results: 70% of people would like to get more information about environment-friendly characteristics of goods. This might be considered as a positive trend. Environmental reporting is important for 60% and 23% is willing to pay more for the products of a company that regularly reports about its environmental performance. The results suggest that there might be a significant market niche for the products of environmentally responsible companies if environmental management activities are supported by appropriate communication and products are accessible on the market.

The same is true of the social performance of companies: on the level of attitudes we can detect high expectations. Information about progressive employment practices (e.g. family-friendly workplace) would have a positive influence on the purchasing decisions of 78% of consumers, 36% of whom would be ready to pay more for the products of such companies. Corporate support for local communities is important for the 69% of population and 30% is ready to pay more. A little bit more than half of the respondents, 56% states that information on good partnership between civil organisations, local governments and companies would be important when making consumer decisions, 20% would pay more for the products of companies in good partnership.
4.2 Consumer behaviour and its institutional and infrastructural framework

In the following we highlight some important trends that can facilitate or – from the other end – slow the progress of sustainable consumption in Hungary. These are general trends and conditions; we will provide more detailed information on consumption trends in the specific chapters.

Household consumption in Hungary grew faster than the GDP in the past years. While the phenomenon has its negative economic consequences as well (household savings declined and households largely contributed to the indebtedness of the country), the environmental effects of accelerating consumerism are unambiguously alarming. Though ecoefficiency has been improving – due to the decreasing environmental load of industry – it is likely to decline due to increasing per capita consumption.

Nevertheless consumption level is below the Western-European average in all dimensions from meat consumption to the number of automobiles. Therefore Hungary has a double advantage. On the one hand if the country manages to keep the present level of consumption (e.g., in terms of per capita energy) it does not have to face some of the problems that the rest of Western-Europe does in trying to reduce the environmental burden of high consumption. On the other hand we can already employ those solutions, alternatives, measures that were developed by Western countries (leapfrogging).

4.2.1 Opportunities for sustainable consumption: promising trends

In the past years or decade the institution of sustainable consumption is slowly improving. There are established institutions in the civil sector, in education and there are opportunities in public policies being planned or already in force. However, we must mention that in a majority of the following examples sustainable consumption is understood as environmentally sustainable while a holistic approach to sustainability is very rare.

More and more consumer protection and environmentalist civil organisations deal with the social and environmental effects of consumption. For example three years ago seven civil organisations founded the Ecological Consumer Protection Working Group which is a loose network to co-ordinate sustainable consumption projects and provide partnership opportunities; one of the major consumer protection organisations which publishes student diaries in co-operation with Generation Europe included sustainable consumption topics in the latest edition of the diary. Their activities also aim at increasing awareness concerning the sustainability aspects of consumption; several environmentalist NGOs specialised in different topics also deal with the consumption aspects of their fields of activity: for example civil organisations dealing with energy, genetic modification, transport, chemical usage etc..

A very important and basic condition is that environmental education has been present in the elementary and secondary education for several decades. For many years its focus was on biology and nature, but in recent years it has concentrated on a wider understanding of the environment, which is a good
It is also an advantage that the institutions of environmental education are quite developed; there are well established and high quality semi-governmental institutions (e.g. National Institute for Public Education), teacher partnerships, workshops (e.g. Körlánc Association for Environmental Education), even specialised communication forums and civil organisation-teachers partnerships. Unfortunately that is not the case with consumer protection education where sustainable consumption might also fit the curricula. The problem is that despite some promising initiatives regular consumer protection education is not embedded in curricula and is hardly working. Though teaching consumer protection is compulsory by law (CLV/1997), no one takes responsibility for this and organised teaching is rarely practiced.

In recent years sustainable consumption also started to filter into public policies. As we have already mentioned, sustainable consumption is going to be a part of the NDP and its Environmental Operative Programme. The Association of Conscious Consumers also makes – so far not successfully – efforts to involve sustainable consumption in the consumer protection strategy of Hungary. The National Environmental Protection Program (132/2003 OGY regulation) for 2003-2008 also mentions sustainable lifestyle among goals to promote. In 2004 the Ministry for Environment and Water announced its six focus areas, which included future-friendly production and consumption.

It is also an opportunity that in the wider economic and political environment of Hungary sustainable consumption is already embedded in public policies, e.g. in the UN Guidelines for Consumer Protection, in the AGENDA21, in the Sustainable Development Strategy of the European Union or the Sixth Environmental Action Programme of the European Union – just to mention a few examples.

### 4.2.2 Challenges for sustainable consumption: disadvantageous phenomena, trends

In the following we would like to highlight some general trends, which might challenge sustainable consumption in Hungary. These examples reflect to the general aspects of sustainability, exact sectoral data is presented later.

*Ecological footprint*

Among the challenges we have to mention the ecological footprint of the country, which is 3.6 global hectares per person, that is two times the productive 1.8 global hectares per person in 2001 (WWF, 2005). This means if everyone would consume like the average Hungarian does we would need another Planet (WWF, 2005), therefore we have to reduce consumption and/or considerably increase resource efficiency. The ecological footprint of Hungary is similar to some countries with the same socio-economic status (Poland 3.6, Slovakia 3.6, Slovenia 3.8), but lower than that of those countries which are being emulated by most Hungarians (e.g. Austria 4.6, Germany 4.8). On the other hand the ecological footprint of the country
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decreased between 1991 and 2001 by 10% (WWF, 2005), which is primarily due to economic decline, thus the trend is not likely to continue.

Growing consumption

Besides quality, the volume of consumption definitely affects sustainability.

According to household statistics (KSH, 2005b) in the past years private consumption in Hungary has been growing in almost all major fields with the exception of food. While the kg per capita food consumption has been decreasing, in the case of household durables, the number per 100 household of all statistically registered goods (except refrigerators) has been growing between 1993 and 2002 by 100-500%, in the case of cell phones, 84 times. The share of different household expenditures has also changed. In four major groups we could observe growth: maintenance of dwellings (+3.5%), health and personal care (+2.3%), transport and communication (+3.5%), culture, recreation and entertainment (+1%). These trends suggest that private consumption is shifting towards a more unsustainable nature.

Irresponsive corporate sector

While consumer expectations towards companies are well expressed at least on the level of attitudes, the environmental and responsibility culture of companies seems to be rather low according to some common measures used in developed countries. For example, companies only rarely provide information about their environmental and social achievements through channels regularly used by consumers (e.g. products, consumer magazines, databases, shops), and there are only few independent information platforms publishing such information. For example, around 1000 companies have ISO 14000 or EMAS qualification, but only 36 published environmental or sustainability reports in the past 10 years. Between 1996 and 2006 104 reports were published by 36 companies (KÖVET, 2006). We have similar phenomenon with the Hungarian eco-label scheme where in 2006 355 products were qualified by 33 companies. The diversity of the products is very poor: 28% of the products are plastic shopping bags, while 12% are freezers or refrigerators (www.kornyezetbarat-termek.hu).

5 Food

Examining attitudes to the sustainability aspects of food consumption, we focused on two major issues: organic products and genetic modification. While the first has obvious sustainability advantages, the sustainability of GMOs is at least questionable according to our present knowledge. Of course there are other relevant sustainability aspects of food consumption - for example packaging, local origin and transport, chemical treatment or food additives - but we chose to generalise these to fast moving consumer goods and described them in the following chapter.

In case of analysing consumer behaviour and consumption measures we also take a look at the consumption trends of some product groups where we could witness significant changes in recent years, for example the consumption of mineral water or the import of fruits and vegetables. We also introduce some progressive initiatives or sustainable traditions still alive, for example community-supported agriculture or production for self-sufficiency and the relative wide spread of farmers markets.

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5.1 Attitudes, declared consumer behaviour

5.1.1 Organic food

A telling result is that according to different surveys, almost half (43-53%) of the population is interested in organic products. To 35% it is important whether a product is organic, (ACC, 2005; Capital Research, 2005), but only about 7-10% buys regularly (Sági, 2004; Capital Research, 2005), 34% buys rarely these goods (Capital Research, 2005). The data shows that 16% does not consume organic because of its higher price, while 12% does not purchase because organic products are not available for them (Sági, 2004) point to the need of infrastructural development which, by increasing supply, would lead to lower prices as well. In this case developing infrastructure (more organic markets, organic section in markets) could generate practically 100% market growth, compared to the current level. It is alarming - and suggests the need of further awareness-raising - that almost every third person (29%) agrees that the only thing that makes a difference between organic and regular products is that the first is more expensive (Capital Research, 2005). 46-60% of consumers does not take into consideration whether a product is “organic” (ACC, 2005, Capital Research, 2005).

5.1.2 Genetic modification

Similar to the rest of Europe (GfK, 2004), Hungarian consumers are sceptical of genetically modified food. According to a research 62% of the population are afraid of genetically modified food (Capital Research, 2005). As our survey shows 43% of the population takes into consideration whether the product is free from genetically modified ingredients. Among those who pay attention the information has high importance (an average of 4.48 out of 5) (ACC, 2005). Another survey measured 55% for the ratio of those who consider GMO-free feature important (Capital Research, 2005). Thus on the Hungarian market “GMO-free” can be a competitive advantage for companies or genetic modification can mean a huge market loss.

5.2 Consumer behaviour and its institutional and infrastructural framework

Due to the economic recession of the 1990s, the kg per capita food consumption in general decreased between 1993 and 2002, with the exception of dairy products where consumption more than doubled, and a slight 3-4% growth of bread consumption (KSH 2005b). However, in recent years the trend has possibly changed.
5.2.1 Opportunities for sustainable consumption: promising trends

Organic farming

Organic agriculture started in the 80s in Hungary and was characterized by a slow development due to the weakness of the domestic market. Today, the share of land under organic cultivation is around 2%, practiced on 128,690 hectares (Biokontroll, 2005). The size of the agricultural area managed organically has an annual growth rate of 12-20%. Due to the weakness of the domestic market, the majority (around 80-90%) (Mokry, 2001; AMC, 2003) of organic food produced in Hungary is for export and the production does not target to fulfil domestic market needs (Willer and Yuseffi, 2005); a substantial share of products available at shops are imported (Kovacs and Richter 2005). Although the market of organic goods in Hungary grew by 15-30% in 2003 and a growing demand is seen by experts for the domestic market (Richter and Kovacs, 2005), the level of organic sales still remains very low. One of the most significant reasons is the high price premium that is on average around 30-50% (Härning and Vairo, 2004). The estimated size of the Hungarian domestic market is about 10-20 million euros, the average consumer expenditure on organic food was around 2 euros per year in 2003 (FiBL survey 2004; Willer and Yuseffi, 2005). In the past decade the size of organic farming territories has grown ten times, but the ratio comparing to all agricultural land is still just half of the rate of the EU15 average (KSH, 2005f).

In comparison with crop production, organic animal husbandry has less importance, although its size is increasing; especially cattle and sheep farming have a significant role. Organic-poultry began to grow again after 2004 (Biokontroll 2002, 2003, 2004, 2005).

Besides good ecological conditions, the present eco-controlling system can be seen as a strength of Hungarian organic farming.

Markets, organic markets and self-sufficiency

Farmers markets and production for self-sufficiency still present a significant source for private food consumption. These kinds of supply, by offering the possibility of direct shopping and consumption, shorten the distribution chain and have sustainability benefits.

In 2002 672 markets were operating in 488 locations (KSH, 2003b). Nowadays, these markets are slowly disappearing; the most obvious reason for this is the growing number of super- and hypermarkets (KSH, 2004). In 2005 5000 retail shops operated in market halls, that is about 3.3% of the total number of retail units. The majority of the shops sell food and they represent the 4% of all food shops. However the market significance of markets is decreasing, while in 2000 the net income of market retailers was about 140 million EUR, in 2002 it was 81 million, which is 1.2 and 0.6% of the income of all retail companies (KSH, 2003b). Despite their decreasing significance, farmers markets are still integral parts of purchasing culture and habits. In 2006 there are 13 periodically or continuously operating organic markets or regular markets with an organic section (Biokultúra, 2006).

Production for self-sufficiency still exists, though its ratio comparing to all household expenditures decreased from 8% to 4% between 1993 and 2002 (KSH, 2005b). However, we suspect that official statistics underestimate the size and significance of production for self-sufficiency:
some experts say that 40% of the vegetable and fruit consumption is coming from own or production, or is purchased in the neighbourhood, outside of official selling points and markets.4

**Social aspects of agriculture**

Community Supported Agriculture is only present in Hungary in some isolated cases. A small-scale pilot project has been running in Central Hungary, but it is also being reorganised and taken over. The NGO which used to run the project, called Open Garden Foundation (Nyitott Kert Alapítvány), has operated a vegetable box scheme, built organic food communities, and also ran education projects and an organic garden for demonstration purposes. A similar initiative is run by Galgafarm: bio farming with the active involvement of local communities and consumers. The project which is supported by an education centre also aims at bringing social benefits to its neighbourhood by creating workplaces and by offering life alternatives to the youth (Tudatos Vásárló 9, 2006). Other initiatives are also present; there are more than dozen eco-villages in Hungary that promote sustainable lifestyles within complex solutions including housing, work and social problems (Vadovics 2006).

**Fair Trade goods**

Fair trade (FT) goods can be seen as symbols of extended consumer responsibility: paying attention and taking care of developing country workers’ conditions. Therefore the market share of FT goods might be a good indicator of how open consumers are for the global social aspects of sustainability.

A country report made by Trialog (2005) sees the year 2005 as the starting point of the Hungarian Fair Trade movement, when Védegylet (Protect the Future), a Hungarian NGO organized an alternative festival, called Ökofeszt, in Budapest, which among other things introduced the principles of Fair Trade and give visitors the possibility to try Fair Trade products. In the same year the alliance of civil organisations interested in the promotion of Fair Trade products was formed (Fair Világ Méltányos Kereskedelem Szövegség, Fair World Fair Trade Alliance). Although data on importing organizations, points of sale, turnover, label licenses or market shares are not available yet, a growing interest can be seen both from non-governmental organizations (Krier, 2005) and few supermarkets as well, where Fair Trade products became part primarily of the coffee, tea and chocolate assortment. However the Fair Trade market is of minor importance – according to its market share. According to the estimation of the president of World Fair Trade Alliance, there are two supermarket chains in Budapest and around 12 organic food shops all around the country that sell Fair Trade goods; two coffee shops sell FT coffee in the capital. The yearly turnover of FT food sale is most possibly around 120 000 EUR. The most popular products are coffee, tea, chocolate, banana and dried fruits. The establishment of the first specialised FT shop has already been started.

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4 Personal communication, Zoltán Szöts, Central European University.
5.2.2 Challenges for sustainable consumption: disadvantageous phenomena, trends

**Processed food**

Soft drinks affect sustainability in several aspects: processing, transportation and post-consumer waste mean extra burden on the environment. According to market research data consumption of soft drinks increased between 1989 and 2003: an average adult drinks mineral water on three days per week, which is more than 100% growth during the observed period, the consumption of juices remained almost the same with 2.1 days per week, while the consumption of sparkling soft drinks increased to 1.8 days from 1.3 (GfK, 2003). The numbers - 92% of juices is sold in tetra-pack packaging, and only 1% of sparkling soft drinks has refundable packaging (HuMuSz, 2005) - refers to the environmental load behind the increasing soft drink consumption.

In 2002 the majority of the ten products that had most rapidly growing market shares were processed food. Among others: sandwich cream (43% growth), sausage (+29%), coffee cream (+16%), salted cookies (+12%), flavouring additives (+13%). According to the interpretation of the market research company, the phenomenon relates to accelerating lifestyles (GfK, 2002).

**GMO**

Food containing GMO have appeared on the shelves of shops in Hungary too. In 2004 Greenpeace in Hungary made an awareness-raising campaign after the GMO-labelling regulation went into force. The organisation asked about 500 retail and producer companies to make public statements about having their products GMO-free. According to their GMO-free booklet published in the same year, 7 out of 15 retail chains, and more than the 2/3 of producers claimed to be committed to GMO-free goods (Greenpeace, 2004).

Another promising direction, that environmentalist organisations, organic farmers and local governments started the “GMO-free area” movement in Hungary too. According to data by Friends of the Earth Hungary by 2006 more than 60 settlements and 300 private land owners have joined the movement (MTVSZ, 2006). These settlements commit themselves to offer GMO-free public services, to support GMO-free agriculture, follow-up GMO authorization processes and if possible make local relief against them and in its scope of action limit GMO crop harvesting

**Fruits and vegetables**

Based on different data sources we can assume that the consumption of local fresh products decreased against imported or processed food. The cultivation of 10 out of the 15 most important vegetables, and 4 out of the 11 most important fruits has been decreasing in the past 10 years (KHS-STADAT, 2006e; 2006f). The consumption of fruits and vegetables decreased by 36% between 1993 and 2003 (KSH, 2005b). The export of fruits and vegetables more than doubled between 2001 and 2005 while import grew by 39% (KSH, 2002; KSH, 2003; KSH, 2004c; KSH, 2005c; KSH, 2006).

**Concentration of food trade**
Besides the growing number of super- and hypermarkets, the number of economic organizations operating retail shops is decreasing year by year — operating concentration is progressively growing, the market share of independent small shops, which are not part of a chain, is rapidly decreasing (2003: 22%, 2005: 18%) (KSH, 2004; Orbán, 2004).

6 Housing

In this study we use the term “housing” as a general word for diverse functions of a modern home. Overviewing several survey results we faced the difficulty that many data which might be important for evaluating the sustainability of housing is not collected and measured by official statistics, for example domestic CO2 emissions.

Concerning attitudes we could find data on waste, water and electricity consumption, but not on attitudes towards energy efficiency or renewable energies; there is no data on the usage of constructing materials or whether environmental aspects count in the selection of home. We have found data on attitudes towards fast moving consumer goods only in few cases: on local products, on natural products and data with limited reliability on attitudes towards household chemicals.

Analysing consumer behaviour and its institutional and infrastructural framework, we explored the trends of house constructions and the spread of electric household appliances, but we could not find data about the market share of more efficient products (for examples appliances in energy efficiency category A or higher). We also examined waste trends in cases of behaviour as well.

6.1 Attitudes, declared consumer behaviour

Despite the promising attitudes, declared consumer behaviour differs a lot. Our survey suggests (ACC, 2005) that about 63% of the respondents take into consideration environmental product features, while other surveys show that about 41-54% is ready to pay more; those who had participated in environmental education are more likely to prefer such products (Valkó, 2003). At the same time it is worrisome that only 18% of the people regularly buy eco-labelled products while some 30% states that it is not interested in “environmentally-friendly” labelled product (Sági, 2004). The fact that 57-60% claims that it only seldom meets such products (Valkó, 2003) points to the need of infrastructure development.

6.1.1 Energy and water

For a significant majority of people wasting energy or water means wasting money; in both cases the number of those who think that saving is an environmentally beneficial behaviour is less than 10% (Puczkó, 1999). This suggests that awareness-raising should concentrate on the fact that saving energy and water is beneficial in both financial and environmental grounds.

We do not know much about the attitudes toward energy efficiency or related consumer behaviour, but according to survey results 53% of
consumers often or seldom buys energy-saving light bulbs and 13% does not purchase such products, because they are expensive (Sági, 2004).

6.1.2 Waste

In this case we intended to explore the attitudes towards both prevention and post-consumption waste management. For prevention attitudes we could find information on packaging choices.

The relevant researches show that it is only 19% of consumers who think that preferring recyclable packaging means less burden on the environment (Puczkó, 1999), while half of the consumers does not care about if the packaging is refundable (ACC, 2005), about 30% of the respondents always examine whether the food has environmentally friendly packaging (Capital Research, 2005), 36% looks for refundable packaging (Sági, 2004). It is likely that due to the current market situation (small refundable packaging supply) and the declining market share of products in refundable packages these consumers can not satisfy such needs. There is a need for facilitating and enhancing communication between stakeholders and market actors, and at the same time developing the infrastructure (e.g. refunding system).

People’s perception about the correlation between selective waste collection and the environmental quality is rather positive: 44% of the population thinks that selective waste collection puts less burden on the environment (Puczkó, 1999). When people were asked about their first idea concerning environmental or nature protection activities, 38% spontaneously mentioned selective waste collection, in case of guided questions 66% mentioned it and it was the fourth most frequently mentioned idea (HuMuSz, 2005). These are promising results on the one hand, though we have to remember that in many countries where selective waste collection has been practiced for several years, the actual volume of waste has not declined (Eurostat, 2006).

Talking about waste management and responsibilities 44% of the population agreed that the solution of the waste problem caused by packaging, or the success of selective waste collection (41%) depends on individual efforts (HuMuSz, 2005).

The results concerning recyclable packaging and selective waste collection from the survey of Puczkó (1999) suggest that the idea of preventive environmental protection is less understood and probably less practiced.

6.1.3 Natural products and healing

As already mentioned, there have been several awareness-raising campaigns in Hungary on artificial food additives and potentially harmful household chemicals in recent years. Therefore we assumed that people are more open to natural products or products with natural ingredients.

There are very receptive attitudes toward more natural products. 74% of consumers finds it important that the product does not contain artificial ingredients (Capital Research, 2005), according to our survey 60% of the population takes into consideration if the product is free from additives or synthetic colouring (ACC, 2005).
48% expressed interest in natural healing and already tried such methods; the same percent of the people agrees that health politics should take natural healing more seriously (Sági, 2004).

The highly represented positive attitudes to natural products suggest that there might be a fair market niche for such goods. Presumably this demand is currently not satisfied; therefore it would be advantageous to focus on infrastructure building and information flow instead of awareness raising.

6.1.4 Household chemicals

We could not find representative surveys about attitudes towards household chemicals, but there was one survey among young intellectuals in bigger cities conducted by a civil organisation. Despite the limitations of this research we think that the results are interesting and can be taken as an upper estimation about the attitudes towards household chemicals.

Almost everyone (96%) agreed that frequently used chemicals carry health risks. Answering close-end questions PVC (84%), air fresheners (83%), fresh fruits and vegetables (65%), ozone (75%) was believed to be risky to the health (LMCS, 2006).

6.1.5 Local products

Besides being beneficial to national economies, consuming local products undoubtedly has sustainability advantages. Consuming local products means less transportation-related carbon dioxide emission and therefore less contribution to global climate change; food safety, health and environmental risks are easier to manage – just to mention a few examples.

Local, Hungarian products are important for a significant majority. According to different surveys, 63-82% of consumers find important the information whether the product was made in Hungary (Capital Research, 2005, ACC, 2005), a fair number, 54% of them is also willing to pay more for them (ACC, 2005). 40% of the population also thinks that local companies are better in meeting consumer demand then multinationals (Sági, 2004). Since the word “Hungarian” or “local” are catch words for consumers, further support and promotions also stressing environmental benefits might be recommended. Supporting the “local” is such a strong attitude that it is worth linking other messages to it when promoting sustainable consumption.

In general we can conclude that the awareness of sustainability aspects is alarmingly low in those fields where the effects of consumption appear in a distant time or space, for example in the case of energy, transportation or water consumption.
6.2 Consumer behaviour and its institutional and infrastructural framework

6.2.1 Challenges for sustainable consumption: disadvantageous phenomena, trends

**Number of households**

The number of households – as a basic consumption unit – can predict general consumption trends. Following the millennium the number of households began to increase again and in 2005 the number of households reached 4 million. The number and share of one-person households increased considerably, reaching 29% in 2005, which means that almost every third household consists of only one person (KSH, 2005d). The reasons for the growing number of single-person households might be the following: degrading age structure of the population, growing number of single elderly, growing number of housing stock and simultaneously decreasing number of the population. The rising demand of youngsters to become independent and the separation of generations also contributed to the fragmentation of households. The average household size decreased from 3.1 persons in 1960 to 2.47 persons in 2005 (KSH, 2005d).

The number of new-built homes, their area, as well as the ratio of new house buildings per 1000 person grew rapidly, between 1991 and 2004 the latter increased by 30%. From 2000 the number of commissioned homes grew by at least 10% every year and the rate of small flats or houses increased considerably as well (KSH, 2005d).

The rate of new flats within the overall flat building grew from 10% to 40% in five years, and the importance of the agglomeration grew as well – 70% of new flats were built in agglomeration areas of bigger cities (KSH, 2005d), which means growing personal transport due to growing distance between workplace and home, for example, in the agglomeration of Budapest (Studio Metropolitana, 2001). These housing and construction trends put an increasing burden on the environment both on land use and on the use of natural resources such as increasing electricity consumption.

**Consumer durables**

Besides the growing number of one-person households, the number and variety of durable consumer goods in households is increasing as well. In addition to the growing number of these goods, household appliances with new functions have also appeared (KSH, 2005b), the majority of households is equipped with more and more electric devices. The number of refrigerators, freezers and CD players more than doubled, the number of video cameras and microwave ovens and computers grew by cca. 300%, the number of mobile phones grew extremely 84 times between 1993 and 2003 (KSH, 2005b). While the number of devices bought and used in homes – e.g. television, computer, hi-fi, kitchen machines and mobile telephones – is increasing (KSH 2005b), their life-cycle is becoming shorter. This data might not be alarming or new to Western-European readers, but one of the sustainability advantages of Hungary originated in its relatively “low” development, thus for example relatively low household energy consumption due to the low spread of electrical devices.
While the energy-efficiency of household/kitchen devices is improving, the total energy consumption of households is not decreasing due to the growing number of electrical products (Eurostat, 2006).

Waste

The quantity of waste (municipal, electric and packaging) continued growing – between 2000 and 2004 the increase of municipal waste quantity was on average 3.5% every year, of which more than 80% gets to waste deposits (Eurostat, 2006). According to the estimations of a comprehensive study on waste management in Hungary, the volume of residential waste had also been growing by 2-3% per year up to 2005 (HuMuSz, 2005). Building and demolition debris and electric waste represent a considerable share in waste quantity increase. With the growing number of electronic devices and computers an increase is expected in the quantity of electric waste as well. In Hungary 70 million tones of waste is generated yearly, 4.8 million of that was municipal solid waste in 2005, the per capita amount was 506 kg in 2004 (Persányi, 2005).

Energy

According to a survey carried out in 1996, heating accounted for most energy consumption per dwelling; its share was around 70%, followed by cooking that accounted for 14.9%, water heating for 11%, electric appliances and lightning for 3.8% (Elek and Nagy, 2004).

Widely accessible government programmes promoting household energy-efficiency and energy-saving (for example the National Energy Saving Program for the residential sector that started in 2000) and those supporting the spread of household usage of renewable energy sources were stopped or operated very limitedly in the last few years. In many cases legal regulations are not supportive, rather making the spread of more sustainable technologies (e.g reed-bed sewage treatment) more difficult. Legal regulations also make it more difficult to use traditional building methods (e.g. loam houses) and to reuse building materials.

6.2.2 Opportunities for sustainable consumption: promising trends

Waste

Positive results are shown concerning the general willingness to selectively collect waste and the service is also available for almost half of the entire population. According to data collected by the Central Statistical Office and the Ministry of Environment and Water, in 2000 15kg/person was collected separately, this number grew to 49.6 kg/person for 2005 (Persányi, 2005). Almost 4000 selective collection points have been established – reaching 4.5 million people. According to the plans of the responsible ministry, in the coming years the infrastructure is going to reach the whole population. (Persányi, 2005).

Energy efficiency

The quality of newly built houses remarkably improved according to West-European and Hungarian studies, especially in the field of energy efficiency due to better insulation and energy-efficient heating equipment (Elek and Nagy, 2004; Rijkens-Klomp and Lieshout, 2004).
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The long time awaited regulation was announced for the energy efficiency certification of dwellings. According to the new regulation the energy measures of buildings should be measured and categorised. As the first step, the new certification process should be applied for the dwellings built after the 1st of September 2006 (7/2006. (V. 24.) TNM regulation). Since the regulation is very new yet there are no experiences with its effectiveness, nevertheless the institutions are slowly building. For example the Hungarian Association of Energy Auditors was founded (Zöldtech, 2006) and the energy auditor education has already started at the major technical university (BME, 2006).

Water

Per capita water consumption reduced by 50% in the 1990s mainly due to the decrease of water use for domestic and watering purposes. During the same period (1992-2000) water prices grew six times while sewage fees grew eight times more than the changes of the consumer price index (430%) (KSH, 2005b), which possibly also contributed to decreased use. As real income increased in the last few years, household water consumption started to grow again and that is also true of the poorest households (Boda et al, 2006).

Community usage, lending

Community usage might be a solution for growing individual consumption, for example car or bicycle sharing systems proved to be successful in several European cities (HuMuSz, 2005b). Unfortunately these forms have negative historical connotations in Hungary and therefore they might not be popular in future. On the other hand similar institutions are slightly developing. In 2003 there were more than 3000 lending points in the country 3.6% more than in the previous year, and 12.2% more than three years before. About 40% of the lending points deal with entertainment, 10% with wedding clothes, 4-4% with machines and sport facilities, 11% with vehicles (KSH, 2004b).

7 Mobility: Transport and tourism

There is a lack of information on attitudes towards the sustainability aspects and on the environmental effects of tourism in Hungary. Based on the presumption that the majority of environmental loads of tourism derive from mobility we merged the two categories and focused on this aspect.

7.1 Attitudes, declared consumer behaviour

As we have already mentioned we could not find comprehensive researches about the relevant aspects of transport and tourism, but the partial results of the surveys introduced below are still telling.

7.1.1 Transportation: perceptions about pollution

The evaluation of the sustainability aspects of the different modes of transport suggests that formal or civil environmental education should concentrate more on this topic. Only 6% of the population is aware that airplanes cause huge environmental damages, while 28% thinks that airplanes do not pollute at all (!) (Puckó, 1999).
64% of the population regularly walks (Sági, 2004), possibly complementary to other modes of transport. While 30% of the population regularly rides bicycles, 68% of the population never or only seldom do so (Sági, 2004). On the other hand according to a survey of Magyar Turizmus Rt. 43% of the adult population and half of the population under 25 is interested in bicycle riding (Magyar Turizmus Bulletin, é.n.).

Almost half on the people (44%) uses public transport (Sági, 2004). According to 57% of the population buses are extremely polluting, to another 24% moderately polluting, 1% thinks that they are not polluting. 37% says that cars are only moderate polluters. Only one third (29%) of the population thinks that it is less environmental burdening if they take care of how often they use their car (Puczkó, 1999). 27% travels by car alone, 40% travels in shared cars. 43% of the population would not be willing to pay more for petrol; even if they were assured that the surplus is assigned for environment protection (Sági, 2004). On the other hand 66% of the respondents mentioned air pollution caused by car to be the most serious environmental problem (HuMuSz, 2005). The controversial results highlight again that the knowledge about sustainability and the preferences of people are not coherent, and that we are more able to evaluate environmental problems close to our everyday life (e.g. air pollution is a very visible and significant problem for the urban majority); time effect can be also a possible but in our views week explanation.

7.1.2 Preferring cars

According to the Institute of Transport Sciences the three most frequently mentioned aspects of choosing between different transportation modes are punctuality (36%), quality (22%) and low prices (21%) (KTI, é.n.). These priorities might explain the spreading of car usage against common transport.

Due to the lack of detailed information it is only presumable that people are hardly aware of the environmental effects of tourism. According to a survey conducted among the population around Lake Balaton, one of the most popular tourist destinations, 40% of tourists would never change car to public transport and 27% of tourists would do so in case of more favourable timetables. The same survey showed that 82% of tourists around Lake Balaton travel by their own car and only 11% uses railway (Puczkó, 1999), though railway services are available around the lake.

7.1.3 Consequences of growing tourism

The majority of people expect positive changes from the development of tourism: economic advancement of the country or the settlements, development of the society and modernisation. On the other hand among negative consequences crowd and noise are mentioned on the first place (28% agreed), and increasing criminality on the second place (23%). Only 19% agreed that growing tourism means growing pollution, and another 19% agreed that street order would decline (Szonda Ipsos, 2000). These results suggest that the overwhelming majority of people do not consider tourism as an environmentally disadvantageous activity.

7.1.4 A chance for eco-tourism

According to a survey on holiday habits, most of the respondents think that the natural values of the destination influence tourist choices the most
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(4.31 score out of 5), besides cultural and architectural values. (Szonda Ipsos, 2000)

28% chooses destination because of the natural features of the place; when inland tourists were asked about their satisfaction with the different aspects of their yearly main travels the “natural environment” was scored to 4.69 out of 5, right after hospitality on the first place (4.71) (Turizmus Bulletin, 2004)

7.2 Consumer behaviour and its institutional and infrastructural framework

Transport is heavily dependent on fossil fuels and has a significant contribution to CO₂ emissions and air pollutants. In the transport sector CO₂ emissions grew by 1.3% on average annually, due to the shift from rail to road transport; further increase can be expected since road transport is the fastest growing segment of transport. Energy consumption by rail has decreased from the 90s, but energy consumption by aviation has continuously been increasing (Elek and Nagy, 2004)

7.2.1 Challenges for sustainable consumption: disadvantageous phenomena, trends

The major challenge for the sustainability of mobility is the continuously growing trend of the number of cars, car usage and its growing share from transportation against public transport.

Car ownership and usage

In 2003 47.5% of households had passenger cars, in 2004 48.3%: the rate was 64.6% in the case of active households and 23.2% in the case of pensioners (KSH, 2005b). The number of passenger cars also increased by 12% between 2002 and the first half of 2006 (KSH-STADAT, 2006d). The average age of passenger cars improved slowly in the last few years from 11.7 years in 2002 to 10.4 in 2006 (KSH-STADAT, 2006c), which also means that the lifecycles of cars decreased.

After 90’s the energy consumption of passenger and freight transportation increased and individual transport gained ground against public transport, increasing railway and bus fares in passenger transport made the use of passenger cars more competitive (REC, 2003; Elek and Nagy, 2004).

Shopping is done by car in an increasing number, in the first half of 2005 19% of shopping was arranged by car, which covers 38% of the total purchase value. The same data in 2003: 16% and 34%. (GfK, 2005). According to a survey on tourism habits, 71% of inland tourist used cars to reach their destinations, while only 17% used railway (Turizmus Bulletin, 2004).

Travelling with public transport

The situation of public transport in cities where the infrastructure is well developed - therefore there is a real choice opportunity to consumers - can reflect to and predict the general situation. According to the yearly reports of the Budapest Public Transport Company, the number of citizens using public transport decreased by 9%: from 1.529 billion in 1994 to 1.398 in 2003 (BKV, 1998; BKV 2003).
We can detect similar changes for the country as a whole as well. The number of people travelling with public transport for long-distance destinations decreased by 5% in average from 2002, in case of buses and train the decrease was 5% in the case of ship 35%, while travelling with airplane doubled from 2.2 million in 2002 people to 5 in 2005 (KSH-STADAT, 2006a). The number of people travelling with local public transport decreased by 6.6% between 2002 and 2005; metro and suburban trains lost more than 9% of their customers, while the number of customers did not increased at either mode of transport (KSH-STADAT, 2006b).

7.2.2 Opportunities for sustainable consumption: promising trends

Alternative modes of transport

According to estimations of the Ministry of Economy and Transport, currently only 1500 km bicycle roads exist, but according to the plans in 10 years another 5000 km will be built. In 2006 the Ministry of Economy and Transport announced prizes for establishing “Bicycle-friendly workplaces” and “Bicycle-friendly Settlement” that might contribute to the growing popularity of bicycle riding. At the same time it must be noted that according to the Western-European experiences people choose bicycle riding instead of public transport and not instead of cars, which means that in itself the spread of bicycle riding in towns only moderately decreases car traffic.

In Hungary there is still a strong tradition of public transport use, its network is well-developed. Although public transport (bus, train, underground railway and suburban railway) has become less attractive during the 90s, it still represents the majority of total passenger trips, the modal split is around 60% for public transport and 40% for passenger car use (see e.g. REC, 2003).

Tourism, ecotourism, village tourism

A large part of the Hungarian population is not participating yet in tourism activities. Thus it is a good opportunity to seize the moment and concentrate on developing more sustainable alternatives. This opportunity seems to be gaining ground.

In the last few years the number of Hungarians travelling abroad by airplane grew radically (10-17% every year) (KSH, 2005g), but travelling abroad in general still accounts for a minor (about 10%) part of tourism (MTR, 2004; Szonda Ipsos, 2000). Nevertheless we have to notice that – mainly due to financial shortage – around 70% of the population does not participate in tourism, neither inland nor abroad (Szonda Ipsos, 2000; KSH, 2006b). About 90% of those who travelled chose inland destinations in 2004 (MTR, 2004).

In case of eco-tourism growing interest and importance can be seen both in policy arena and the practice. It became an important part of the National Strategy on Tourism Development for 2005-2013 and in line with it the Ministry of Environment and Water drawn up the National Eco-tourism Concept last year and some sectoral researches emphasised the opportunities and advantageous features of the country.

There are 10 national parks in Hungary which already became destinations of eco-tourism, and the law on nature protection from 1996 also emphasises the role of national parks in tourism. On the other hand all the parks progress in this field and have employees for developing and
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managing eco-tourism activities. According to the data of national parks the number of eco-tourism visitors grew between 1999 and 2002. The number of visitors of the most popular parks was between 170-220 000 (Michalkó, n.a.)

We can witness the same positive trends in village tourism. Since 1988 the number of guest nights in domestic village tourism increased by 80% (against the 23% growth of domestic tourism) and accommodation capacities increased by about 70%. On the basis of the guest nights rural tourism is responsible for 4% of the total domestic tourism (KSH, 2005g).

8 Conclusion

A short conclusion about sustainable consumption in Hungary could be that the situation is comparatively worse concerning available alternatives and supporting infrastructure than concerning attitudes and awareness.

8.1 Green, but not consistent attitudes

Our survey and similar ones show that the Hungarian is surprisingly “green” in her attitudes.

At the same time the fact that on the general level the majority of people show positive attitudes towards sustainable consumption does not necessarily mean that they are informed or aware of certain aspects of sustainability. That is, education and information spreading is still needed.

Positive attitudes do not mean either that people indeed act according to them. Usually there is a gap between claimed attitudes and behaviour, but in Hungary – if it is possible – this gap is even greater. For example there is a huge gap between those who – according to their declaration – buy organic products regularly and the estimated size of the “organic” market.

While the infrastructural conditions of sustainable lifestyles are very week or missing in most of the sectors, the majority of respondents are conscious of environmental problems deriving from consumption, and, in general, open to sustainable alternatives. Survey results show for example that the majority agrees with the necessity of moderating consumption and living simpler in order to reduce environmental problems, but people are not ready to change their lifestyles. These attitudes are obviously not consistent, and they are also surprisingly unevenly distributed among the different sectors. For example some major environmental problems associated with travel and tourism are almost unknown to Hungarians. Furthermore, consumers have serious difficulties with understanding the global effects of consumption, which are far from their neighbourhood.

However, we can conclude that in general respondents show positive attitudes towards sustainable consumption alternatives, and in some cases they are also willing to make certain changes in their consumer habits.

8.2 Need for further awareness-raising

Often there is a lack of information about the opportunities to change or available alternatives. Awareness-raising and education on sustainable consumption still have a great role; these should focus on facts, the details of problems and alternatives for solving them.
Concerning awareness raising, it is a well-known phenomenon from Western-Europe that environmental protection for many people – regarding their own lives and lifestyle – is associated exclusively with selective waste collection (in other words, they do not see the casual relationship between their energy consumption, car usage and climate change, or the health and environmental effects of household chemicals). People think that if they collect waste selectively they would have done their part. In Hungary a similar phenomenon also exists: 80% of Hungarians considers selective waste collection important from the perspective of environmental protection (HuMuSz, 2005). Hopefully the trap might be avoided if different “green” household practices are popularised with the same intensity.

International and Hungarian researches and surveys suggest that civil organisations might be one of the most effective actors of awareness raising: people trust civil organisations to the greatest extent (in this respect the state and companies fall far behind civil organisations (see e.g. SustainAbility, 2003).

8.3 Developing institutional and infrastructural framework

Examining consumption patterns we found that in many respects Hungary is on the same, or even better level of sustainability compared to some well-developed EU member states. The ecological footprint of Hungary is lower than that of most Western European countries. This is due to a lower level of development and consumption and the survival of certain traditional consumer and lifestyle models. For example behaviours as bicycle riding or re-usage are mainly coming from “shortage economy” before the 1990s, but are still popular in the country side.

Trends regarding the volume, the structure or the related environmental damages of consumption are less favourable. In this perspective it is worrisome that the conditions of sustainable consumption are weakly or not supported by the legal system and government policies, furthermore its infrastructure is underdeveloped in many cases. In certain fields (e.g. transport, household energy consumption) no remarkable efforts have been made to change consumption patterns.

In Hungary, initiatives providing community support for alternative consumption in some fields are more or less developed (e.g. eco-villages), while other forms (e.g. consumer cooperatives) cannot be found or have just started their operation. Supporting these initiatives is not only advantageous for their direct stakeholders but their multiplying effect and demonstrative nature might be remarkable as well.

We have to take into consideration that awareness-raising can only be successful if alternatives are available and supported by appropriate (e.g. legal) institutions and infrastructure. If the conditions change the behaviour of people will change as well.

8.4 The role of the government

To make consumption more sustainable, an exemplary conduct by the state is essential. If hybrid cars, energy-saving bulbs and selective waste collection for recycling are not present at state organisations and in the buildings of local authorities why should one have these at home?
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In our study we could not evaluate in detail the government programmes which aim at promoting sustainable consumer patterns. However, our general impression, supported by some evidence, is that the government in Hungary should be much more pro-active in supporting, promoting, popularizing sustainable consumption alternatives. There are some areas (e.g. spreading renewable energy use, like solar collectors, in households) where currently no effective government programme or initiative exists. Or even if a sustainability programme is launched, there is always a threat that for budgetary or other reasons it can be stopped at any moment – sustainability policies being formulated at the margins of public policy. Government procurement procedures do not incorporate principles or aspects of sustainability. There are some problem areas (e.g. small-scale, alternative sewage treatment, the use traditional construction materials etc.) legal and institutional barriers make impossible the spread of more sustainable alternatives.

Through the proper revision of legal regulations, consistent programmes (which are not changing unpredictably), the support of civil and company initiatives and the development of physical infrastructure the government should contribute more to the establishment of those conditions without which the spread of sustainable consumption patterns are not expected. In many cases at least temporary state support is indispensable to make more sustainable products generally available. This obviously needs resources, but we should not forget that opportunities for win-win solutions do exist, and in this case promoting environmentally and socially sustainable alternatives can yield short-term economic benefits as well.

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CBL III China-Japan Environmental Survey: Is Social Capital effective for promoting pro-environmental actions?

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1 Introduction

Is social capital effective for promoting pro-environmental actions? We have been carrying out China-Japan (nationwide) environmental consciousness survey from 2000 onward. We will report results from 2005-2006 Shanghai and nationwide Japan survey. We focus on China-Japan comparative analysis of the role of social capital—people’s networks and trust, and mass media, and other information disseminating networks forming pro-environmental consciousness, attitudes, and actions.

2 Social Capital

2.1 What is Social Capital?

Social Capital is recently focused concept by Putman, and others. According to the review by Tsujinaka (2000):

a) Putnam (1993:167,2000:67) “Social capital here refers to features of social organizations, such as trust, norms, and networks that can improve the efficiency of society by facilitating coordinated actions.”

b) The World Bank, “social capital refers to the institutions, relationships, and norms that shape the quality and quantity of a society’s social interactions … Social capital is not just the sum of the institutions that underpin a society – it is the glue that holds them together.”

c) The OECD (The Well-Being of Nations, 2001:41): “networks together with shared norms, values and understandings that facilitate co-operation within or among groups”

Pelling and High (2005) discusses the Social Capital and Climate Change adaptation: According to their discussion, social capital refers to several aspects such as:

a) Bonding: Ties to people who are similar in terms of their homogeneous demographic characteristics.

b) Bridging: Ties to people who do not share many of these characteristics.

c) Linking: Refers to one’s ties to people in positions of authority.
As Pelling and High claimed, it seems that social capital concept to be important for explaining pro-environmental actions, especially political movement and consumption behaviour, as those behaviours happened not only internal motivation of individuals, but also external influence such as cooperation with other community members, or information from friends and others. Although Social capital concept is concept of organizations or groups, we applied here as individual basis.

3 Effects of Mass Media

3.1 Theory of Mass Media effects

There are several theory that deal with effects of mass media on people’s attitudes and opinion towards social issues. There are several theories that explain mass media effects on public opinion. One of the well known one is the agenda setting effect. This was also called “The limited effect” theory, as this theory limited mass media effect as “mass media effect is only for people to what to think about, not how, why, and how to react the issue mass media has reported.” But McCombs &Estrada (1997) criticized this, and stated “the media may not only tell us what to think about, they may also tell us how and what to think about it, and even what to do about it”

Others are, for example, the theory of spiral of silence, the third person theory, the selective exposure theory. The selective exposure theory is considered to be extremely important as this theory claims people access only to their favorite mass media, and favorite category of contents. This means that people who are interested in the environmental issues access information about the environment, and who are not interested in the environmental issues are difficult to get information concerning the environment. But if people have lots of friend, or join variety of organizations, he or she can get variety of information, and some might be about the environment.

4 China (Shanghai)-Japan comparative Survey

4.1.1 Outline of Surveys

For our China survey, as it is almost impossible (without cooperation from the national government) to draw respondents from nationwide, we chose Shanghai City area as our survey area. The survey was carried out from December 2005 to January 2006, samples are drawn from residents in Shanghai city 18 years old and older. Here, “residents” mean not only “registered” citizens, but also, the people who have been lived in this city more than five years. Town committee offices usually keep those residents’ information and are responsible to renew the lists. So, we approached Town committee offices as sampling units. The effective sample size is 1012 out of 1500 planned samples, using stratified 3 stages random sampling.

For Japanese survey, it is done during March, 2006, samples are drawn from nationwide, 20 years old and older male and females, who are registered at municipal offices. Effective sample size is 1288, out of 2000 planned samples, using stratified 2 stages random sampling.
4.1.2 **Survey Questionnaires**

Our questionnaire consists of the following items:

a) Perception on the Environmental issues.
b) Communication (general issues and the Environmental issues).
c) Information sources and trust in media.
d) Exchange information w/ others.
e) Pro-environmental actions.
f) Green consumption, saving energy, political actions.
g) Values, attitudes towards the environment, everyday lives.
h) Materialist-post materialist dimension.
i) Social capital (personal efficacy, belongings to organizations, and trust in people).
j) Demographics.

For Social capital, there are several versions of questionnaires which try to measure social capital concept, but we used some questionnaires from past surveys such as “the National cultural characteristics survey” which has been carried out by one of the leading Japanese research institute, the Institute of Statistical Mathematics. Those questionnaire consist of several items, such as trust, network and norms.

5 **Analysis**

5.1.1 **Pro-environmental actions**

Figure 1 and figure.2 show the distribution of answers for questionnaires of pro-environmental collective actions and green consumer actions, respectively. For pro-environmental collective actions, we picked up eight actions such as “Do voluntary work”, “donation”, “join meeting”, “contact to company”, “sign a petition”, join in a boycott, “join an environmental group”, “post opinion”.

![Figure 1: Pro-environmental collective actions](image-url)
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The right part is Shanghai results, and left is Japanese results in figure 1. Bar displays are, from bottom to top, “have done”, “might do”, “would never do”, “DK”, “NA”. Some are more favourable actions in Shanghai, and others are less favourable comparing to Japanese. “Do voluntary work” and “donation” are more favourable to Shanghai respondents, while “join meeting”, “join in a boycott”, “sign a petition”, “join an environmental group”, and “post opinions” “contact companies” are more favourable for Japanese respondents.

For green consumer actions, we picked up following four actions, such as “Check and purchase eco-mark labelled products”, “Purchasing organic food Bring own bag”, “Purchasing products from companies that advertise environmentally friendly”. The upper part is Shanghai results, and bottom part is Japanese results in figure 2. Bar displays are, from left to right, “always”, “often”, “sometimes”, “never”, “never seen before”, “DK”, and “NA”, respectively. Respondents who chose “always” are more in Japan than Shanghai in every items, and Shanghai respondents are more likely to answer “DK” and “NA”. Overall, Japanese respondents are more likely to take green consumer actions. It is natural that these actions depend on the availability of taking them.

![Figure 2: Green Consumer actions](image)

![Figure 3. Conceptual model for behavioral change](image)

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5.1.2 Logistical Regression models

To analyze factors affecting pro-environmental actions, we employ logistic regression analysis. The conceptual model for this logistic regression analysis is shown as Figure 3. Our goal is changing behaviour, e.g. taking pro-environmental actions such as joining meetings that discuss the environmental issues, saving energy, buying environmentally friendly products. For this purposes, there might be several factors that could be effective for changing human cognition: direct experience, mass media report, basic norms and values, changing weather pattern, etc.

As independent variables, we used actions in figure1 and Figure2 with recoding as “have done” and “might do” =1 and others=0 in figure1 actions, and as “always” and “often” =1 and others=0 in figure2 actions. Then using response choices of other questionnaires as independent variables, we adopted logistic regression analysis. Results are as follows (figure 4,5,6,7).

5.1.3 Factors affecting pro-environmental collective actions in Japan and Shanghai(China)

Figure 4 and 5 are the distribution of responses about the pro-environmental collective actions in Japan and Shanghai. In both regions, The upper part is information sources including mass media exposure, and
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some information sources are positively effective and some are negative. In Japan, respondents who get information about the general social issues from Television are more likely not to do volunteer work. But those who get information about the environmental issues from magazines are more likely to sign petitions. In sum, those who get information about the environmental issues from TV, radio are more likely to taking actions, and from newspaper and internet are more likely not to take actions.

As for the genre, those who watch TV programs such as Science and Technology, sports, movie tend not to take actions, also those who read newspapers of social issues, economy, domestic policy tend not to take actions, while international politics, regional news and weather forecast tend to take actions.

For the social capital items, organisational participation level that is for the measurement of social network, is positively effective in all actions. Also, talking about environment, talking about the politics with some are also
Conclusions

positively effective. So, social networks are very much effective for people to join those pro-environmental collective actions.

Another social capital items, trust, seems different. “Most people can be trusted” is negatively effective in two actions, and other trust items are not significant in Japan.

For Shanghai, China, information sources including mass media are not so effective as in Japan, friend and family as information source is negatively significant, internet is positively effective for joining the boycott. But reading newspaper are positively effective in any genre.

For the social capital items, organisational participation level is positively effective in all actions. Trust items is positively effective in ‘talking to government’ action.

Figure 6. The result of logistic regression analysis (Japan/Green consumer)
5.1.4 Factors affecting green consumer actions in Japan and Shanghai (China)

As green consumer actions, we picked four actions such as checking eco-labelling when purchasing, purchasing non-pesticide or organic food, and bring bag when shopping, buy products who advertize environmentally-friendly. Figure 6 shows Japanese results. As for the information sources, newspapers, internet are negatively effective to those actions. As for the newspaper genre, domestic policy, editors, are negative, and special issues, sport, are positively effective.

For the social capital items, social networks such as organizational participation level, talk about environment or politics with family members and friends are positively effective. Trust items is also positively effective.

Figure 7 shows Shanghai, China results. In China, there are several western style Super markets, and “Green color products” or organic products are sold there. But white super bags or plastic cups, are very popular, and sometimes it is granted as “symbol of developed” lifestyle. Like pro-environmental collective actions, information sources are not effective factors for taking green consumer actions. Rather, organizational participation level, trust in government, attitudes towards risk, are more crucial factors for taking those actions.
6 Conclusion

Pro-environmental actions are truly depending on society’s social, economic and environmental condition. In this sense, Japan and China are strictly not be comparable. But Japan is definitely one of the developed countries. China is now rapidly growing country, and the one who is chasing the developed countries lifestyle.

In this paper, we focused on the social capital theory and effect of mass media on pro-environmental actions in two aspects, one is collective actions and another is green consumer actions. Social capital items are somewhat significant in some actions, and most significant was organizational participation level. Previous researches tended to look individual internal variables, and not social networks or exposure from mass media on pro-environmental actions, but from this result, we found that social networks, effect from mass media should not be overlooked.

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CBL III Consumer Demand for Information about Corporate Social Responsibility (CSR)

Perception, demand and publicity of CSR and CSR-information offers

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1 Introduction

The implementation of sustainable consumption and production pattern is a professed goal of economic and consumer policies. The importance of ethical management dimensions up to the implementation of holistic Corporate Social Responsibility (CSR) concepts has increased in recent years (a.o. Schoenheit et al., 2006; Auger et al., 2003 and current popular press like e.g. Presseportal 20.07.2005). However, competition on the most consumer good markets has been subject mainly – and in some cases almost exclusively – to pricing mechanisms and product quality considerations.

One of the drivers of CSR concepts could be the consumers. As purchasers of goods and services they are one of the most important stakeholder groups in the consumer good industry (compare Schoenheit/Hansen, 2004; Hansen/Schrader, 2004). Numerous consumer studies on ethical consumerism or sustainable consumption suggests rising consumer interest in social responsible behavior of companies shown by e.g. preferences or even willingness to pay more for products of so-called “good companies” or products with ethical features (a.o. Schoenheit and Wirthgen, 2006; Mohr and Webb, 2005; Schoenheit, 2005; Auger et al., 2003; Bhattacharya and Sen, 2003; imug, 2003; Mori, 2000; Marymount University Center of Ethical Concern, 1999; Lafferty and Goldsmith, 1999; Devries, 1997; Brown and Dacin, 1997).

However, Consumers tend to be hesitant when it comes to the real purchase decision, which is in part a communication problem. First of all, easy-to-digest comparative information about CSR is hard to come by. In Germany, currently and quite new, there is only the Stiftung Warentest, which provides sporadically in addition to its comparative product tests for selected products information about the producers and/or retailers offering

1 CSR is here defined referring to the European Commission as the voluntary social and environmental responsible behaviour of companies (compare European Commission, 2002).
the products under study. Furthermore, CSR is a so-called “credence attribute” which results in consumer incertitude when companies report about their CSR activities\(^2\). The dilemma is that consumers have to trust the information about CSR and cannot discern and evaluate the given information by themselves even not after consuming the product.

Against that background this paper looks at consumer perception and understanding of CSR as well as CSR-information demand and knowledge about CSR. Furthermore the paper presents the publicity and helpfulness of selected CSR-information offers and finally investigates the relevance of different CSR information aspects for consumers purchase decision.

2 Methodological and theoretical framework

The research is based on a representative consumer household survey (n = 1008) in Germany following a standardized questionnaire\(^3\). The survey was conducted in 2005 by means of computer adopted telephone interviews (CATI) with random sampling and filter on the main purchasers of the household.

The analysis of the consumer perception and understanding of CSR is done by means of a quantitative content analysis. Referring to Mayringer (2000) in the first step, expert based CSR dimensions were defined and categories with its subcategories added. After sifting the raw material, the categories were revised and finally the allocation of the material conducted. Throughout several coding by different people at different times the reliability of the method was improved. The applied statistical analysis was a frequency analysis. The frequencies in the categories and dimensions can be interpreted as the intensity of which people think and communicate about a specific subject – in this case about CSR. The raw material is data based on an open question about the understanding of “business responsibility”.

Consumers demand, publicity and relevance of CSR-information and information offers was investigated by means of descriptive frequency analysis mainly based on theoretically underlaid rating scaled statements. In order to ensure most possible reliable results from questions using rating scales the following precautions were conducted:

- pre-tests to ensure the right understanding of the questions,
- variation of the order in response alternatives to avoid order effects,
- interpret carefully, knowing it’s a sensible subject which leads to political correct bias.

Theoretically the analysis of consumers’ subjective information demand contains three dimensions: the interest in and relevance of information, the felt information deficiency and the active search of information (compare Bahlmann, 1982; GI-Fachgruppe, 2003; Jahnke, 2003). The extent of the

\(^2\) Information incertitude depends on the possibility to check information (Kaas, 1995). Thus the institutional economics differentiate between search, experience and credence attributes. This classification goes back to Nelson (1970 u. 1974) and Darby/ Karni (1973).

\(^3\) The consumer survey was conducted in the frame of the BMELV funded project “Perception of Corporate Social Responsibility (CSR) – activities of companies as option for consumers”.

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information demand depends furthermore on the knowledge about the subject. For both constructs “subjective information demand for CSR” and “CSR-knowledge” some statements and questions are used to build sum indices.

However, it is to be mentioned, that the information demand not necessarily results in the use of information. Evaluation and use of information depends on several factors: assessment of the information and the information source concerning helpfulness including credibility and topicality furthermore the knowledge about the existence and source of the information as well as the availability of the information (Foscht and Swoboda, 2004). According to the information dilemma with credence attributes, credibility plays an especially important role in the context of CSR-information (see above). But, a positive evaluation of the information alone is still no assurance of the use of the information, e.g. for the purchase decision.

3 Findings of the representative household survey

3.1 Publicity of the term “CSR” and consumer perception

A simple question about the publicity of the term “CSR” revealed, that 77 % of the interviewees had never heard the term “CSR” before.

On the other hand the findings of an open question analyzed by means of a quantitative content analysis show that the understanding and perception of business responsibility altogether seems to be quite broad. With different personal focus and interest, the interviewees altogether associate a wide range of social and ecological aspects, market and societal aspects as well as ethical subjects with business responsibility (CSR) (see table 1). However, the majority of the interviewees named only about two items. Summing up, we can see that consumers’ perception and understanding of CSR is not broad or even holistic, it differs a lot depending on the personal focus. The main focus lies on social and ecological aspects like environmental actions, treatment of employees, job maintenance and compliance with social standards, which seem to be the most important CSR dimensions in the view of consumers. Asking the interviewees directly for their weighting of 8 selected CSR dimensions presented by the interviewer, similar findings result. The relative importance of different CSR aspects depends amongst others presumably on consumers personal dismay e.g. unemployment as well as the current news and public discussion of some issues.

A consumer study of Sen and Bhattacharya (2001) confirms the personal focus on different CSR aspects, indicating that consumers’ reaction on CSR initiatives of companies depends on the fitting with consumers’ preferences for different CSR performances. Regarding a study from the Netherlands, it is to be assumed, that consumers focus on or have preferences for different CSR aspects furthermore varying depending on different industries as well as depending on the beneficiaries – rather the company itself or rather the society (Herpen et al, 2003).
Table 1: Consumer perception and understanding of CSR (imug representative household survey, 2005, n = 1008)

<table>
<thead>
<tr>
<th>Social aspects</th>
<th>Ecological aspects</th>
<th>Market and societal aspects</th>
<th>Ethical aspects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment of employees (n=279)</td>
<td>Environmental actions (n=317)</td>
<td>Quality to fair prices (n=122)</td>
<td>Responsibility over profit (n=26)</td>
</tr>
<tr>
<td>• responsible, solidarity behaviour with employees (138)</td>
<td>• prevention of air, land and pollution (268)</td>
<td>• secure and high quality products (78)</td>
<td>• to act ethical justifiable (20)</td>
</tr>
<tr>
<td>• social security benefits (72)</td>
<td>• spare application of raw material and energy, application of renewable primary products (29)</td>
<td>• value for money (44)</td>
<td>• to take more responsibility for the society (3)</td>
</tr>
<tr>
<td>• payment (42)</td>
<td>• responsible use of new technologies (3)</td>
<td>• product and producer information (57)</td>
<td>• less egoistic profit and power orientation (2)</td>
</tr>
<tr>
<td>• equality of treatment of disadvantaged groups (18)</td>
<td>• short rout of transport (1)</td>
<td>• transparent production process (16)</td>
<td>• less shareholder orientation (1)</td>
</tr>
<tr>
<td>• career advancement (4)</td>
<td>Environmental products and packaging (n=84)</td>
<td>Customer orientation, service (n=30)</td>
<td>Honesty and reliability (n=17)</td>
</tr>
<tr>
<td>Job maintenance (n=175)</td>
<td>• environmental friendly packaging (69)</td>
<td>Support of social and ecological projects (n=17)</td>
<td>• honesty (14)</td>
</tr>
<tr>
<td>• jobs and apprenticeship (94)</td>
<td>• regional products (10)</td>
<td>Feasibility (n=6)</td>
<td>• reliability (5)</td>
</tr>
<tr>
<td>• job location Germany (81)</td>
<td>• recycling etc. (5)</td>
<td>• solid financial polit (3)</td>
<td>Others (n=4)</td>
</tr>
<tr>
<td>Compliance with social standards, fair trade (n=162)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• no child labour (63)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• compliance with social standards (62)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• fair trade (33)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• support of the economy in poor countries (4)</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Content analytical categorisation of open answers of the following questions: What do you consider as responsible behaviour of companies? How would you express your personal expectations? (several answers possible)

3.2 Information demand for and knowledge about CSR and selected CSR-information offers

Most consumers seem to know somehow, what CSR is about. But, how well do they feel informed and are they interested in CSR-information and which ones, if any, are of particular interest for the purchase of consumer goods and services? This kind of information would be relevant for companies trying to make CSR to a business case. Last but not least, the possible information demand needs to be satisfied by CSR-information offer and consumers need to know these offers. Currently there is only rarely CSR-information offers available – especially easy-to-digest comparable consumer information. This study focuses on the helpfulness of a range of selected CSR-information offers in the view of consumers as well as on the publicity of two existing CSR-information offers, the publicity of the CSR-test of the Stiftung Warentest and the publicity of sustainable or environmental reporting of companies.

The findings clearly show that not many consumers – only 7 % of the interviewees - feel really well informed about the subject CSR. This is also confirmed by poor publicity of the term CSR and the poor publicity of the
Consumer Demand for Information about CSR

two existing CSR-information offers under study. Only about 20% of the interviewees have ever heard about CSR, not many consumers could remember and state one specific existing CSR test of the Stiftung Warentest (less than 1%) or one existing sustainable business report (4% of the interviewees). Building in a first step a sum index “CSR-knowledge” out of these questions and in a second step based on that a consumer segmentation, three segments can be identified: One group really well informed about CSR (4% of the interviewees), one group moderate informed (48%) and one group bad informed about CSR (48%) (see figure 1).

Figure 1: Index and consumer typology “CSR-knowledge” (imug representative household survey, 2005, n = 1008)

The poor knowledge about CSR correlates with a relatively high information demand for CSR. 60% of the interviewees show interest in CSR-information and 39% feel an information deficit, but only 25% indicated that they have already actively searched for CSR-information. Combing these three dimensions of information demand to one sum index as basis for a consumer typology the following three groups result: 21% of the interviewees have a high CSR-information demand, 66% show moderate information demand and only 13% indicate a low information demand (see figure 2).

Considering that these are findings of a consumer survey asking rating scaled questions to the socially sensitive subject CSR, we have to interpret the presented figures carefully. What we definitely see, is that the CSR-information demand is higher than the knowledge about CSR. And regarding the figures of the poor CSR knowledge, the overestimation due to political correct bias does not seem to be that high.
In the context of CSR information demand follows the question, which CSR information are of particular interest and which CSR information offers do consumers trust and consider overall as helpful. Looking at our two existing CSR-information offers, like assumed the interviewees stated higher interest in the CSR-tests of the Stiftung Warentest (36 % very interested, 39 % rather interested) than in sustainable reporting of companies (17 % very interested, 37 % rather interested). Nevertheless, over 50 % stated an interest in sustainable business reports. The interviewees were furthermore asked generally which CSR-information offers out of a given list of six possible information offers they evaluate as helpful. The results confirm the prior findings: consumers regard CSR-information offers of consumer organisations as most helpful (see figure 3).

Figure 3: Subjective helpfulness of selected CSR-information offers (imug representative household survey, 2005, n = 1008, scaling: 1-5 presented as indices from 1-100 – the higher the index, the higher the helpfulness)
Consumer Demand for Information about CSR

This is probably due to the independent evaluation. The second and third most helpful offers are media reports or reports of environmental agencies. Then follow CSR-information offers of unions and companies and at last critical book publications.

Besides the different helpfulness of possible CSR-information offers, it is to be expected, that some CSR information have a stronger impact on consumers than others. Considering that consumers possible active role in driving CSR is concentrated on their purchase decisions, either to prefer or to avoid a purchase of a specific product depending on the producers’ CSR performance, one question of the survey focused on consumers purchase propensity considering selected positive and negative CSR-information aspects. According to Herzbergs (1987) two-factor theory of job satisfaction, we assumed furthermore that some CSR issues rather lead to consumer preferences as “award” for a businesses CSR performance and others rather to consumer “boycott” as “punishment” for a businesses CSR performance.

The findings clearly indicate that job maintenance is the most relevant CSR aspect out of the CSR issues under study. It can be assumed that news about job maintenance lead in its positive and negative way to a relative strong consumer reaction (see figure 4).

Figure 4: Relevance of selected positive and negative CSR-aspects for consumers purchase propensity (imug representative household survey, 2005, n = 1008, figures in percentages, only top one boxes, all CSR aspects were presented in its positive and negative way)

Preference means that consumers favor and prefer a specific product, while „boycott“ means that consumers avoid intentionally the purchase of a specific product e.g. due to a producers CSR performance (compare Hirschmann (1974) who uses in case of a non-purchase due to a purchase of another product or only a purchase delay the term movement.) In this paper “boycott” is not used in the narrow definition of an organised intentional purchase refusal.
The contrary can be expected for the issue “information transparency” including the availability of sustainable reports etc. The figure also indicates that there are some CSR issues like consumer information and environmental management of the production which a significant part of consumers would rather award instead of punishing. On the other hand, social aspects like especially the treatment of employees followed by the compliance of social standards count to the CSR issues consumers would rather punish by avoiding the purchase of specific products. Looking at the CSR issues which show clear differences for consumers’ purchase propensity, one could also assume that more consumers tend to rather punish than to reward a company for its CSR performance. Except job maintenance, none positive CSR aspect stimulates 50% and more of the interviewees to reward a company for its CSR performance.

This aspect is also supported by other consumer studies indicating that negative CSR information have a stronger impact on consumers than positive CSR information (Mohr and Webb, 2005; Sen and Bhattacharya, 2001; Folkes and Kamins, 1999; Handelman and Arnold, 1999 and Creyer and Ross, 1996).

However, it is to be considered, that these are findings of a consumer survey which tend to be overestimated. Furthermore, consumers can only award or punish a company for its CSR performance, in the case, they are informed about the CSR performance of the company, know which products are produced by the company and have the choice to chose an alternative product. In this context, figure 1 showed already that the consumer knowledge about CSR is poor. This is supported by findings of Devinney et al. (2006) stating that consumers rarely know about CSR features of products. And last but not least, consumers will only chose an alternative, if the alternative product is of the same or better quality at a similar price level (compare Devinney et al., 2006; Wirthgen and Schoenheit, 2006; Mohr and Webb, 2005; Webb and Moor, 1998).

4 Overall conclusion

The findings of the representative household survey indicate that consumers’ perception and understanding of CSR is highly depending on personal focuses and not at all holistic. Most of the consumers have still a poor knowledge about CSR, which led for a significant consumer segment in a currently quite high CSR-information demand. However, information demand does not necessarily result in the use of existing information offers and even less in consumer reaction. Consumers’ evaluation of different CSR-information offers varies strongly. Furthermore, consumers’ responses to a businesses’ CSR performance seems to be highly depending on the specific CSR issues. These results should be considered especially by companies trying to implement CSR as business case, but also by companies, which act socially responsible and write CSR reports in order to avoid negative banner headlines and competitive disadvantages.
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CBLIII How to communicate sustainable lifestyles to hard-to-reach consumers?

A report on the large scale experiment “balance-f”

Lucia A. Reisch, Sabine Bietz and Martin Kreeb

“Project balance” is a trendsetting initiative to enforce sustainability communication in the German general public as well as an academic research project that accompanies this trendsetting initiative and evaluates its outcomes. The project goals are on the one hand to spur communication and public discourse on sustainable consumption and production with a cross media approach (i.e., TV, Internet, print, and podcast) based on emotionalized messages, and on the other hand to gain deeper insight through accompanying research into how such communication processes work empirically and to find the factors for success and failure. The project is designed as a transdisciplinary practice project with partners from academia, media, and media research. Its basic hypothesis is that the use of emotionalized and entertaining messages (“sustainment”) can be a successful tool in promoting attention to, interest in, positive attitudes towards, knowledge of, and positive behavioural intentions regarding sustainable consumption and production issues of the “broad masses”. It uses a two-step approach: first, gaining viewers’ attention, interest, and sympathy via “limbic” social marketing tools (i.e., triggering positive emotions), and second transmitting convincing cognitive messages that inform and confirm prior attitudes towards behaviour change. The methods used are reception analysis and content analysis. Both direct (e.g., online-questionnaires, video taping) and proxy measures (e.g., switch on - switch off data) are used. Data are retrieved mainly from focus group discussions, expert group discussions, individual interviews, case studies with companies, market response analysis and computer assisted qualitative data analysis (CAQDA) of the TV clips. Results show the potentials and pitfalls of such a “sustainment” approach.
2 The background: prior research on sustainable consumption

For more than two decades, behavioural consumer research has been investigating individual and institutional limitations preventing sustainable consumption behaviour ("barriers") as well as enabling factors for the performance of more sustainable lifestyles ("drivers"). Before the 1990s, this research was conducted under the label of “environmental” and “prosocial” behaviour (see e.g., Reisch and Røpke, 2004). For the development of efficient intervention strategies, knowledge about the underlying psychological variables is indispensable, and has been analyzed both as a function of stable dispositions as well as of environment-specific cognitions and emotions. While the explanatory power of generalized personality traits and broad beliefs (e.g., control beliefs, altruism, and generalized social responsibility) on various sustainable attitudes and behaviours has proven to be low and inconsistent environment-specific cognitions – in particular: moral cognitions, ecological awareness, environmental-specific control beliefs, and environmental justice appraisals – exert powerful and stable effects on sustainable behaviour (Montada and Kals, 2000). Following Shaver’s (1985) model of responsibility, the attribution of ecological responsibility to oneself as well as to powerful external agents (e.g., politics, corporations) is based on a general awareness for ecological risks and on control beliefs regarding the ability to efficiently reduce the risks. In sum, it has been shown that moral reasoning is a powerful motivational base for overcoming interest-shifts, social traps, lock-ins, and high-cost perceptions. Hence, intervention programmes have at least two entry points: They can aim at creating risk awareness (via providing information and knowledge) and/or at providing immediate behaviour solutions in order to increase the perceived behavioural control (i.e., showing concrete, low cost behavioural alternatives).

Yet, this reflects only half of the story. For a long time, sustainability behaviour research has neglected the powerful and stable impact of various categories of emotions. This omission can be explained by the prevalence of rational choice-based action theories such as Ajzen and Fishbein’s (1980) Theory of Reasoned Action, the Theory of Planned Behaviour (Ajzen, 1991), or Bagozzi and Warshaw’s (1990) Theory of Trying. A core element in these models is the proposition that individuals act on the basis of beliefs about consequences, cost-benefits, and importance. The basic assumption of those theories is summarized in the formula of the restricted, resourceful, expecting, evaluating, maximizing man (Coleman and Fararo, 1992). Obviously, emotions do not fit and are not considered in these models. Only over the past decade or so have a significant number of studies in consumer research involving consumer emotions been published (overview in: Laros and Steenkamp, 2005).

Recent studies on the emotional foundations of sustainable (usually only environmental) behaviour show that the moral cognitive perspective of the underlying motives for sustainable behaviour is supplemented by moral emotions. These are: indignation about insufficient pollution control of others, anger about too much pro-environmental decision-making, and feelings of guilt about own insufficient sustainable consumer decisions.
Another emotional source is represented by emotional affinity or simply love of nature. Whereas moral emotions are traced back to moral cognitions, feelings of love toward nature are based on nature experiences, which should ideally involve other significant factors. In contrast, ecological fear and experienced ecological burdens are less important. Kals and Maes (2002, p. 113) summarize as follows: “With regard to the socio-ecological dilemma, the significance of a moral base makes sense, as there is only little direct personal benefit derived from sustainable behaviour. This moral dimension is reflected not only cognitively, but also experienced emotionally. [...] Sustainability should not only be appraised cognitively but also as an internalized norm, which is interconnected with personal experiences and even feelings of love”. Indeed, the emotional dimension of sustainable behaviours is increasingly taken into account in intervention programmes – such as “project balance”, where the experience of positive emotions plays a key role.

3 The concept: models on inducing behaviour change

Social marketing research as developed by Andreasen (1995, 2001) has provided ample positive empirical evidence of its potential to influence consumers, particularly as regards health messages. Here, positive emotional appeal has proved to serve in moving a target audience from non-interest and non-knowing to a stage of contemplation of behavioural change (Monahan, 1995). While fear appeals were more counterproductive than effective – provoking defence mechanisms and preventing attention (Hale and Dillard, 1995) – positive emotions have proved to be much more conducive to behavioural change.

Following Andreasen (1995), approaches to induce behavioural change in consumers can be segmented into five alternatives:

1. the education approach with its focus on educating people, but bearing the risk of boomerang effects;
2. the persuasion approach used in social advertising with a focus on arguments and motivational hot buttons that will educe consumers motivation to change behaviours, but bears the risks of a (too) pushy “selling approach”;
3. the behavioural modification approach of behaviourists stresses the principles of learning theory, i.e., learning with reward and punishment; however successful, the approach is very costly and can hence be only applied to individuals or small groups;
4. the social influence approach that uses campaigns directed at influencing community norms and collective behaviour. While seeming to be promising, the approach is limited to situations in which social issues and norms are well understood and accepted, the pressures to conform are extremely strong, and the behaviour to be influenced is socially important and visible (e.g., in smoking campaigns); the more educated and emancipated the individual consumer is, the less likely it is that group norms will play a major role;
5. The social marketing approach that comprises features of the above in a comprehensive and integrated manner. It places customer behaviour at the centre, uses the “Four P’s” as intervention, relies on market research, and carefully segments target markets. For the promotion of sustainable consumption issues, social marketing seems to be the most promising approach. It shares most of the characteristics unique to the field, i.e., invisible benefits and consequences while costs are realistic; benefits to (geographically and temporally remote) third parties; intangibles that are difficult to portray; need for long term engagement due to large amounts of complex information, the need to change basic values, and the need to get outside opinion leaders on board.

In consumer behaviour research, high-involvement behaviours are conceptualized as being developed through definable stages. To date, several of such stage models have been proposed (McGuire, 1976; Maibach and Cotton, 1995). For the purpose of “project balance”, the Transtheoretical Model of Behaviour Change (Prochaska and DiClemente, 1984) has been chosen as the conceptual base.¹ According to the model, consumers proceed through the following five stages: precontemplation (i.e., consumers do not think of the behaviour as being appropriate for them; possibly due to ignorance, presumed irrelevance, or principles); contemplation (i.e., consumers think about and evaluate recommended behaviours); preparation (i.e., consumers have decided to act and prepare, e.g., search for brands and stores); action (i.e., consumers carry out the behaviour for the first time or several times); and confirmation (i.e., consumers are committed to the behaviour and have no desire or intention to return to earlier behaviour). The model has undergone considerable field testing (e.g., Mohr et al., 2001), and has been validated as useful. According to this research, it is possible to separate target consumers into these five groups and to employ the appropriate intervention strategy in order to fulfil the respective marketing task, namely: create awareness and interest; change values; motivate behavioural change; create action; and maintain change (Andreasen, 1995). The aim is to move consumers on to respective stages, not to bring everyone to “confirmation stage”. This will more likely be reached with tailored messages and tailored media use.

4 The study: “project balance”

4.1 Design and research goals

“Project balance” is set up both as a trendsetting initiative to enforce sustainability communication in the German general public as well as an academic research project that accompanies this trendsetting initiative and evaluates its outcomes. Hence, the goals of project balance are twofold: firstly, to spur communication and public discourse on sustainable

¹ Alternatively, McGuire’s (1989) twelve-step hierarchical model of communications effects could have been used. The twelve steps are: be exposed to communication; attend to it; like and become interested in it; comprehend it; acquire necessary skills; yield to it; store the message; search and retrieve this information; decide on the basis for action; behave in accord with the decision; reinforce the desired actions; consolidate the new lifestyle.
consumption and production with a cross media approach (i.e., TV, Internet, print, and podcast) based on emotionalized messages; and secondly, using accompanying research, to gain deeper insight into how such communication processes work empirically and to determine what their factors for success and failure are. In its dual approach, the project design resembles what was termed “action research” in the 1970s. Conceptually, the project is designed as a transdisciplinary practice project with several academic and practice partners from academia, the media, and media research. In order to receive permanent feedback from other stakeholders, it has appointed a board of advisors composed of academic experts from environmental psychology, sustainable development, green marketing, ethics, communications research, as well as of practitioners from NGOs, consumer organizations, the German Council of Sustainable Development, the leading German media research institution “Grimme Institut” among others. The project approach is iterative research, i.e., research is seen as a continuous process, not as a one-way activity with a neatly defined beginning and end. It is more like an upward spiral of exploration, planning, structuring, pretesting, implementing, monitoring, and replanning. The project is sponsored by the German Ministry of Research and Education and runs for three years until 2007.

The basic hypothesis of the balance project is that the use of emotionalized and entertaining messages can be a successful tool in promoting attention to, interest in, positive attitudes towards, knowledge of, and positive behavioural intentions / willingness criteria regarding sustainable consumption and production issues of the “broad masses”. The key idea is a two-step approach: Firstly, to gain viewers’ attention, interest, and sympathy via “limbic” social marketing tools (i.e., triggering positive emotions), and secondly, to transmit convincing cognitive messages that inform and confirm prior attitudes towards behaviour change (Reisch, 2005).

Prior research has shown that the latter reaches – at best – the “usual suspects”, i.e., the more educated and principally interested consumers. This has to do with the information overload in today’s attention economy. It is estimated that not more than 5% of actively sent corporate communication directed to consumers is received (Kroeber-Riel and Weinberg, 2003). The metaphor of the “atomization of the media” might explain why consumers show little interest in classic, corporate, one-sided “push-communication”, which viewer research derives from increased zapping while other forms of ad avoidance strategies are increasingly employed by consumers. Hence, an alternative lies in using two-sided “pull-media” such as the internet, where

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2 For a detailed overview of concept, partners, and research design see the project website www.balance-f.de.
3 Förderkennzeichen: 07 BAL 01
4 The original project design had included to track and measure actual consumer behaviour, not just knowledge, emotions, attitudes, and purchase intention. However, due to the fact that only a few products and behavioural strategies have been presented in the TV clips, this has proven to be difficult. Yet, previous longitudinal studies have shown that willingness criteria such as the willingness to commit oneself to the protection of nature are valid predictors of manifest behavioural decisions (Montada and Kals, 1998) and can hence be used as a proxy.
recipients select customized contents and have a dialogue option to exchange views and voice their opinions. Project balance aims at developing and testing a cross media strategy of push and pull-media, with a TV clip as a teaser that ideally redirects viewers to become users, readers, and finally, “doers”.

4.2 The trendsetting initiative

The project focuses on the very beginning of the multi-stage consumption processes, namely, paying attention to and forming attitudes. The more ambitious goals of reaching later stages in the consumption process with more specific information, service tools for consumers, and deeper background information should be provided via other media outlets, such as print (“Welt der Wunder” magazine), websites (www.weltderwunder.de; with rubric “balance”), and podcasts (www.balance-p.de). In order to increase target group exposure, the messages had to be placed in media channels that attract the target audience, i.e., those people who are not or hardly interested in sustainability issues. Channels were carefully selected with regard to reach, frequency, impact, and cost. During the project, cross media spin-offs – a website, a print magazine, and a podcast show – were developed. Currently, Internet TV is explored.

As the main channel for sustainability messages, we chose the TV show “Welt der Wunder” which is aired weekly on the private television programme RTL II. The reasons for this choice were as follows:

1. From commercial audience research, it was known that both “Welt der Wunder” and RTL II’s core audience is less well educated and less interested in environmental and social issues than the average German TV viewer. During the project, this was verified by our own research based on GfK’s viewer profiles. Hence, RTL II and “Welt der Wunder” viewers do well represent the target group of our interest.

2. We were able to get free access to detailed audience research data which is collected by the prestigious German Gesellschaft für Konsumforschung (GfK) in Nuremberg. Access to these data enabled us to track viewers’ switch on - switch off behaviour for every second of both programme and advertisements. Usually, such data are unaffordable for academic research, but for this project, access was provided via a public-private partnership, based on non-profit-cooperation with the producer of “Welt der Wunder”.

3. The TV Show “Welt der Wunder” was switched to RTL II channel in 2004. For the previous decade it had been aired on another private channel (PRO 7). To date, it is the most popular science programme on German TV with about four million viewers per show. The show is aired weekly during prime time.

5 For a detailed comparison of strengths and weaknesses of alternative media for nonprofits see: Andreason, 1995, p. 212, Table 6.3.

6 The German “Gesellschaft für Konsumforschung” (www.gfk.com) carries out most of the German audience research and owns the most prestigious TV panel. It publishes, e.g., the audience ratings for all German TV stations.
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(Sundays at 7 p.m.) and repeated twice during the week on a news channel (n-tv). Research into the effectiveness of health communication has shown that more effective campaigns use multiple media and repetition of a single message either in the form of retransmission of the original message or in slight variations of the basic theme, and that they use the news media as a means of increasing visibility (Backer et al., 1992). Hence, it was expected that a “hook up” cross-media strategy transmitting multiple repeated messages in multiple channels, tailored to the different sub-target groups, would be effective in creating attention and knowledge. It was also hoped that TV viewers could be redirected to the more informative website, the magazine, or – especially for the young age group – to podcast shows on sustainability issues.

4. The TV show host (who is also the producer of the show) has, over the past decade, become a well known celebrity and a “brand” in this own right in Germany. Hence, it was expected that because he enjoys high credibility, the audiences would pay particular attention to messages delivered and presented by him. It turned out that this was an important asset, since it helped to draw viewers to the website and the rubric balance. After all, his interests in the project are not purely economic (i.e., to create a strong brand with a positive image that is attractive for advertisers), but he is also motivated by personal beliefs in the necessity for a more sustainable lifestyle. This turned out to be an invaluable asset since he would deliberately include sustainability information in the moderation that was not presented in the TV clips.

5. The editorial staff, scriptwriters, and the producer were open-minded and interested in embracing the project group’s continuous “sustainability coaching” efforts. In practice, this is highly relevant since the freedom of the press forbids external intrusion in the production of a programme. The content and design of the TV clips are the sole responsibility of the journalists. After the recent heated public debate and legal conflicts on national and European level on surreptitious TV advertising, product placement, and issue placement, journalists and programme makers have become even more reluctant to discuss their work and are highly sensitive to perceived efforts of undue influence.

4.3 Accompanying research

The accompanying research of project balance is split up into three research modules carried out by the three research groups media research,

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7 In March 2006, the European Commission has proposed to revise the European “Television without frontiers” directive towards allowing product and issue placement. The European Consumer Organisation BEUC has criticized this step since it means that the legally-enshrined dividing line that now exists between editorial content and advertising will disappear and that topics and contents of programmes will be for sale.
consumer research⁸, and marketing research. There is a close interaction between those groups, in particular between media research and consumer research. The following figure sketches the project modules and their core research methods:

![Figure 1: Overview of project balance](image)

Consumer research basically carries out reception analysis and content analysis. Both direct (e.g., questionnaires, video taping) and proxy measures (e.g., switch on-switch off data) are used. Data are retrieved mainly from focus group discussion, expert group discussions, individual interviews, case studies with companies (e.g., on their sustainable marketing strategies), market response analysis and computer assisted qualitative data analysis (CAQDA), performed with ATLAS.ti, of the transmitted TV clips. Moreover, viewers are profiled via available GfK data and the employment of standardized instruments measuring their propensity to environmental and socially conscious consumption. The criteria of analysis are: comprehensibility of the message, attractiveness (measured by polarity profiles and direct questions), emotional appeal (before and after design), acceptability, and relevance (with the proxy measure of remembrance of contents and emotions). We also employed an experimental design with attendants of a driving school showing both emotionalized clips and “neutral” video clips.⁹

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⁸ The author of this paper heads the research module “consumer research” and is in charge of the sustainability contents transmitted in the overall project.

⁹ For a more detailed overview see the project group’s Midterm Report (April 2006).
The group discussions were performed between February and August 2006. The group members were specifically selected on the base of their similarity to the project’s target group (i.e., less educated and/or young age and/or “Welt der Wunder” viewer): from groups such as students of vocational schools, secondary schools, but also administrators and sports teams. For the group discussion, we designed a standardized questionnaire to measure – besides socio-demographic data - emotional appeal, attractiveness, acceptability, and relevance of the clip. Recall of the clips’ information was checked.

Special attention was given to the measurement of emotions. While there has been a significant increase of research in affective processes in consumer behaviour research lately (Richins, 1997), information about the nature of emotions and their measurement are still scarce. In the consumer research module of project balance, the measurement of emotions was performed with the German version (Krohne et al. 1996) of the PANAS (Watson and Clark, 1988). It proved to be very helpful to have data to the split second from both media research (switch on - switch off) and the CAQDA of the clips. Hence, it was possible to relate viewers’ reactions to tiny bits of narration or format, and to find patterns and correlations in the data.

4.4 Intermediate results

While the project has only reached halfway, some initial results can be shared – with full respect to the provision of interim results. As outlined above, our conceptual base was the Transtheoretical Model of Behaviour Change on whose frame we focused in the early stages (which we hypothesized could most likely be influenced). In contrast, monitoring and measurement of actual behavioural change (let alone its stabilization into a routine) was barely possible with a design where respective data could only be derived indirectly from company interviews and market response analysis. For such a purpose, one would require a panel design or a form of ethnographic research. For the purpose of this project, the measurement of behavioural intentions was as close as we could get to the later stages.

In order to evaluate the initial results, we followed Andreason’s (1995) description of stage-appropriate marketing tasks:

1. Create awareness and interest: In the case of project balance, most of the target group members are in the stage of precontemplation. Hence, it will be important to show new behavioural possibilities (e.g., presenting Fair Trade coffee), to show their relevance, to communicate that the proposed behaviour is not antithetical to the values of, or even a trend in the consumers’ reference groups10 (e.g., presenting a celebrity who is a consumer of Fair Trade coffee; showcasing LOHAS shopping in London), and that it will improve audience members’ own lives (e.g., presenting benefits and positive consequences in a positive enjoyable frame that creates positive emotions and attitudes). The appropriate tools will be the

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10 Reference groups can be membership groups, aspiration groups, and negative reference groups (e.g., Bearden & Etzel, 1982).
provision of positive emotional stimuli and education on behavioural alternatives. Viewer surveys conducted on the balance project website after the clips were aired showed that balance clips were perceived at least as interesting and attractive as the other clips in the show that did not feature sustainability issues. Moreover, most of the clips were able to create positive emotions. In general, clips associated with negative emotions and a fear appeal were less liked and less well remembered.

2. *Change values*: Some members of the target group will be in the contemplation stage, where they consider and evaluate proposed behaviours. For those viewers, it will be important to showcase the benefits and to reduce perceived costs of behavioural alternatives. In project balance, the TV clip showcasing the thrifty use of compact detergent, focused on the individual benefits (money saving, less environmental harm, health aspects) of “washing right”. There was also “demarketing” in the sense that the individual and environmental cost of the behavioural alternative – conventional filler boosted washing powder – was emphasized. On an emotional level, compact detergent was presented as the modern high tech alternative, the washing powder with fillers as outdated, dull, and even ridiculous.

3. *Motivate*: For those consumers who have reached stage three – preparation – it is important to provide easily accessible information and “service” guidance in order to reduce transaction costs to a minimum. Consumers at this stage are ready for a more extended information search. Here, a three to eight minutes TV clip reaches its limits as information carrier. A solution was to guide viewers explicitly via the show host to the website where additional material (e.g., on the European “wash right” campaign, a voluntary initiative by the large washing detergent producers) and service tools (e.g., a service module that computed the optimal amount of detergent when the user entered her zip code) were provided. As log file analysis showed, many viewers were indeed directed to the website and made use of its offers: Some of them opted for re-viewing the sustainability clips of the latest shows, and actively searched for more information in the rubric “balance”. Many had a look at the print magazine and the podcast show, both of which are advertised on the website; finally, many participated in balance quizzes (that served the project as a measure of knowledge creation), filled in questionnaires (for the research project), chatted with other community members, the producer, or the scientists. From a conceptual view, TV viewers are herewith transformed into Internet users, and the one-way passive information has been supplemented by an active and selective information search process with the option of two-way communication (Chats). This is of uttermost importance, since consumers do not make their decisions in a social vacuum. They are part of families and peer groups, work teams, virtual communities, and neighbourhoods. These groups act as “communication buffers” in commenting on and evaluating information, attitudes, and consumption decisions.
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of the individual. They can act as facilitators, as sources of (contradictory or supporting) information, and as sources of social pressure. Relevant others – people from these communities or celebrities – can act as role models and opinion leaders. These tendencies were exploited in project balance by actively involving the (already existent) “Welt der Wunder community”. Moreover, interviews with the companies’ PR and Marketing departments showed that employees of some portrayed company had liked the “Welt der Wunder” presentation of their company as a sustainability leader and appreciated being approached by friends and family who had also watched the programme. Such “halo-effects” can be expected to have positive motivational and identity building effects both internal (employees) and external (consumers) (“internal marketing”). Moreover, as we found in the surveys and focus groups, viewers often remembered the small, interesting facts presented in the balance clips that they then passed on to others as “conversation pieces” and status markers. All of these represent a few of many possibilities to advance the presence of sustainability issues in the public discourse.

4. and 5 Create action and Maintain change: The critical moment is when consumers are engaging in the behaviour for the first time. Consumer research has shown that perceived self-efficacy and perceived behavioural control have a decisive moderating effect on acting upon one’s intentions (see e.g., Bagozzi and Warshaw, 1990). If then the behaviour turns out to be rewarding, it is likely to be repeated. Hence, securing repeatable behaviour and reinforcing desired behaviour are the final tasks of behaviour modification. Sustainability communication can be helpful in presenting successful examples and in reducing perceived barriers to action. Research on sustainable consumer behaviour has pointed at the necessity for high quality feedback (i.e., fast, precise, independent) that can provide the necessary rewards. Without going into detail, communities (virtual or real) can play an important role in providing feedbacks, rewards, and punishments. However, as outlined above, project balance does not comprise systematic follow-ups, monitoring, and measurement of behavioural change or indeed, its maintenance but limits its research to behavioural intentions.

Preliminary results show that the topic of sustainability is appreciated in this form of medial presentation and that positive attitudes and intentions for actions are generated in the "low interest" target group. Overall, the assessment of the clips through the focus groups was predominantly positive. The clips were mostly perceived as authentic, modern, and good. This is underlined by the statements of the participants in the group discussions.

5 Discussion

While the potentials of the “ecotainment” – or better: “sustainment” – approach, at least for the early stages of consumer behaviour change process,
are looming, there are a number of pitfalls associated with the approach for companies that seriously want to communicate on sustainability issues with consumers.

To date, it is generally agreed that sustainability communication is a highly complex and even risky activity that needs careful strategic planning and genuine stakeholder input. Research and practice have shown that, if not practiced in a sophisticated and culturally adapted manner, it can inflict more harm than good, and consumers might easily feel misled (Becker-Olsen et al., 2006). Hence, transmitting sustainability messages via a communication strategy as presented in this paper is not without risks. Not surprisingly, the “trendsetting module” of the project was blamed from the outset for jeopardizing the serious contents of sustainable development by abridging and “dumbing down” the messages. Yet, the “sustainment” approach is seen as a possible element of a much broader communication concept which does encompass other communication tools that complement mass media communication – from customer relation to stakeholder dialogues. The balance project itself is the result of a collaboration of media, science, and corporations, with sustainability actors and consumer watchdogs closely involved. Moreover, it is aimed at a special target group of the less interested who otherwise would have been hard to reach.

Further, the project has been confronted with the caveat that sailing close to the wind of manipulation and propaganda bears its own risks of reputation and credibility and hence of both communication and research ethics. Business ethics has long been aware of the limits regarding strategic use of ethics (Husted and Allen, 2000; Lantos, 2002). Even though forms of “stealth marketing”, such as buzz marketing that relies on word-of-mouth communication, and subliminal messaging that relies on the forces of the unconscious, might be effective to some extent, it does not seem advisable to employ them in a sustainability communication strategy. The pitfalls of such marketing activities – loss of credibility and reputation – have to be closely evaluated against potential desired outcomes. The charge of manipulation is substantiated if viewers/consumers are not aware of and do not realize that they are being influenced by the market, and that the visibility of the sender/company behind it is hidden. While from a utilitarian perspective, the end justifies the means, from a deontological approach, communication ethics clearly depicts the limits. Basically, manipulation profoundly counteracts the ideas of transparency and trust which are fundamental to sustainable consumption and its communication. In project balance, therefore, it is of utmost importance that the sender is clearly identified, which is the case both in the opening credits of the TV show, sometimes also in the teasers and moderation, as well as on the website and all other media channels. The use of emotional pictures and narratives per se is not seen as problematic.

Finally, a multi-channel strategy will have to deal with the problem of contradictory information and mixed messages. For example, in April 2006, the German carrier Air Berlin announced that it will serve complimentary Trans Fair Coffee on all flights. In a press conference, the company’s CEO claimed that “social responsibility is a matter of course for Air-Berlin, but only a few deeds appear before the public” (Wisdorff, 2006).
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This paper presents one promising, possible alternative for communicating sustainability issues to a broader audience. It also shows that there is a business case for mass mediated sustainability communication, in particular for small or medium enterprises that cannot afford expensive TV advertising. However, there are still number of pitfalls along the way regarding both practice and research. From a macro perspective, the cost of motivating the non-interested might be prohibitively high, and hence, resources could eventually be better allocated in support of the “sustainability case”. More research is needed to provide solid and convincing evidence on the effectiveness of emotion-based sustainability communication.

References


Introduction

Despite existing initiatives and numerous single actors, trying to increase the acceptance of sustainable ways of living, a turnaround is not within a range of vision.

The project “NENA – network of sustainable lifestyles” aims to initiate a network of existing actors in the field of sustainable ways of living. The exchange of experiences and the bundling of existing resources shall realise far-reaching effects for a change of life and consumption patterns towards more sustainability.

The project takes a social marketing approach in order to involve as many actors and target groups as possible. Furthermore, existing experiences and barriers will be analysed together with various relevant experts and representatives. One output of the project will be a guideline for multipliers, supporting them in (re-)designing their concepts aiming at changing lifestyles towards more sustainability. This guideline will contain recommendations for campaigns, initiatives and programs. It will furthermore provide tools for market analysis and evaluation, a toolbox with existing materials, as well as recommendations how to overcome barriers. It shall also introduce/present successful examples of lifestyle change. Additionally, an inventory and evaluation of institutions, existing tools and of education and training offers are available on the project website: www.nenanet.at.

The innovation and effect of NENA can be seen in the systematic analysis and bundling of existing potentials, the visualisation of effects and the support of multipliers. The outcome will show how multipliers, seen as “germ cells” of sustainable lifestyles can be supported in their work: e.g. in which areas of sustainable lifestyles actions from policy makers are required, how framework conditions and markets have to be adapted and.

NENA is a project of the Austrian program proVISION, funded by the Federal Ministry for Education, Science and Culture.
2 Essential Terms and Definitions

The term lifestyle has many connotations, depending on the respective context: sociology, business, medicine and media interpret the term quite differently. The following section gives an overview of the different utilisation of the concept and provides a definition of the term as it is understood within the NENA project.

2.1 Lifestyle and Way of life

In sociology, a lifestyle is the way a person (or a group) lives. This includes patterns of social relations, consumption, entertainment, and clothing. A lifestyle typically also reflects an individual's attitudes, values or worldview. Having a specific "lifestyle" implies a conscious or unconscious choice between one set of behaviours and some other sets of behaviour.

In business, "lifestyles" provide a means for advertisers and marketing personnel to adapt their strategy to specific target groups in order to match consumer aspirations with products. Different lifestyle classifications have been proposed by market researchers.

The specific way of living may be part of a cultural movement or even political protest, but just as well it may represent enjoyment of life. Typical ways of life can be classified by subcultures such as hippies, punks, rockers or mods. Other well-known examples are dandies and playboys. "Simple living" is as well an option and example for a possible way of living, or lifestyle respectively. Certain attributes attached to the way of life of an individual derive from being part of a certain community or having established a border to other ways of life.

Within medicine a healthy lifestyle has always been recommended. The change of unhealthy lifestyle patterns seems to be the most important measure in the prevention and treatment of so-called civilisation diseases, especially when discussing how to finance the welfare state. Programs for a health-conscious lifestyle pay attention to physical fitness, weight loss, healthy eating, stress management training, stopping smoking and the abuse of other substances.

In the German language, the English expression "Lifestyle" is part of the common vocabulary and it mainly addresses lifestyles belonging to youth culture as well as lifestyles directed towards pleasure and consumption, often relating to associations of being ‘cool’ or ‘stylish’. Thus, lifestyle magazines are full of suggestions for party events, dining locations, fashion and so on.

Because of the many misleading connotations it seems to be more appropriate to use the expression 'way of living' instead of 'lifestyle'. The term ‘way of living’ is considered suitable in those cases where the focus is on the way persons organise their life. Whereas the term ‘lifestyle’ is rather associated with short-lived trends.

2.2 Sustainable way of living

Sustainable way of living can be described as a pattern of life that could, hypothetically, be sustained unmodified for many generations without exhausting any natural resources. Social aspects of a sustainable way of life remain to be defined (e.g. by setting value on equal opportunities, distributive justice, social cohesion, accepting plurality of cultures and different ways of living).
The term ‘sustainable way of living’ can be applied to individuals or societies. Though ‘true’ or ‘strong’ sustainability shall be a goal or guide, individuals have to make tradeoffs favouring more sustainable options where practical. Recently, two classes of sustainable ways of living are in discussion: the so-called ‘LOHAS’ and the ‘LOVOS’.

2.2.1 **LOHAS**

LOHAS is an acronym for Lifestyles of Health and Sustainability. In the United States it is estimated as a many billion market segment and worldwide its potential is expected to be high. LOHAS Consumers are passionate about the environment, sustainability, social issues, and health. The marketplace includes goods and services such as:

- Organic and natural food
- Organic and natural personal care products
- Hybrid and electric cars
- Green and sustainable buildings
- Energy efficient appliances
- Socially responsible investing
- Natural household products
- Natural and preventive medicine.

This consumer group is variously referred to as cultural creative, conscious consumers or LOHAS Consumers, and in the United States represent a sizable group: 17% of adults (36 million consumers).

The term LOHAS was first coined when the non-profit LOHAS Journal and Forum was created in 1999 (see www.lohas.com). These consumers are well suited to the commercial interests of the organic food industry and tourism industry. Although there is, for example, a tendency from fast food to slow food and an increase of organically grown and processed foodstuffs, it is discussed controversially whether this post-modern trend correctly reflects the ideas of the concept of sustainability.

2.2.2 **LOVOS**

Rather the opposite of the LOHAS is the LOVOS. Although the LOVOS are a partial group within the LOHAS they are not separately expelled. But they gave important impulses as trendsetters to an ecologically sustainable lifestyle. A person representing the LOVOS is not post-modern oriented but consistently post-materialistic and contrasts with consumerism. LOVOS is an acronym for ‘Lifestyles of Voluntary Simplicity’, whose representatives attach importance to health and sustainability just like the LOHAS, but they differ from the first group by their criticism of consumerism.

It is an essential characteristic of the LOVOS that environmental awareness is in agreement with environmentally suitable behaviour. From a marketing point of view, the LOVOS are to be neglected; but for the change of society the LOVOS comprises a high potential towards a more sustainable future.

2.3 **Definition within the NENA project**

At present and within industrial societies not many individuals can be found that organise their lives in a way that this pattern could, hypothetically, be sustained unmodified for many generations without exhausting any natural resources.
Ulrike Seebacher, Wilma Mert, Ria Müller

The range of options for the individual depends on many framework conditions: the place of domicile, the place of work, income, existing infrastructure such as care for children or elderly persons, options and actual conditions to live single or together with others, and so on.

In a pluralistic society it can be assumed that – within certain limits – everybody is free to choose the frames of his or her personal way of living. Furthermore, options are changing from time to time.

When communicating with different target groups, the NENA team emphasises that the choice of a certain way of living should not be judged a priori, and from an ethical point of view, superior to another. Thus, it is deemed more appropriate to talk about more sustainable lifestyles/ways of living than a/THE sustainable lifestyle. Within NENA project, ways towards (more) sustainable ways of living shall be paved for the individual.

More sustainable ways of living are defined by the fact that an individual opts for socially and environmentally favourable alternatives within various areas, such as:
- Building and Living
- Energy
- Mobility
- Food
- Clothing
- Health
- Leisure time, Social Contacts
- Consumption
- Washing and Cleaning.

Every one can make progress by taking incremental steps towards a more sustainable way of living. In order to promote the many possible ways towards more sustainability on the individual level within the NENA project the social marketing concept is viewed as a promising approach.

2.4 The Social Marketing Concept

Social marketing is a rather new discipline, which was introduced by Philip Kotler and Gerald Zaltman in the 1970s. It can be defined as the planning, implementation and evaluation of programs designed to bring about social change using concepts from commercial marketing (Kotler & Roberto, 1991).

The social marketing technique is an approved strategy to facilitate the acceptance of socio-political issues and behaviour patterns. Ideas, attitudes and behaviours are “sold” using the same marketing principles as for selling products. According to this view social marketing only differs from other areas of marketing with respect to the objectives of the marketing personnel and their organisation. It consists of the planning, implementation and control of programmes to facilitate the acceptance of social concerns or behaviour patterns. However a special feature of social marketing is that it is supposed to lead to behavior change on a voluntary basis.

One basic assumption of social marketing is that societal problems cannot be solved through a behaviour change of single individuals but what is required is a change of population groups and social systems (Kotler & Andreasen 1987; Kotler & Roberto, 1991).
The concept has already been applied in several areas such as health programmes (e.g. nutrition, cancer, smoking, drug abuse) as well as for environmentally related topics (e.g. diffusion of solar energy, climate protection).

Findings of socio-scientific research indicate that the change of lifestyles or the creation of new lifestyles from top-down is only working to a limited extent (compare Lange, 2005). If lifestyles are viewed as stable, socio-cultural patterns which can be actively chosen, but which are anchored within given socioeconomic boundaries (compare Reusswig 1994), the social marketing concept might be a suitable instrument to promote sustainable lifestyles. A characteristic and strength of social marketing is the possibility to actively involve users and population groups and to use existing social networks to disseminate the respective idea or behaviour pattern (compare Hübner & Felser, 2000).

Especially promising within this context is the so-called ‘participative social marketing’. Key factor for a participative social marketing approach is the involvement of as many people as possible to become co-players marketing a certain issue or idea. Through model behaviour of credible individuals and personal communication in existing social networks new ideas and behaviour patterns can be spread.

Within NENA the potentials of social marketing for the promotion of sustainable lifestyles will be analysed based on the application of the concept within existing initiatives.

3 Research project NENA

In its research projects the Inter-university research centre for technology, work and culture (IFZ) applies various scientific methods. In principle the institute uses consolidated findings and methods deriving from the natural sciences and engineering technology as well as from the social sciences.

The studies within the NENA project are conducted with a ‘cross-examination’ approach. IFZ wants to learn about the supply and demand of campaigns/offers in the field of sustainable lifestyles from both the providers’ and the possible customers’ side. In practice, the decision to actually engage in or demand a campaign/offer in the field of sustainable lifestyle is based on a complicated netting of various single but interdependent considerations. In order to reasonably detect these, IFZ combined quantitative and qualitative evaluation methods: the providers are interviewed based on qualitative guideline questions, the (possible) customers of the campaigns have been invited to participate in focus groups. Missing quantitative data and background information has been collected through analysis of written reports and internet research.

Practical approaches are urgently needed to address many and different groups of population, in order to

- raise awareness of the effects of individual ways of living
- motivate as many persons as possible to change unsustainable patterns to more sustainable and productive ones
- train and exercise sustainable ways of life within different areas.

To reach this goal new trans-disciplinary approaches are to be developed and co-operations of single actors shall be enhanced.

Aim of the NENA project is to support initiatives, programs and institutions in Austria whose offers concern aspects of sustainable living patterns.
NENA aims at making their work more visible, more efficient and more effective. Target groups are consultancies, educational institutions, NGOs, research institutions and all other actors whose work contributes to the dissemination of more sustainable ways of living.

These actors are seen as “germ cells” as they are often multipliers. They shall be strengthened in order to enhance social changes towards more sustainability.

The first research phase focuses on the following three questions:
- Which institutions and persons through their work contribute to the spreading of sustainable ways of living?
- Which methods and tools do they use?
- Which are the respective target groups?

Thus, in a first step information on existing initiatives, programs and offers has been gathered via internet based research, personal contacts, and interviews. Details of institutions and persons who are (possible) multipliers of sustainable lifestyles have been collected in a database. Here, by now 51 institutions working in different regions (mainly in Austria), 78 offers and 32 tools are listed. Existing offers and tools used are described according to a detailed analytical scheme. Some of this information is accessible on the project website www.nenanet.at.

The results of a preliminary analysis are presented below.

3.1 Analysing institutional offers

The term “offer” is used within the NENA project for any advisory, educational, or training offer an institutional provider designed for different target groups aiming at one of the following goals: awareness raising, stimulating changes of unsustainable habits, training or exercising more sustainable patterns of life.

The analysis of existing offers focuses on the following topics:
- Which groups of population are addressed by the institutional offers? Which groups are neglected?
- What is the didactic concept of the offer? What are the characteristics of the design?
- Are target groups and practitioners involved in the development of offers? If so, how does this interaction take place?
- Do the providers evaluate the impact of their offer?
- Is gender taken into account during the design, marketing and implementation phase?

A first screening revealed that there are many offers addressing children and pupils up to the age of 14 years. Sustainable lifestyle initiatives address senior students of secondary school or university students but only a few projects are targeted for young adults outside educational places. Offers for adults are found less often as offers for schools and kindergarten, and programs especially for elderly persons are lacking. So do sustainable lifestyle initiatives for minorities (e.g. handicapped people, migrants).

Some institutions pay attention to a broad participation of representatives of the target groups and various actors in the design phase, but this is far from being common practice. Concerning evaluation there are many differences between the researched and contacted institutions. For some, evalua-
tion is a standard procedure, others evaluate by and again, and many institutions have not yet any institutional practice of feedback and evaluation.

The taking into account of gender ranges from ‘not detectable’, a casual use of gender sensitive language to a design respecting gender differences and gender sensitive marketing of offers.

3.2 Evaluating tools

Within the NENA project a “tool” is every aid or instrument used by institutions and implemented in their offers, that supports the topic ‘lifestyle and its effects on the (ecological and socio-economic) environment’ by giving information, motivating for change towards more sustainable ways of life, or providing training. Tools are analysed with respect to:

- Target groups
- Availability
- Scientific background
- Suitability for different groups of population (in terms of e.g. possible barriers such as required previous knowledge, language, constitution)
- Type of mediated knowledge.

There exists a broad spectrum of available tools ranging from CO₂ calculators, quiz, questionnaires, to computer games and other instruments. These tools either concentrate on one aspect of sustainable lifestyle (e.g. mobility, energy, food) or lifestyle and consumption in general. Tools for all target groups can be found, e.g. children of preschool age, pupils, adolescents, and adults. These tools are generally easy to understand, and no, or only moderate, previous knowledge is required.

Besides the above-named advantages the tools assessed hold some weaknesses. Answers often are too predictable or they deal with figures difficult to relate to day-to-day experiences (e.g. CO₂ tons). Learning is not encouraged in those offers where no explanations are provided (especially in the case of a “false” answer in a quiz). Hints how to practically change unsustainable patterns are often lacking. On the technical side it has to be criticised that some programs are not easy to install, or to handle, or they do not motivate for repetition.

3.3 Carrying out interviews

The qualitative interview is an important method of qualitative social sciences to collect data. Within the NENA project this method was chosen as it allows to capture the perspective of the respondent consistently. It provides an insight into the experiences and apperception of the interviewee and thus in general evokes new and surprising cognitions. The interview was structured with guideline questions allowing time and space for the respondent to explain their work and thoroughly reason his/her comments.

15 actors in the field of sustainable lifestyle were addressed and interviewed between March and October 2006. The interview questions concerned the design and topics as well as the factors of success and barriers of their offers. They furthermore sampled the status quo of the programme evaluation and revision/ensuring of the participants’ knowledge gain. Beyond that the interviewees were asked to make suggestions on how to best disseminate more sustainable ways of living. The following sections summarise the main findings of the interviews.
There is a broad spectrum of offers available in the field of sustainable lifestyle. Their design varies from providing information or material to offering seminars, conferences, establishing and maintaining nature trails. Beyond that the design includes the maintenance of a sustainability library, the gathering of community members to improve the municipality and a project in which a common vision of the outdoors (in German ‘Freilandleitbild’) is being developed.

The topics addressed in these offers and initiatives cover the topics of Education for Sustainable Development as far as possible. Special focus lies on the topics of energy, mobility, waste, consumption and social well-being.

The actors interviewed named various target groups to be addressed by their offers: families, young children in pre-school, school and extracurricular activities, schools, university students as well as businesses, public authorities and political decision makers. Although no specific target group was favoured, it appeared that no offer explicitly addressed/invited minorities.

It stands out quite clearly that measures ensuring the participant’s knowledge gain and evaluation are undergone in different ways. They vary from one organisation to the other. Some institutions do not revise the knowledge gain of their participants at all. Mostly lecture notes are handed out and/or participants are to give presentations on a certain topic addressed in the course of the seminar. One institution even sets up a mailing-list for their participants, enabling and encouraging them to exchange evolving questions, request support and share information. Concerning evaluation practices most of the actors obviously have little understanding of the meaning and benefits of evaluation. Because of that programmes or activities are either not evaluated at all or – in one case – a project report was considered sufficient evaluation. On the other hand, those organisations that evaluate their offers, do in general not use the results to benefit from this feedback. In these institutions questionnaires are applied and informal verbal feedback is given but no systematic mechanism exists that reintroduces ideas for improvement back into the organisation. Again, one institution stands out as it has established a systematic evaluation mode. Each team member in the initiating organisation assesses her-/himself but is also evaluated by the course instructor and the participants. Based on the results of this round, the team elicits room for improvement.

One of the key questions of the interview concerned the success factors of the offer. The variety of factors mentioned has been allocated to the following topics:

- Internal organisation
- Perception of the organisation from external stakeholders
- Challenge of `teaching’ the difficult subject sustainability: How to make the invisible visible?
- Dissemination of campaigns
- Long-term involvement of participants/realisation of transfer into everyday life.

The barriers that organisations face in conjunction with their offer have been located in the following fields:

- Internal organisation
- External (political, financial, social etc.) structures
Intrinsic motivation
- Challenge of ‘teaching’ the subject sustainability: How to make the invisible visible?
- Mode of conveyance

Concerning the experience of the experts and their suggestions on how to disseminate more sustainable ways of living, the interviews revealed the rather general appeal for credibility on one hand. On the other hand, one initiator surprised with a rather complex approach which needs to be analysed regarding its feasibility.

3.4 Carrying out focus groups

The focus group is a special type of group interview. Participants are selected because they have certain characteristics in common that relate to the research topic (e.g. lifestyle or profession). The purpose of a focus group is to better understand how people feel or think about an issue, product or service. Focus groups work particularly well to determine the perceptions, feelings and motivations of people or to evaluate strategies and concepts. The method is often used to evaluate hypotheses and ideas.

In the special case of sustainability research within the NENA project the focus groups were used to investigate the sustainable awareness and sustainable engagement of the participants (which offers in the field of sustainable lifestyles were known and which ones did the participants take part in?) together with the evaluation of the quality of these campaigns, offers or initiatives. The third reason was to determine the need for further action (information and communication strategies) in order to promote sustainable ways of living to a large target group. So far, three focus groups took place in Graz in June and October 2006 respectively. They were located in the premises of IFZ and lasted 2.5 hours. The first two focus groups were held with students of Environmental Sciences at the University of Graz. Each of the groups had 7 participants. All of them had attended the seminar of Ecological Product Policy (held by scientific staff of IFZ) in the summer term of 2006. The third focus group within the NENA project addressed teachers, as they are important multipliers of sustainable lifestyles. This group consisted of 4 participants who in the past had participated in seminars at environmental education centre Styria (Umwelt-Bildungs-Zentrum Steiermark – UBZ). A forth and maybe fifth focus group is planned to take place in spring 2007, inviting former participants of ‘Autofasten’, an initiative of Austrian Catholics aiming to go without car the during lent and former participants of the SOL initiative (promoting the ‘clean-euro’ method).

Two main questions were of special interest to the NENA-team: What can be learned from successful examples? Which risks and barriers threat the successful promotion/ dissemination of offers in the field of sustainable lifestyles? The following sections summarise the main findings of the focus groups.

Participants felt attracted by offers that suggested a variety of applicable advices, which also had a smart appearance. Good promotion was voted to be an important success factor. But despite that the participants agreed that most offers would not be able to provoke behaviour modification towards a more sustainable way of life or guarantee it in the long-run respectively.
The following suggestions were made by the participants on how to promote sustainable lifestyles in order to reach a large target group:

- Use of suitable communication channels
- Clear communication and visualisation of the impacts, consequences and personal benefits of actions
- Editing of information in a way easy to understand and favouring short and simple wording
- Necessity of making sustainability visible and possible to be experienced by participants
- Easily applicable design of activity suggestions
- Signalising: every behaviour modification towards a more sustainable lifestyle has a positive effect – irrespective how tiny it may seem to be.

Participants of all three focus groups – university students as well as teachers – identified one main reason why sustainable ways of living has not reached a large target group so far.

Education for Sustainable development and thus the topic of sustainable lifestyle so far has – if at all then only by chance – played a role in vocational training. Because of that fact the participants pledged for anchoring sustainability as an integral part of the curriculum of university students and especially of teachers.

All in all the focus groups proved to be an effective approach to gather deeper insights into the participant’s apperception. The focus groups produced completely new and unexpected aspects, interrelations and gave inspiring impulses for new ideas that will most likely contribute to the improvement of the offers in the field of sustainable ways of living.

4 The NENA network

The topic of sustainable ways of living is complex, with many interdependent aspects. It consists of many different actors and institutions who are involved promoting various aspects of sustainability. Despite the variety of offers and actors a real change towards sustainability is still not in reach. Missing elements are the changes of social values and attitudes towards more sustainability. For the short term, especially a change of consumer habits of a wide populace is needed in order to handle climatic change and solve environmentally related problems. Despite many efforts of single actors, companies and institutions which promote and practice sustainable lifestyles, the impact of single initiatives seem not strong enough to facilitate this change of values. New, trans-disciplinary approaches and a stronger cooperation of single actors is necessary.

Thus, as already indicated above NENA wants to establish an actor-network within in the area of sustainable ways of living. Institutions and actors occupied with topics, which are connected to sustainable lifestyles (e.g. mobility, nutrition, health etc.) are seen as “germ cells” for a social change of values. These multipliers are experts of their topics, they are in touch with different stakeholders and target groups and with their work try to raise awareness for sustainability. NENA aims at linking and strengthening these “germ cells” to bundle resources of various actors and to facilitate an exchange of experiences.

The main challenge is that within this network there participate actors from different backgrounds, with different disciplines and manifold claims.
and strategies. Irrespectively, it will be necessary to bring them together to work towards a common aim and also manage to make decisions consensually. At the same time this trans-disciplinarity might be a strength as it allows the combination of different areas beyond competition and may lead to new ideas and solutions to promote more sustainable ways of living.

NENA has chosen an approach of participation to involve the different stakeholders. This approach anticipates a high acceptance and increases the probability to develop new strategies. The aim of the project is to enable mutual learning processes, so that the participants involved gain new perspectives on barriers and possible solutions. Therefore one crucial task of the research team is to initiate the interaction and highlight possibilities of cooperation.

Against this background a first network meeting with a special focus on lateral thinking took place in Graz, October 12th 2006. 40 participants joined the successful half-day event. They appreciated having the chance to get to know other actors, exchange experiences and ideas and discuss the necessity (and possible design) of a network like NENA. Especially well accepted was the presentation on lateral thinking as well as a “sustainable speed-dating session”, which was set up instead of an ordinary round of introductions.

5 Conclusions and Outlook

The NENA project has passed its first year and will end in autumn 2007. In the next phase the implementation of a vital network and the enhancement of joint activities is most important in order to bring the topic ‘sustainable ways of living’ to a broader public.

The NENA database provides a comprehensive overview on actors, offers, initiatives and campaigns and existing tools supporting the promotion of the idea of ‘sustainable ways of life’. The database focuses on Austrian institutions, but there are some additional data, mainly from Germany, but also from Switzerland. Quite a few examples are available in the English language.

The NENA platform is a hub for exchanging information concerning sustainable ways of living. The NENA website (www.nenanet.at) and a NENA newsletter which will inform on project activities support the exchange and mutual learning. Furthermore, personal meetings are regarded indispensable as they will take place every six months. Individual activities shall be linked and new approaches to promote more sustainable ways of living shall be made visible. At the first network meeting participants indicated that they were keen on cooperating with each other one of the attendees they had talked to during the ‘speed dating’ session. Thus a first impulse was given that network participants will enrich the work of and support one another.

The next output of the project will be a report, summarising the results of the inventory and evaluation of institutions, existing tools, and education and training offers. Based on these findings, and supported by the input from interviews and focus groups, guidelines will be developed. This guideline shall support institutional multipliers in (re-)designing their concepts aiming at changing lifestyles towards more sustainability. The guideline will contain recommendations for campaigns, initiatives and programs, tools for market analysis and evaluation, a toolbox with existing materials, as well as recommendations on how to overcome barriers. It shall also show examples of successful changes of ways of living.
The guideline will be tested by the partner (Umwelt-Bildungs-Zentrum Steiermark – UBZ) in their re-design of a school program for spring/summer 2007. Feed-back of the pilot phase in some Austrian schools will result in adaptation of the guidelines which will be launched in autumn 2007.

The outcome of the project will provide information on the areas of sustainable lifestyles in which actions from political decision makers are required, how framework conditions and markets have to be adapted and how the work of multipliers can be supported.

The success of the project certainly depends on on-going cooperation among the network partners. Because of the special motivation (many individuals are working voluntarily) and subject (sustainable ways of living) it is very likely that this process of working together creates the commitment that keeps all parties involved for the long-term.

References
CBL III  Developing 'Eco-Benchmark' for consumer-oriented LCA-based environmental information on products, services and consumption patterns

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1 Introduction

Science-based approaches like Life Cycle Assessment were proposed as a basis for consumer information tools in the 2002 United Nations World Summit on Sustainable Development (World Summit 2002). LCA has been recognized also in the EU in the context of Integrated Product Policy as providing the best framework for assessing the potential environmental impacts of products currently available (EU Commission 2003).

Although LCA could provide information that environmentally conscious consumers need, the forms in which it has been provided have often been rather inaccessible. Published LCA reports tend to be extremely technical, featuring long lists of environmental pollutants and abounding with technical terms. On the other hand, there have been some efforts in the LCA community to develop illustrative presentation formats. It is common to benchmark the various effects against the total effects in an area or country; e.g., in the Eco-indicator method the environmental effects are normalized by the effects caused by the average European during a year (Goedkoop and Spriensma 2001). Further, the normalized results can also be weighted according to the assumed seriousness of each effect: in Eco-indicator, these weights are determined by a panel method. After normalization and weighting, the resulting 'ecopoints' can be shown in illustrative forms, e.g., using the common column format (Goedkoop and Spriensma 2001, Seppälä et al. 2001).
Several Finnish research institutes designed in 2003 a three-year project to develop 'eco-benchmarks', i.e. illustrative presentation formats and benchmarks for presenting LCA-based information to consumers and various stakeholders. For more information about the tool and the development process see Nissinen et al. (2005, 2006) and www.environment.fi/eco-benchmark.

2 Material and Methods

2.1 Tasks in the project

Several important tasks were identified for realizing an understandable, reliable and well-known tool to deliver LCA-information (Figure 1). The core assumption was that LCA results would be easier to understand if they were linked to a familiar frame of reference, and compared to an everyday object. Therefore LCA-studies of consumer products were surveyed and their suitability for the benchmark was assessed. The presentation format and figure were designed, and both the whole idea and the benchmarking alternatives were tested both in consumer focus groups and in seminars with various stakeholders. The final format was developed on the basis of the various alternatives and the feedback gained.

Two conditions were set for the product benchmarks: 1) there must exist an LCA of the product which is of good quality, and can be updated and modified (if needed) to be relevant to the conditions of Finnish consumers, and 2) the product must be a familiar ‘everyday’ product to Finnish consumers. A survey was conducted of existing LCA studies, using literature...
databases (e.g., Cambridge Scientific Abstracts). Tens of LCA studies were pre-evaluated, and more than ten studies were thoroughly assessed in terms of whether the results of the selected LCA studies could serve as reliable benchmarks. Five LCA studies were selected for further work, i.e. updating and modifying to Finnish consumption. The original idea was to finally select one product to be used as the product benchmark. After a seminar with stakeholders, however, we found a way to integrate all five products in a ‘benchmark-ruler’.

Rye bread and cheese were the food products selected as benchmarks, largely due to the importance of food in everyday consumption and considerations of data availability and quality. Rye bread and cheese make up only a small portion of the daily food intake, and thus also of a consumer’s total daily environmental load caused by food, but they provide an illustration of the environmental loads of commonly used food products. Other benchmark products are also common and typical products for Finnish households: a wash of laundry, a two-bedroom apartment and a car trip (see Nissinen et al. 2005 and 2006 for more description of the products and their role in Finnish consumption).

Some modifications and updating were needed to all of the selected LCA studies. A general modification was to use new data for the environmental effects of electricity and district heating, representing the year 2003 and national average values, also taking into account imported electricity on the basis of country-specific values.

2.2 Life cycle impact assessment

For the methods used in life cycle impact assessment, see Nissinen et al. 2006 and Anon 2006.

2.3 First set of alternative presentation types

Six different presentation formats were developed for the first brochure and consultation with the consumer panel (Nissinen et al. 2005). The presentation formats focused on different levels of aggregation of the environmental data (e.g., whether environmental impacts should be presented separately for different environmental problems such as climate change and eutrophication, or weighted by experts and summed up into a single column), as well as on visual vs. verbal presentation. In the presentations, comparisons were made between the environmental impacts of an illustrated product (a car trip of 20 km) and the benchmarks. See Nissinen et al. (2005) for more information, including the figures.
2.4 Obtaining feedback from consumers and other stakeholders

Consumer feedback was obtained from volunteer members of the Consumer Panel of the National Consumer Research Centre. We considered them to be an appropriate group to involve as consumer representatives, because active and environmentally conscious consumers and environmental communicators would be the primary target groups for the benchmark information. We solicited help from 300 members of this panel, clearly stating the environmental topic of the study, and obtained 57 volunteers for the co-design process consisting of (1) inspecting the information package, (2) participating in a focus group interview, and (3) participating in a second round of feedback on the improved brochure via postal questionnaires.

2.5 Analysis of household consumption by the input-output method

In Finland Mäenpää (2005) has estimated the environmental impacts of household consumption using the input-output (i/o) method. The study was based on the i/o table of the year 1999 with 152 branches of production. For this article, re-calculation was made by using same characterisation coefficients for the environmental impacts as in the LCA study.

3 Results and Discussion

3.1 Basic elements of Eco-Benchmark

The basic ‘Eco-Benchmark’ was given the form of a ruler, which aims to serve as a yardstick for scaling the environmental impacts of different products, services or activities (Figure 2). The scale of the benchmark-ruler is based on the average daily per capita environmental impacts of the whole Finnish economy, which are set at the value of 100. This ruler also integrates the different benchmark products, i.e. products like bread and car. They serve as additional – and perhaps more down-to-earth – benchmarks.

Eco-Benchmark now takes into account five important environmental impacts, which are weighted according to their importance (please note that each product also has other important environmental effects). In Figure 2, next to the actual Eco-Benchmark, you can see the various environmental impacts of the benchmark products in a weighted and aggregated form. The same type of figure can be used to show the environmental impacts of any consumer product or service for which an LCA has been conducted. In addition to the aggregated presentation, it can often be valuable and informative to show the values for each environmental impact class, as in Fig. 3. The ruler is not shown in these figures, only the scale, in order to differentiate from the basic presentation format, which aggregates the various environmental impacts.

We suggest that the presentation types in Figs. 2 and 3 could be used in a combination. When using ordinary A4 paper, the first page could present the aggregated results, and the second page show the results for each impact.
Figure 2: The elements of the benchmarking: the ruler, the scale, and the benchmark products. Together they form the 'Eco-Benchmark'. In addition, the different environmental impacts of the benchmark products can be seen here in the columns.

class. This kind of combination of the presentation types would cater to the needs of both those who prefer aggregated data, and those who prefer to draw their own conclusions on the relative importance of different environmental impact categories.

3.2 Some details and remarks about Eco-Benchmark

The total daily environmental impacts per person (= value 100 on the scale) are calculated on the basis of the annual emissions and energy consumption in Finland. For example, eutrophication effects have been calculated on the basis of the annual emissions of nutrients from industry, agriculture and human settlements.

It is worth noting that a large share of Finland’s emissions and energy consumption are caused by the production of export products. On the other hand, imported products cause emissions too, which are not included in these calculations. Using the input-output method, we can estimate that private consumption amounts to about 64 % of Finland’s environmental impacts (the value 64 is also noted in the figure).

The environmental impacts have been weighted (i.e. given priorities) according to their relative importance. The weights are based on the views of almost a hundred environmental experts in Finland, and they are shown in the legend of the figure.
3.5 Using Eco-Benchmark

Comparing the environmental impacts of a car trip and a bus trip serves as an example of using the benchmark presentation (Figure 4). The figure shows that a car trip and a bus trip are both ‘products’ that are very significant in comparison to other products. It also shows that there is a large difference between these alternatives. A conclusion can be easily drawn: This is certainly a choice that counts.
3.6 Users of Eco-Benchmark

Who will use Eco-Benchmark, and how? We consider environmental educators as the primary target group, suggesting that Eco-Benchmark can be used when informing citizens on the environmental impacts of products and consumption patterns (a brochure was already produced to serve this purpose). Offering the Eco-Benchmark directly to consumers as long as there are only few published LCA might raise false expectations. But LCA activities are expected to increase rapidly in coming years.

The benchmarking method will also help manufacturers and retailers to provide information about the environmental impacts of their products. We think also that the illustration of product environmental impacts can be valuable for experts in administration and research organisations when developing policy instruments in the field of integrated product policy.

3.7 Disseminating the tool

Brochures, a tv-program, a press release, seminars, a website and scientific publications were produced in order to make the Eco-Benchmark well known among environmental educators working with consumers, product policy experts in administration, and the research community (Fig. 1). This will be of course an ongoing activity. The webpage www.environment.fi/eco-benchmark is a key dissemination channel.
4 Environmental effects of consumption determined by the input-output method

The value for the total environmental impacts per capita was 64 for consumption (Figure 5). The difference between 100 and 64 is caused by public consumption, capital formation and the difference between export and import.

The environmental impacts of food consumption (1) are the greatest, mainly because of the eutrophication effect. Housing (4) rises to second-highest place, and after that the operation of personal transport equipment (8), both having climate change impacts as the most important class. The environmental impacts of recreation and culture (11) as well as the use of hotels and restaurants (13) are relatively high, too, especially if they are summed up, representing 'leisure'. Education (12) is small, but in Finland it is mainly provided for free and is part of public consumption, being thus outside this figure.

Air travelling is of course one major concern due to its high environmental impacts. Air travels of consumers belong to recreation and culture (when bought as a part of a packet holiday) or transportation services (9) (when directly bought flights), the relation between them being fifty-fifty.

The average effects of the housing sector (i.e. homes) are larger than our 'apartment-benchmark'. One reason for this is that in the i/o method, housing also includes the electricity for the various appliances in homes, which are not included in the impacts of the apartment. The impacts of the operation of personal transport equipment determined by the i/o method are also higher than our 'car-benchmark', at least partly explained by the benchmark car being newer (less than 5 years old) and having lower emissions than the average car fleet in Finland. Regarding food, the i/o method clearly shows that the overall impacts of all consumed foodstuff are high, while our 'food-benchmarks' show the impacts of only two food items. In conclusion, the overall pictures that the two methods (LCA, i/o) give are not in conflict. However, it is evident that it is mostly fruitful and recommendable to look at such results side by side, if available, as they provide a complementary picture of the environmental effects of the various products and consumption commodity groups.
5 International and country-specific Eco-Benchmarks?

We suggest that country-specific Eco-Benchmarks could be developed also in other countries, and products like passenger cars could offer a possibility for an international eco-benchmark. See Nissinen et al. (2005) for some more discussion about this.

References


1 Introduction

1.1 Issues related to the term „sustainability”

The liberalist paradigm of perpetual economic growth is challenged by sustainable development which aims to harmonize social, environmental and economic values in sustainability triangle. Although by now it is commonly acknowledged that environmental protection cannot be considered in isolation from the development process (RDED, 1992) and sustainable development is broadly adopted in legislation, the implementation of the sustainability principle is still complicated, full of contradictions between different ideologies and principles.

In my opinion, one of the reasons here is superficial and rhetorical use of the term „sustainability” – it is not any more unambiguously associated with environmental protection, sustainable practices or reducing social inequality. Aguirre states (2002: 102): „[…] the [original] use of the term „sustainability” [is] quite different from an increasingly popular use of the term during the surge period that is largely and wholly devoid of environmental concerns“. And conversely, sustainability is often understood as merely a narrow environmental restriction that helps to balance economic benefits and alternative values, to find win-win solutions.

The notion of sustainability is frequently used in situations where it marks simply somebody’s necessity or wish to maintain the status quo. In such cases, discussions about sustainability revolve around technical minutiae. De Geus (2002: 193) has also found that „hard” questions are not taken into account in social debate on social development: „Attention has been focused from the very beginning on so-called soft questions – questions that do not imply difficult choices or controversial dilemmas.” In those debates, ingrained policies and resources to be used become a goal for its own sake. This phenomenon is criticised by Marcuse (1998) who introduces the notion of justice into discussion about sustainability and finds that
sustainability of the policies does not guarantee the justice of the policies; and vice versa. In his view, a means of achieving a goal is sustainable only if it is also socially just.

Acknowledged approaches to sustainable development expect economic development to function in a way "that meets the needs of the future generations to meet their own needs (WCED, 1987: 24)". Nevertheless, there are no reliable ways to maintain possibilities of meeting the unknown needs of the future generations, as argued by Raskin (2000: 68):

"But in translating this principle into specific targets and action, broad philosophical consensus shatters into a cacophony of definitional debates, interpretations and slogans. The concept of sustainability is sufficiently rich and protean to refract the full diversity of human interests, values and aspirations. Bankers, social critics and environmentalists have all decanted old wine into this new bottle".

Putting a gloss on old squandering patterns can be seen in consumption: products are labelled "environmentally friendly" or sustainable as a result of minor and dubious alterations in the production cycle. According to Manoochehri (2002: 47) "this approach is inadequate because not only are social context issues ignored but, most importantly, the use of resources across the whole economy is not taken fully into account."

Therefore, in implementing sustainable development one should not be afraid of asking substantive questions and make do with merely technical changes. Raskin (2000: 67) argues, that "policy reforms can bend the curve of development toward a sustainable future if the political will for action could be found for fundamental changes in the values, lifestyles and institutions embraced in conventional development paradigms." To put sustainable development into practice, policies, decisions and resources should have as wide as possible ecological, cultural, economic, historical, socio-demographic and regional dimensions in order to put a fair and objective price tag on consumption. This requires that the planning of production or use of resources should start with defining the goals at an embryonic stage, opening the process to public discussion and ensuring transparent decision-making, including implementation. It ensures that the aspect of social justice is implemented in the concept of sustainability - "the agenda even for an environmentally limited definition of sustainability will be very different for different groups (Marcuse, 1998: 108)".

1.2 Estonian Context

Estonia as a new EU member state has intensely implemented the policy-making procedures and principles of Western Europe. The above-discussed problems crop up in particular in the context of cultural disruption of the post-Soviet transition society.

To explain the context in which the notions of social justice and sustainability are used in Estonia, it is necessary to clarify some recent social processes. During the Soviet era, these complicated and contextual terms or their equivalents were defined through ideology that made the terms monovalent. Public debate over public interest and sustainability was illusory and devoid of content, substantive discussions took place outside official structures. From 1988 to 1991, when Estonia was regaining its independence, old institutional structures were torn down as a result of and interplay between critical and active public who opposed Soviet culture and
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sporadic events. However, mass movement, critical public, new elite, national awakening, etc. waned during the institutional changes of the 1990s (Lauristin and Vihalemm, 1997). Among Eastern European countries, Estonia experienced one of the fastest political and economic transformations. In the early 1990s, a series of radical economic reforms was initiated and carried out quickly. Liberal ideology shaped not only the economic policy but also the other policies. The idea of individual freedom, going-back-to-the-West, economic prosperity and technological development legitimized the neo-liberal reforms carried out in Estonia at the beginning of the 1990s. The analysts of post-Soviet transition have brought out that the institutional reforms can be made quickly but the culture processes are inertial. So the discrepancy between the speed of institutional reforms and the slowness of cultural changes might hinder the political and economic development (Lauristin, 1997; Sztomka, 1996).

Economic stratification into winners and losers was quick in a society with ambiguous rules; sudden economic and social inequality increased in society bitterness, individualisation and distrust (Lauristin and Vihalemm, 1997). Following the regaining of independence, the mid 1990ies were characterised by very low public participation and trust, low individual responsibility and ambiguity of political processes (Vihalemm et al., 1997). It was also the time when environmental issues began to be integrated into legislation. As this took place in an incoherent society where substantive discussions had lost their common grounds, the penetrating western consumerism legitimized double standards and shallowness, very similar to the official policy of the Soviet era, also with regard to environmental issues. The long-term ignoring of bottom-up input and political populism have made it possible to avoid many legal obligations, including those arising from international law, in implementing environmental policy. Immaturity of society has prevented Estonia from being adequately prepared to fight with the pressure put on the natural and social environment by private interests, including international economic system. Common goals and public interest have been defined to some extent in comprehensive documents prepared by single expert groups (e.g. Sustainable Estonia 21), but those legal instruments often do not have real output in society. Bottom-up arguments in both determining public interest and standing up for one’s rights were introduced to environmental policy only in the new millennium. The experience of involvement is scares in public structures and they lack cultural readiness – there area no substantive discussions over the concept of sustainable development. A quotation from Reading (2000: 239) suits well to describe the situation in Estonia: „[…] a society-wide conversation about the desirable benefits and unacceptable costs […] can occur only when the lifeworld reasserts itself through democratic political action to build institutions that enable such a conversation to occur in the first place.“ This article analyses discussions in Estonia about a national natural resource – oil shale. However, the analysis of research material pointed out many issues of sustainability and social justice which are also applicable to other dilemmas of economic development.
The case of Estonian oil shale mining

The aim of this article is to discuss on several aspects of sustainability in the case of oil shale mining in North-Eastern Estonia. Estonian energy system is historically based on local fossil natural resources – oil shale (solid, lignite like). Estonian energy production is unique in the world, because oil shale is energetically very ineffective and related to enormous environmental and social impact, which is the reason why no other country is using their oil shale deposits in energy production. A monolithic oil shale based energy production system achieved by the end of the Soviet era its maximum capacity; in the course of restructuring of economy during the transition period, oil shale production has significantly decreased. The Soviet era, characterised by irrational and squandering production style, has become a thing of the past, but in the context of the rhetoric of long-term sustainable development Estonia has not transferred from the oil shale based energy production to more sustainable solutions (the proportion of renewable resources in energy production is still less than 1%). On the contrary – according to the rise of prices at the global fuel market the ineffective production and export of oil shale oil has become more profitable and the interest of energy and chemical industry towards bringing into play new mining fields has grown enormously since 2004.

If the consumption level of oil shale and technical-economical conditions of energy plants will remain the same, active supplies of oil shale will end up in 40 years. From the active supplies of oil shale fields already in use there will be enough resources to cover Estonian national electricity needs till 2025 (Estonian..., 2005). There is objectively no need for opening new mines in fifteen years unless oil shale will be used to produce oil for external markets. Should the export interests of oil manufacturers be realised, oil shale mining would increase from 15 million to 50 million tons in a year, which would exhaust our oil shale deposits in 20 years. The Ministry of the Environment admitted in 2005 that in order to curb careless use of natural resources, a national strategy for using oil shale is needed. At the beginning of 2006, the Ministry started to work on developing the strategy, which provides for the management of an extensive public debate, included under pressure from stakeholders. The interested parties in the process are government institutions, energy and mining companies, energy consumers, people living in mining areas (miners and rural population) and scientists.

Oil shale is energetically very ineffective due to its low energetic value and outdated technologies – only 30% of oilshales energetic value is turned into electricity, efficiency of oil shale is 15%. Mining of oil shale is related to enormous environmental impact, the main consequences of it are the loss of groundwater, which flows to the mines and is pumped out to rivers, contamination of groundwater by heavy metals, degradation of biological diversity in the rivers, landslid and changing landscapes. Oil shale based energy causes also high CO2 emissions and huge amounts of combustion waste (90% of Estonian waste). Important impacts are also health problems of the miners and local inhabitants, damages of buildings caused by explosion waves and landslide, lack of alternative futures for local development.

Both strip and deep-level oil shale mines are situated in the North-Estonian district, as well as oil shale dependant energy plants and chemical industry. Most influenced Estonian county by the oil shale mining is Ida-Virumaa, which is the second biggest county in Estonia (178311 inhabitants (13,3% of total), 3364 km2 (7,4%)). Ida-Virumaa is the most urbanized county in Estonia – 88% of the people live in the cities (vitted). City inhabitants are mainly occupied in energy, chemical and wood industry; people in the country are
A public debate over oil shale based energy production is essential, taking into account the complicated situation of oil industry and one of the three development goals pointed out by the World Summit on Sustainable Development 2002 – changing unsustainable production and consumption patterns.

The aim of the following analysis is to reflect, how plan public interest (social justice) and sustainability are defined in the process of preparing the oil shale mining development and how could an analysis of public interest prevent established unsustainable practices to be continued under the name of sustainable practices. The analysis determines the definitions of interests of which stakeholders are taken into account in the decision-making process and which arguments are used in considering those interests (empowerment). The role of the analysis in defining sustainability is looked at on the example of one interest group – rural population of the mining areas. The empirical body of the article forms from document analysis, participant observation and three focus-group interviews with local inhabitants in North-Eastern Estonia (mining district). Sources used were the Minister of the Environment and Government directives, fundamental research and brief of the strategy, various decisions, public announcements and press releases, e-mails, minutes of meetings and discussions, observation. In a broader sense, the structure, levels, transparency and timing of the decision-making process were analysed. As at the moment of the process no relevant texts were published in the national press, the reflection of public interests in the media is not analysed. The activity of the author in voluntary environmental organisations has facilitated the analysis of the process of preparing the oil shale strategy.

3  The process and rules of procedure of organising public debate over oil shale development plan: document analysis and participant observation

The impacts of oil shale mining became a hot topic at the end of 2004 when on 23 and 24 December the Ministry of the Environment received first extraction applications for the untapped oil shale deposits in Maidla rural municipality, which was obviously perfect timing to avoid public discussion during the compulsory two-week publicizing period in the beginning of proceedings. At the beginning of 2005, another six extraction applications were filed for the oil shale deposits in Maidla rural municipality and two neighbouring municipalities. The timing of applications was aiming to profit from Estonian legislation, as higher demands on environmental impact assessment took effect on 22nd of February 2005 (new law of EIA), although most of EU environmental legislation (i.e. stricter demands) was supposed to be in force already July 1 2004. The Maidla rural municipality government brought to the attention of the Minister of the Environment that the applications included various omissions and were in breach of several

occupied in small enterprises and family firms, agriculture. City and country inhabitants differ also by their nationality – city people have emigrated from Russia during the Soviet period (forced industrialization period), country districts are populated mostly by native Estonians. As many of the city inhabitants are miners, the contact with oil shale derives from their profession (health issues). At the same time district people are influenced by direct effects of neighboring mines (loss of water, landslide, vibration, dust and explosion waves).
legislative provisions, including administrative practice. The Minister did not find that the rights of the municipality had been violated substantially and dismissed the appeal. As the Minister is the person who decides on the issuance of permits and in practice no permit has been refused, the Maidla rural municipality filed a statement of claim to the court against the Ministry of the Environment. The case is still pending. Local rural municipalities (five) applied to the parliament and as a result the Minister promised to prepare an oil shale strategy and suspend the issue of extraction permits until the strategy is completed.

On 11 July, the government approved the strategy brief, prepared by the Ministry of the Environment and coordinated by the State Chancellery, Ministry of Finance, Ministry of Economic Affairs and Communications and the legal basis of it was tied to the energy sector development plan. The same version of the brief was sent to stakeholders for information – thus the interests, content and limits of the strategy were determined before involving the public. It is important that the brief, which focused clearly on the energy aspects of oil shale, set the strategy’s goals without defining public interest. This fact is included in the text of the brief. Before the brief was approved (i.e. issues defined), fundamental research was completed (in January 2006), also focussing on the resources and technologies.

While the first version of the strategy is planned to be prepared by November 2006, public debate over SEIA (strategic environmental impact assessment) was carried out already in August. This, although legally correct procedure, put stakeholders in a difficult situation because they had to discuss the possible impact of a non-existent document.

On 6 July, the Minister of the Environment established a strategy work group (including six representatives of different sectors), who, by the directive of 26 June, were trusted with the task of „determining the ways of the use of oil shale as a national strategic energy resource, including the use of shale oil and oil shale gas by implementing the principle of distributed energy production”.

Fundamental research and working versions of the strategy and SEIA documents will be reviewed by a committee established on 17 March 2006. The members of the committee are the energy specialists of three ministries and one university, three representatives of energy companies, an environmental protection activist and two representatives of local rural population (included in the committee in May and September under the pressure of the public). In September 2006, the Minister of the Environment approved a provision laying down that the committee’s resolutions will be adopted by at least two thirds majority vote. An analysis of the composition of the committee indicates that it is not possible that two thirds of the members will vote for an alternative decision. Thus, the committee may adopt any strategy at the whim of the energy sector.

A round table of 21 representatives of NGOs, local authorities and the Ministry of the Environment was organised at the end of July. However, the round table does not have any sanctioning power. The round table meets once a month and sees only the heads of the working group and the committee; the reflection of stakeholders’ interests in the strategy depends on the cooperativeness of the later. The members of the round table can not be replaced without the Minister’s regulation.
In this context there is a danger that the implemented rules of procedure will make public participation purely formal. As it is obvious that no representatives of important interest groups – the Ministry of Social Affairs (health and employment), the Minister of Regions or county governors (strategic development of the mining area), miners (employment) and consumers (expectations regarding electricity and oil) – are officially included in the process, it is important to ensure that these specialists are included unofficially in the decision-making process. Unfortunately, the press releases and official communications from the Ministry of the Environment, prepared to ensure public involvement, do not reflect the interests of different interest groups. Communications are technical, dry and energy centred, which is probably the reason why the media has stayed out of the process.

As one of the main problems of the strategy was undefined public interest before the start of the process, it is important that the process is open, which would enable to correct the mistake later. An example of an attempt to define public interest later is a text from the round table meeting of 11 September 2006:

V: Goals and restrictions of preparing the strategy. National interest must be defined somehow. It was suggested that this should be done by the Riigikogu [parliament]. It is not correct because we have to define it ourselves. [The Riigikogu cannot do it; they may discuss the issue for two years and still not reach a conclusion. The committee can do it.]

K: Would you please specify the idea that national interest must be defined by the committee. Who will define it?

V: National interest must be defined by the Commission of Estonian Mineral Resources, because this is a question of energy security. National interest has been already defined in the development plan.

K: [Why is the development plan approved by the government, not by the Riigikogu where the voice of those determining public interest would be heard?]

V: The government is most competent to take into account legislation and all development plans.

The head of the working group defined national interest as energy supply and national security. He answered the questions of the members of the round table without commenting on his arguments, which indicates that his approach was formal and legally erroneous:

K: Does the development plan deal with the issue of burning oil shale and the climate changes arising from the burning of fossil fuels?

V: No, not specifically. There is no sense in dealing with this issue separately.

K: Is it reasonable to export oil shale to keep the trade in balance?

V: In free market economy we can not say how much will be exported. Our working group can not determine that.

K: have you considered the interests of our county and region?

V: It is a complicated issue. When the question was discussed in the committee, it appeared that we can not take into account the aspects of regional economy in preparing the document. This will be decided in the discussions between local authorities and the government.

3 V – representative of the working group, K – representative of the round table
It appears that the interests of local people are not included in the strategy. An application by local rural municipalities to carry out further studies concerning the national environmental fund strategy (the impact of new mines on regional development) was also dismissed (the chairman of the council is the Minister of the Environment).

National interest was worded only on 20 October, ten days before the first version of the strategy determining the status of 10% of Estonian GDP was completed under the leadership of the oil shale committee: "The national interest is to guarantee to the Estonian consumers uninterrupted supply of electricity and heat and refined oil shale products by applying the best technology available in mining and processing oil shale, by using oil shale and other natural resources efficiently and by minimising negative environmental and social impacts, so that oil shale would last for as long as possible and national security would be guaranteed." This interest determined by a few people defines oil shale directly as an interest of energy production that could be guaranteed by using other resources. The interest was determined through consumers whose representatives were not involved in the process. The government will approve the strategy on 1 May 2007.

To illustrate the importance of involving public interest in the decision-making processes concerning sustainability, I will analyse in detail the views of an interest group which has been left out from the process – the rural population of the mining areas – on aspects which would help to ensure fair price and sustainability in practice.

4 Opinions and opportunities of local population to participate in the decision-making process: focus groups

At this point I introduce the main results of focus-group interviews with country inhabitants of one the rural municipalities of Ida-Virumaa county – Maidla. 332 km² or 10% of the territory of Maidla municipality is mineland; there are 900 inhabitants, 94% of them Estonians. 60% of the budget of the local authority comes from environmental taxes (oil shale and water use). The recovery of the district from the post-Soviet structural-institutional change and recent investments in the district were turned upside down in 2005, as energy companies applied for opening new mining fields in the territory of the Maidla municipality. The territories applied in mining applications cover the area of Maidla municipality almost entirely. Mining companies also approach local landowners covertly and one by one trying to buy their property. Local authorities in Maidla and neighbouring municipalities that face the same problem have formed a public confrontation against Ministry of Environment – they organize public meetings and inform constantly local media to encourage discussion among local inhabitants.

Three focus-group interviews (altogether 16 interviewees, men and women, aged from 22 to 82) in Maidla in May 2006 discuss upon local people visions of the sustainability of the region, social justice and decision-making processes of Estonia.
4.1 Sustainability and social justice issues

The focus-group discussions confirmed that there are many different closely intertwined issues related to sustainability.

4.1.1 Historical injustice

At the beginning of the 1990ies when privatization started, people got their properties back, those under the mines were compensated by the state. During the Soviet era as well as in the fifteen years of independence the negative effects of the mines have never been compensated to the individuals. „If they compensated for all the pain and troubles, like it is done elsewhere in the world: moral damage, everything, dust, pollution – then there would be no sense in mining any more (M – 40ies).” New windows and wells, renovation of buildings, cleaning up for the contamination have always been extra individual expenses for local people. Uncertainty about the future was related to metaphors from the past. „Everybody is stressed here, […] nobody wants to make a home – as if we are waiting to be deported (M – 40ies).” The woman (60) who had sold her land to the mines reasoned: „In [nineteen] forty one… my father was imprisoned the first time and his property was expropriated. In [nineteen] forty five he was arrested the second time and again everything was taken away. In [nineteen] forty nine a free ride to Siberia… mother went with two sacks and two children… and so… [moving out of the way of mines in the sixties, the monetary reform of the nineties] cannot trust anyone any more. And when you hear that again something is threatening you… That’s why [I sold].“

4.1.2 Social justice

The prices of the land with oil shale beneath have grown rapidly. The man in his 40ies: „I have many problems with that. I have lots of rental land […], I have talked to people; they are elderly people. They say – what am I going to do with that land, I need money – and I understand them, they sell but I cannot pay for 80 thousand hectares. I would buy 40, 50. The bank even gave money for that, I could have bought but I would have been bankrupt then. Simply […] turnover is slow in agriculture [and] prices are up. I could have bought and then they [mining companies] would have fought with me only… in this sense.“ At the same time the prices of the property fall rapidly. „It is a vicious circle, real estate prices are falling, aren’t they. If we had a mine, then who would buy your house and forest and land (F – 40ies)?“ This means that the mobility of local people is limited because if they wanted to leave they would not get enough money for their property to start over in some other place with the same quality of life.

4.1.3 Socio-demographic issues

Several times the majority-minority issues of Ida-Virumaa were brought up as an issue of social justice. In the period of russification and industrialization many low-skilled Russian workers were deported to Estonia to work in the industries of Ida-Virumaa, now 45-95% of the population of towns are Russian speaking migrants and their descendants. As rural people are mainly Estonians, urban and rural populations are distinguished by nationality and language. Lack of understanding and communication between the two cultures was often pointed out by respondents. For example, the closed community of mines (closed territory, language barrier) was often
blamed for its ineffective working culture, etc. In the opinion of the interviewed Estonians, Russian culture does not care about living and natural environment - Estonian land owners whose property is near mine areas, claimed that Russian miners dump on their fields the waste generated at their workplace.

4.1.4 Social isolation and cultural sustainability

The Russian speaking population of the north-eastern part of Estonia is mainly under the influence of Russian and Estonian Russian language media (Vihalemm et al., 2004), while the Estonian language media has distanced itself from the Russian culture in Ida-Virumaa. Several studies indicate that Ida-Virumaa is mentally separated from the rest of Estonia (Hallik, 1999). Similar experiences were described by rural Estonians. „Then I had school reunion in Tallinn […] and I said that I live in Ida-Virumaa and they looked at me as if I was a ghost. Believe it or not but I have not gone to school reunions since because I live somewhere among the Russians, in Ida-Virumaa. […] they […] do not know a thing about Ida-Virumaa (F, 50ies).”

The respondents blamed the overall unpleasant image of Ida-Virumaa for it, as different media are used to represent this area through mining and chemical industry issues, Russians, black combustion waste mountains – as part of Estonian energy discourse which nobody wants to relate to. This specific image impedes public discussion over the future of the district and the maintaining of Estonian culture, including rural traditions. Man in his 40ies: „I wanted to conclude contracts on growing strawberries, wanted to grow strawberries. They said: Ida-Virumaa, no-no-no, these strawberries are not edible. Strawberry is a sensitive plant, it absorbs all this pollution.”

Because of the aging of population and their leaving from the region the respondents were afraid that Estonians would not survive in the region if they are abandoned.

4.1.5 Regional development

The consequences of mining are partly compensated to local authorities through environmental taxes, but those are paid only for direct consequences (e.g. oil shale; amount of water that is pumped into rivers), not indirect ones (like groundwater pollution, social problems) and individual damage. According to Estonian legislation, rural municipalities who collect environmental taxes, do not receive from the state any other support that is provided to other local authorities. Man in his 40ies: „I am like a donor, sell my organs. I can sell only one kidney, not more.” This system of financing rural municipalities does not facilitate alternative development. „If there was no mine and […] all those people would have stayed who lived here before. They could have had the same money from taxes […] from other taxes (M – 40ies).” Although regional situation has improved in recent years, many people have still left Maidla municipality as there are no jobs for them. Man in his 20ies: „If we are talking about developing the municipality and what we should do for that, then the greatest problem is that there are no jobs here, […] to say that we have clear and unique and interesting environment and people come to live here but work somewhere else… this is […] it does not work very well in real life, I think that we should have companies, jobs. […] mines are related only with energy production, oil shale and shale oil industry, there are no such […] small or medium size enterprise. What would you do here among those slag heaps?”
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4.1.6 Economic sustainability

The energy politics of Estonia turned out to be a subject actively discussed, as extra use and export of oil shale products will fasten the running out of stable energy sources. From the interviewees’ point of view Estonia acts unsustainably as it has no such resources as some oil states do. „They say it is our wealth – oil shale – our gold. They are just like those Iran shahs, putting the money in their own pockets, people won’t see it. […] people are poor, the system is the same as in some oil country, Muslim country. […] The day before yesterday there was an article in Äripäev [daily], an academician is writing that this is our oil. Damn. Whatever. Who wants the money for this oil (M - 40ies)?” In focus-groups no national benefit aspects from shale oil production were mentioned, but the need to find a less environment-hostile energy source in the long run was strongly emphasized. Discussions on energy went into detail and pointed out several more specific issues of sustainability.

4.1.7 Sustainability of natural resources

The idea of future regret of present lifestyle and politics was reflected in all focus-group interviews. The interviewees felt that it is unjust to run oil shale (which was formed by nature in millions of years) out in a century. Some respondents brought up the issue of fair price of natural resources, e.g. they argued that water is for them soon more expensive than oil shale, in 40-50 years there will be no land, no water, no forest and future generations are have to pay high price for it. Respondents were aware of the efforts to restore nature on previous mining fields, e.g. arable land, which are publicly communicated by the mining companies as positive examples of social responsibility. Still, the farmers told that the re-cultivated soil is practically dead, water regime is ruined and there is also constant threat of landslide, because re-cultivation projects have been carried through without sufficient respect to land and knowledge of biological and geological processes.

4.1.8 Conclusions

The respondents described numerous issues related to sustainability and justice (culture, economy, historical justice, socio-demographic and regional developments, health, natural environment), which stem from the monolithic energy production system implemented during the Soviet era. Many problems accumulated in one region and made it vulnerable. To consider these aspects the public interest of other interest groups (in particular the Russian speaking urban population – miners) should be analysed and to introduce these aspects into the existing concept of the sustainability of energy consumption and proposed shale oil export.

4.2 Reflection on the likeliness of civic activity in Estonia

In the case of environmental development project the representatives of private interests do not have to justify their production plans or their consumers’ needs. At the same time, public interest must be justified profoundly and in a well argumented way. This issue arose in all focus groups spontaneously, because in Estonia people can have their say in environmental issues only by way of influencing minor technical questions – no development project has been banned as a result of environmental impact assessment.
Examples brought by the respondents turn around public discussions and reports on different environmental impact assessments. The man in his 20ies criticises the motivation obligation: „We are local people […] in a report on environmental impact assessment there were some kind of […] chemical formulas or laws of physics […] all brought out in a scientific way. A person goes there… to the discussion […]. These formulas are shown to him […], he does not understand a thing about it. […] It is a hypocritical system… on the one hand everything has to be motivated and justified, like in a state based on the rule of law […]. On the other hand […] it is declarative, they say that it [involvement] is so but they don’t give you any opportunity. In principle it means that [a person] has to study everything if he wants to argue that something is not correct in the scientific study or […] some arguments are not correct, […] you have to carry out a similar study but everybody knows that this is not possible. Where would he take these facts, how can he argue […], that I carried out a scientific study and calculated […] that an indicator is different.” Respondents reflected also general mistrust towards legislation and scientific argumentation. „Those amendments and amendments of amendments and other cunning provisions – ordinary people […] is not able to follow them (F, 60ies).“

Several examples of inquiries and EIAs were described which were made in the interests of mining companies („he who pays the piper calls the tune“). E.g. local people could not prove that shock waves had broken their windows, because official investigations showed no impact; the contamination of the air was measured at the times wind was from opposite direction; the vibrations of the explosion waves were measured during the days mines didn’t work. Man in his 40ies: „I was there when they measured at my workplace. Sensors were in my office. Then they warned by the radio that there would be a bang – there was no bang. […] fixed that something was. As soon as they finished measuring, there were big bangs. It is difficult to prove. When you complain, they say „We are not breaking the law“.

Interviewees described several situations were fake arguments were used in public discussion. E.g. when the forest of one landowner had fallen askew due to the landslide above the mines, the owner was told that he has nothing to complain as according to the official inquiry the productivity of the soil had even gone better. This argument from that single situational inquiry was repeated again and again in public communication to show how positive effect the mines have on the local community. „I have seen many such studies where it appears that they have made a mess and then they say that it is a good thing, it is good for this and for that … (F – 30ies).“

The process of new oil shale mines was also considered hypocritical, because local authorities have no legal mechanisms to protect their people: „Local government definitely […] stands up for justice. Here […] it is clear to everybody who have gone to school and read books that right and justice are different things and […] it comes out in a two-face society like ours. On the one hand something is done… some laws are adopted and procedures prepared but […] there is no substance. That we are right, everything is based on law and order. But right is not based on justice […], for things to be in balance, for all interests represented equally (M – 20ies).“

Conclusion. As the defined interest of local people us not decisive in the decision-making processes related to mines and no mining application has ever been rejected, decision-making processes where sustainability and
justice issues are concerned were reflected as not transparent, biased in favour of private interests and insincere.

5 Conclusion

It appears from the article that issues of justice deserve closer examination in the concept of sustainability and that sustainability and social justice (public interest) can not be defined and realised without a structure and culture enabling internal and critical discussions.

The impacts of the inefficient energy system created during the Soviet era have reduced mainly because the consumption capacity of the Soviet Union has disappeared – during the 15 years of independence Estonia has not been able to create a policy which would prepare us for Kyoto 2012 (increasing oil shale production would result in buying additional CO2 emission rights). It can be postulated that joining of the technological-economic culture of EU was rationalized for Estonia mostly through translation (top-down strategy) not through inner reflection. Many international directives and regulations have been approved by Estonia but established unsustainable practices are continued under the auspices of them. Low reflexivity of the implementation of policies is seconded by strongly entrenched ideology of fast economic profit (peculiar to a transition country) which has weakened the reflection of bottom-up arguments at the level of state apparatus. This culture enables private interests to intervene in the state’s energy policy.

While ministries, energy and mining companies have determined the need for new oil shale mines on the basis of the sustainability of the state’s energy supply and security, more versatile views of local people about sustainability do not reach the decision-making processes. Empirical analysis has explained that officially involved target groups, such as NGOs and local people, do not have a say in making decisions. Integrating alternative solutions in the decision-making process is complicated because the expected results are pre-defined, e.g. fundamental research and strategy brief proceed from the presumption that oil shale must be extracted a priori (the means are defined as the purpose). The objective of the strategy and national interest are defined by a small range of people and alternative issues and indirect impacts are rejected; official gobbledygook prevails over simple and less technical-scientific language of the representatives of interest groups. Definitions of public interest which do not suit the vision of those who are preparing the strategy are ignored without any justification.

Although different target groups wish to participate in decision-making process and broaden the scope of definitions of sustainability, reducing the defining of sustainability into merely technical issue creates for private interest better opportunities to be taken into account than for different definitions of public interest. In a situation where the requirement of involving different interest group is fulfilled in form but not in substance it is not possible to find sustainable solutions, save for admitting the mistakes of energy policy. Although the article showed that by inhibiting critical discussion it is not possible to find a solution where sustainable natural resources and social justice are combined, opening public interest through different interpretations of social justice may create a solid basis for extensive definition of sustainability. Focus-group interviews which were carried out with representatives of on interest group indicated that there are
numerous regional, historical, socio-demographic, health related, economic, nature related and cultural aspects of social justice that would help to ensure the preservation of many values if included in the decision-making process.

Management of the dilemmas related to the future mines by the government has been one-sided, has decelerated public discussion and critical reflection, and emanated from the logic of short-term economic profit of the oil industry. As the possibility of substantial involvement in solving the issues of sustainable development is ignored by executive powers and industries, finding sustainable solutions is not easy in practice. Conventional rationality with regard to natural resources is very careless because if European legal and economic regulations are transposed superficially, the „losses” of Europe which were the initial reason for those regulations can be forgotten. These losses should serve as lessons. As Raskin (2000) says: „broad environmental challenges cannot be achieved as the developing countries also adopt the industrial country developing model and the culture of materialism and individualism“.

Estonia and many other rapidly developing countries (including new EU member states) should in addition to copying institutional and procedural practices also develop democratic reflection. Estonian experience shows that for different interest groups it is often easier to express their interests through EU institutions than through national ones. Therefore, EU control over practices of member states could compensate for the deficiency of democratic culture.

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Defining Sustainability


World Summit on Sustainable Development (2002).
FOOD

Food Matters

*Preventing food losses in the kitchen.*

Conny Bakker

_Info-Eco_

1

**A century of kitchens and only incremental changes**

1.1 Kitchen design

In 1920, Christine Frederick started to redesign kitchens as if they were assembly lines in a factory. Her book ‘Household Engineering’ had a big impact on European kitchen design (Gorman, 2003). It taught designers how to design kitchen environments and cooking procedures that would maximize the homemaker’s investment of time, energy and money. I believe that Christine Frederick’s work marked the start of the ‘kitchen as a machine’ metaphor that has greatly influenced the way our kitchens work today.

In fact, the ‘kitchen as a machine’ metaphor has been so powerful, that the basic layout of a kitchen has remained largely unchanged since the 1920s. Storage, cooking, cleaning, waste disposal: these are (and remain) its main functions. Appliances have been added gradually, first the refrigerator (around 1930), later the ventilation hood, dishwasher and microwave oven. Each of these appliances brought about ‘revolutions’ in the way we store and cook our food. The ventilation hood, for instance, enabled the development of the open plan kitchen, which looked out onto (or was part of) the living room. Thus, the person cooking dinner could take part in family life, instead of being tucked away in the kitchen.

Research shows that nowadays we find the kitchen the most important room in the house. Over 52% of us eat in the kitchen, 35% hold family meetings there, 19% receive their guests in the kitchen (De Keuken, 2006-2007). The kitchen has become the heart of the home, but at the same time it is still the old ‘meal machine’. Naturally these contrasting, though also intertwining, perceptions have had a bearing on kitchen design, but in a rather superficial way. In kitchen showrooms we sit down with the sales person to ‘design’ our dream kitchen, based on standard components, materials and colours.

I find it quite amazing that we can go so far in personalising our kitchens, but that at the core, it is still the same kitchen as a century ago.
1.2 Kitchens of the future

Designers of course have come up with radical alternatives. Recently, a graduate student from industrial design (University of Technology, Delft) developed the ‘No-kitchen’ concept for Electrolux. “Housewives have more or less disappeared”, she claims, “and people spend, on average, no more than 15 minutes behind the stove each day. So, why do we need kitchens?” Her future kitchen is a flexible series of appliances, that can be activated any time and any place. The designs include movable cooling boxes, a mobile ventilation hood, and a barbecue-style cooking top. It is a ‘kitchen on demand’ concept, no longer the heart of the home around which families gather, but a convenience like a vacuum cleaner: used every once in a while when needed.

GE presented its future kitchen (“year 2035”) early 2006. “This suite of appliances is designed for efficiency”, says the press release. “Imagine awaking in the morning and walking into the kitchen. Ask, ‘What’s for breakfast?’ and the kitchen will offer a list of foods available and menu possibilities. Select your meal, and you’re ready to start the simple preparations needed.” Also, if you are away from home and need to know what’s in store, “Just pick up the phone and call home. Your kitchen can give you a heads up on what foods you have in the refrigerator and pantry, suggest menus and supply a grocery list.”
Figure 2: GE Kitchen of the future, 2006. The kitchen has a display combined with touch-sensors across the entire surface. A blog at [www.experientia.com](http://www.experientia.com) commented: “This is exactly what you do not want a kitchen to look like: a huge and complex looking dashboard full of blinking and twirling windows that talk to you...”

One can of course argue about the role the designers have given information technology in this kitchen: it does seem like a bit of over-ubiquitous computing. The kitchen can make planning and cooking easier, and thus “enhance people’s entire kitchen experience” (GE press release), but in spite of all this technology, it still does little more than tell you to buy eggs and give you instructions on how to cook them. The appliances underneath the ‘IT coating’ haven’t changed.

The main characteristics that designers want to convey about future kitchens are convenience, energy efficiency, intelligence (interconnected appliances), and functionality. In spite of their attempts to create an energy efficient kitchen, I find it striking that the one aspect of the kitchen with the biggest environmental burden is hardly ever, and only indirectly, dealt with: food loss.

### 2 Food loss matters

The energy content of the food an average Dutch household consumes in a year outstrips the total energy consumption of the kitchen by a factor 2.5 (Kramer, 2000). Of all this food, ten to fifteen percent is discarded after purchase (Domeinverkenning Voeden, 2000). Loss this far in the food chain is an accumulated loss: all the energy that went in the growing, harvesting, preparing, packaging, transporting, selling, storing and preparing of the food is lost.

<table>
<thead>
<tr>
<th>Product</th>
<th>Average consumption per year (kg per household)</th>
<th>Food loss in household (estimate)</th>
<th>Average losses per year (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potatoes</td>
<td>96</td>
<td>10%</td>
<td>10</td>
</tr>
<tr>
<td>Fruit</td>
<td>88</td>
<td>15%</td>
<td>13</td>
</tr>
<tr>
<td>Vegetables</td>
<td>103</td>
<td>15%</td>
<td>16</td>
</tr>
<tr>
<td>Wheat products</td>
<td>37</td>
<td>15%</td>
<td>6</td>
</tr>
<tr>
<td>Bread</td>
<td>113</td>
<td>15%</td>
<td>17</td>
</tr>
<tr>
<td>Dairy</td>
<td>355</td>
<td>10%</td>
<td>36</td>
</tr>
<tr>
<td>Fish</td>
<td>9</td>
<td>10%</td>
<td>1</td>
</tr>
<tr>
<td>Meat/meat products</td>
<td>91</td>
<td>10%</td>
<td>9</td>
</tr>
<tr>
<td>Oil and fats</td>
<td>40</td>
<td>10%</td>
<td>4</td>
</tr>
<tr>
<td>Eggs</td>
<td>20 (414 eggs)</td>
<td>10%</td>
<td>2 (41)</td>
</tr>
<tr>
<td>Rice</td>
<td>10 (estimate)</td>
<td>155</td>
<td>2</td>
</tr>
<tr>
<td>Other</td>
<td>134</td>
<td>15%</td>
<td>20</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1096 kg</strong></td>
<td></td>
<td><strong>136 kg</strong></td>
</tr>
</tbody>
</table>

Food loss matters
2.1 Why food is wasted

An analysis of the wasted foods show that people are bad at planning how much food they should buy (nearly half of the wasted food was in opened packages). They also have difficulties managing the use-by dates of the foods: 27% of the wasted food was past its ‘use-by’ date. The remaining 25% is food that was cooked but not eaten. It follows that most of the food that’s thrown away (almost 75%) was never cooked or otherwise prepared for a meal. It was ‘raw’ (LNV, 2006).

Managing food seems to be problematic for most people. These planning problems have their origin in the changes in our lifestyle, which started (in the Netherlands) somewhere in the early eighties. Women started to work away from home, families became smaller. The traditional housewife began to disappear. Smaller, more footloose families and a higher disposable income led to the now familiar hectic of family life. At the same time, large supermarkets replaced local grocery stores. We shop only once or twice a week, and need to plan in advance what we’ll be eating.

According to the Brussels Observatorium voor Duurzame Consumptie (BIM, 2005), the main factors that contribute to food loss are:
- Food has gone off, or one thinks it has gone off,
- Lack of time,
- Bad refrigerator management (no one is responsible anymore),
- Wrong estimate of daily consumption of family members,
- Fear of an empty cupboard (guests might come unexpectedly),
- No shopping list,
- Impact of special offers (which leads to buying more than you need).

Consumers are largely unaware of their wasteful behavior. When questioned, most of them “feel bad” about food loss, but they all underestimate their own food wastes.

3 Solution strategies

I can see solutions along three lines: better planning, better storage and better cooking.

3.1 Better planning

Planning is key if we want to avoid food loss: if consumers manage to plan their meals better (in terms of what to cook, and when), this could make an enormous difference. In the previous paragraph it was shown that nearly half of the wasted food was in opened packages, and another 27% was past its use-by date. These are all products of bad planning.

Most kitchens of the future have an answer to these planning problems: they use information technology. The example of the GE kitchen of the future is rather extreme with IT taking over completely, but in 2003, Electrolux introduced a prototype of an MMS fridge, which lets users with cell phones that have multimedia messaging service (MMS), remotely snap a picture of their fridge’s interior. The refrigerator has web cameras to capture images of the items inside the fridge (Wired News, 2003). This makes it easier to keep track of the items in the refrigerator.
The idea is nice and relatively low-tech, but according to Wired News, refrigerators with added-on intelligence have never made it to the store floors for two reasons: the home appliances sector is very slow in terms of adopting new technology ("it moves at a glacial pace") plus these web-enabled fridges cost about 12 times more than an average ice box.

3.1.1 Low-tech solutions

Perhaps solutions that are even more low-tech are needed. One is to stimulate consumers to make lists and a weekly meal planning. Several supermarkets in the Netherlands publish free magazines or leaflets with recipes and grocery lists, often including ideas on what to do with leftovers.

Another idea (and this is where industrial designers come in) would be to redesign the insides of kitchen cupboards and in particular refrigerators, making it easier for consumers to get an overview of what’s inside. All too often, small cups and jars lead a forgotten life inside a fridge or pantry, i.e. they disappear from view, hidden behind larger containers. The kitchen cabinets with drawers instead of shelves are a step forward, but fridges can certainly do with some innovative ideas. Perhaps fridge shelves can become transparent drawers; perhaps fridge interiors can take inspiration from displays in supermarkets (these were designed for maximum exposure of a product). I am quite certain that fridge interiors have not been designed with the idea of ‘keeping track of what’s inside’ in mind, so there is a lot to be gained here (without fridges becoming extremely expensive).

3.2 Better storage

As 27 percent of the food was past its use-by date when it was discarded, this is obviously an area of concern. The retail and food service industries also have difficulties with the ‘use-by’ date: it is one of the main reasons for food loss in the supermarkets. This is why a great deal of research goes into better preservation techniques for fresh food. Today, for instance, many vegetables, meats and ready-made meals have a protective atmosphere (usually a mixture of oxygen, nitrogen and carbon dioxide), which keeps them fresh for a longer period. These developments are good for the supermarkets, because their fresh produce has a longer shelf life, and for the consumers as well, because their food will keep longer.

3.2.1 A chain is only as strong as its weakest link

It is remarkable how much energy and attention goes into bringing fresh produce to the supermarket: from farmer or grower to the factory where it is processed and carefully packaged, to the distribution centres, all with controlled-temperature transports, to the supermarkets and shops where it is stored under optimal conditions. The moment a consumer puts a product in his shopping cart, however, is the moment when the food chain seems to stop. The consumer is ‘on his own’ with the product, with only a label to guide him. Sometimes, not always, the label gives information (usually in a small typeface): best before date, advice on storage temperatures.

It would be interesting to take this last part of the food chain, where all loss is accumulated loss, a bit more serious. Transportation from supermarket to home would be the first place to look for improvements. Milk, for instance, should be stored between 4 and 7 degrees Celsius. Every
hour a milk carton is left at room temperature reduces its keeping quality with one day (source: www.campina.nl). It follows, therefore, that highly perishable goods such as milk and milk products, meats, fish, etc, should be cooled (or kept cold) when transported home, especially in summer. Clever products to help people do this are missing. Supermarkets could for instance offer services like locker-fridges to temporarily store your groceries when you need to do more shopping. Designers could develop shopping ‘cool bags’ that can be stored at home in the freezer (always cold when ready to go shopping). Or they could develop cool boxes (built-in) as car accessories.

Consumers need to learn to transport and store their products at the right temperature. Labels on perishable foods could be colour-coded (ice-blue), to give an extra indication of the need for cold storage. Use-by date and in particular storage temperatures should be in extra large, bold print (important for elderly people and the visually impaired). On the other hand, tropical fruits and vegetables like tomato, cucumber, aubergine and pepper should not be kept in the fridge (the cold affects them in a negative way; they might rot sooner). These fruits and vegetables could benefit from a ‘No-Fridge’ label.

3.2.2 At home

The temperature inside the refrigerator at home should be between 4 and 7 degrees Celsius, to adequately slow bacterial growth. This seems a straightforward guideline, but in reality it is not so easy to establish, as fridges do not come with a built-in thermometer (there are a few exceptions, but these are mostly high-end models). This is an omission I find hard to understand. A built-in thermometer should be a standard accessory in any fridge, preferably one with a large, easy to read display.

A second point is the inadequacy of the fridge’s interior to help consumers decide where to put their groceries. The refrigerator’s internal temperature is not uniform; depending on fridge design the coolest spot could for instance be at the bottom of the fridge, or at the back. The most perishable goods should be kept there. Icons or pictures inside the fridge could help customers remember where they should put meat, fish and milk, where the vegetables should go and the best place to keep cheese in top condition.

Refrigerator hygiene is another point. A clean fridge is a healthy fridge. Some models have an antibacterial coating with silver nanoparticles that prevents bacteria growth. This will probably help to keep food in better condition, but still the fridge needs to be cleaned every now and then. It might be an idea if the fridge indicates, at regular intervals, that it needs to be cleaned.

3.3 Better cooking

“Never in our history as a species have we been so ignorant about our food. And it is revealing about our culture that, in the face of such widespread ignorance about a human being’s most essential function—the ability to feed itself—there is now a network broadcasting into ninety million American homes, entertaining people with shows about making coleslaw” (Bill Buford in The New Yorker, www.newyorker.com, 2006).

A good cook knows when a fish is fresh, if meat has been hung long enough, what a really fresh pea should taste like. He or she knows how to
revive green leaves when they have wilted, how to store food, how to prepare it, what to do with leftovers. Much of this kind of knowledge has disappeared, as has the will or ability to spend a lot of time on shopping, preparing, cooking and cleaning up. By and large, we don’t know how to cook anymore. Van Beusekom’s graduation project, the No-Kitchen, acknowledges this fact: she does away with the idea of ‘the kitchen’ altogether.

Obviously, this opens up new market opportunities, in particular for ready-made meals and smaller portions of fresh foods. Also, it is an indication that food loss is going to be a growing problem in kitchens.

3.3.1 Ameliorate or re-educate?

There are two ways of dealing with this. One was described in this paper: it is a ‘designerly’ approach of problem solving: ameliorate the kitchen environment by developing better labels, better shopping bags, better fridges, etc. The other way involves re-educating the consumer: making him a better cook. It is an approach taken by TV chefs, such as Jamie Oliver, who writes in his latest cook book (Oliver, 2006): “Things were so different fifty-odd years ago, when the general public had a good knowledge of cooking. In actual fact, I wouldn’t need to be writing this book if we were all as well informed as people were back then, but our priorities about food have changed.”

For designers, re-educating consumers is difficult. It often results in projects such as the GE kitchen of the future, where the design more or less takes over (in this case through information technology), limiting the freedom of the consumer. The GE kitchen of the future conveys a clear message (to me, at least): ‘you are hopeless when it comes to planning and cooking; let me help you’. It is precisely this implicit message that designers must try to avoid when developing concepts and products to make people better cooks.

3.3.2 Fresh on demand

In the Netherlands, a remarkable project is about to start (called Fresh on Demand), which points in the right direction. It is a network of collaboration in the food chain: food growers, food packagers, retailers, producers of kitchen appliances and designers working together to prevent food losses in the kitchen. Fresh on Demand was instigated by IBM and Wageningen University (the leading European university in the Life Sciences: health, nutrition, nature and the living environment). Its goal is to reduce food loss by 1.2 billion euros per year in the entire food chain: from farmer to consumer.

4 Conclusion

Preventing food wastage is an important strategy, because it makes a big contribution to the energy efficiency (and CO₂ reductions) of a kitchen. This paper outlines the main contributions designers can make. There are several ‘quick wins’: improvements that can be made with relative ease, and that can make a real difference, like the development of a (fashionable and handy) shopping ‘cool bag’ that keeps perishables cool between supermarket and home. Or the inclusion of a thermometer in a fridge, as a standard accessory.
Two decades ago, industry adopted the management strategy of ‘good housekeeping’. The objective of good housekeeping is to minimize material losses and prevent unnecessary waste generation. It is time to take this metaphor back to where it came from: the kitchen.

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FOOD  Researching the interests and problems of organic food producers, processors and consumers:

the case of Western Lithuania

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1  Introduction

Food chain, where the actors are interlinked to produce food products to consumers, is part of a complicated system. Organic food chains are often considered alternative food chains, characteristic to which is close connection between the consumers and the producers of the food. Close connection is enabled by the short chain with few or no intermediaries, and therefore often considered also the most suitable for marketing organic products (Marsden et al., 2000). The local market of organic food in Lithuania as in other new EU member-countries is in the formation stage and developing chaotic (Fullen et al., 2002; Rutkovičė and Ribaišauskienė, 2003). The main problems beyond this process are hidden in weak coordination of agricultural policy and knowledge among the actors of food chain (Zemeckis, 2003). The official approach prevails that the equal financial support to the organic producers is the main precondition for organic farming development in whole country despite the land quality (Šankūnas, 1997). However according to the research findings (Bučienė, 2003, Baltramaitė, 2001) the organic farming only on fertile soils can obtain at maximum 80 % of yield output produced in the conventional farms, and on less favourable land this difference may reach 40 and more %. Thus, the agricultural policy has to solve this problem and stimulate new organic farmers in accordance with the initial soil quality.

It was forecasted that by the year 2006 the area under organic production will constitute 5 % of the country agricultural land. In order to achieve this
goal among the problems, solving issues related to market will have to be addressed (Rutkovičienė and Ribašauskičienė, 2003; Zemeckis and Rutkovičienė, 2000). The aim of current research was to study the territorial distribution, production potential and problems of organic farms in Western Lithuania (three counties – Klaipėda, Tauragė and Telšiai) as well as the demand of organic food in Klaipėda town in order to manage the local market problems and strengthen the ties among the actors of the organic food chain.

2 Methodology

To fill in these gaps four social surveys were fulfilled: (i) one on producer interests and problems in whole Western Lithuania; (ii) two on consumer expectations and priorities in Klaipėda, the biggest town of Lithuanian Sea-Shore region, with population of 192,954 (2005) (Lietuvos Statistikos Departmentas, 2006); (iii) one on the processing problems within the country. Consumer research on the main factors of food choice, demand of different kind of organic food products and the price level was performed by inquiring the 22 respondent-institutions with public kitchens, and 300 individual respondents of Klaipėda town. Among institutions the big enterprises, with 60-100 and more clients per day, were chosen. In total 3 hospitals (with 700-1000 employees), 13 schools and kinder gardens and 6 cafeterias were inquired. The schools, kinder gardens and cafeterias were selected randomly, while all the hospitals were surveyed.

Individual respondents (39 % of male and 61 % of female) were grouped to the age groups of 20-30, 31-40, 41-50, 51-60 and 60+ years old. Proportionally the bigger number of younger people was chosen for interviews since the previous research showed that those groups were the main consumers of the organic products (Rutkovičienė and Ribašauskičienė, 2003). According to the education, the respondents distributed as follows: primary –3, basic-3, secondary-36, higher-17, high - 41% of all respondents. The sampled population for inquiry was proportional to the total adult population of Klaipėda town according to gender ($\chi^2=2.9; df=1; p>0.05$), but not representative enough for the group of pensioners ($\chi^2=7.1; df=1; p=0.008$).

In total 17 processing enterprises were inquired on the recent and perspective problems of extension their capacities, raw material supply, competition, market, etc. Among the selected processors, 75 % were processors of organic food products and 25 % of both organic and traditional products.

The answers of all respondents were analysed, summarised and expressed in relative figures.

3 Results

3.1. Producers, products and ways of realisation

During 2000-2005 there was an increase in both organic farm number and acreage in Lithuania. For area it made about 35 % annually in 2000-2002, and about 60 % after 2002 on the average (Fig.1). The highest increase in number of organic farms is characteristic to the Biržai (114 farms certified), Trakai (111 farms) and Šalčininkai (92) municipalities (Paurytė and Šion, 2005). In parallel to the number and area of organic farms, there was an increase in number of food processing enterprises in Lithuania: if in
Researching the interests and problems of organic food producers, processors and consumers

2002 in total 13 enterprises were certified, in 2005 such were 20. The majority of organic farms and certified processing enterprises are concentrated in the Northern and Eastern parts of Lithuania – regions with the poorest soils and sensitive landscapes, such as karst or hilly areas with numerous lakes and streams (Fig. 2a and b). There are no organic farms in small newly established municipalities yet because the less information spreading and absence of training traditions for farmers.

In 2004 there were 149 organic farms and farms in conversion in 3 counties of Western Lithuania. This made about 6605 ha or 0.9 % of agricultural land (as compared with countries average –1.5 %). In 2005, there were already 258 organic farms (or 1.67 % of agricultural land (as compared with countries average –2.45 %).

Figure 1: Dynamics of number of organic farms and their agricultural land area in Lithuania, 2000-2005 (http://www.ecoagros.lt)

Figure 2: Distribution of organic farms (a) and processing enterprises (b) by municipalities in Lithuania, 2005
Among the counties, Tauragė county distinguished by the largest number of organic farms (107, as compared with 84 and 67 in Telšiai and Klaipėda counties), and Telšiai county – by the largest acreage and farm-size (4299 ha and 51.2 ha correspondingly).

According to the previous research (Rutkienė and Ribašauskienė, 2003; Zemeckis and Rutkienė, 2000), the main consumers are the citizens of big towns, young families, more educated people. That is why the Western part of Lithuania has a big potential for organic food market: the great number of population during summer season due to the nearness of Baltic sea and Curonian Lagoon, and because of the third biggest town in Lithuania – Klaipėda is located here. The agriculture is still among the old traditional activities in the rural areas of the coast. The most of cereals and milk are produced in organic farms of Tauragė county, the berries, bee products and herbs - in Klaipėda county, meat, fruits and vegetables – in Telšiai county (Fig. 3).

Figure 3: Assortment of organic food products in Western Lithuania counties (Bakanauskaitė, 2005; Inquiry results, 2005)
In general, the crop production is prevailing in the counties as compared with animal production. This situation might be explained because of low capacities of local processing industry, that makes selling of organic milk and meat for the same price as traditionally produced products.

According to the inquiry, farmers prefer to sell their products at local market places. Another popular way of realisation – direct supply of consumers (from door to door). Selling to the processors was the third way of realisation. Selling through mediation of other actors was characteristic for farmers of Telšiai and Tauragė counties, but not for farmers of Klaipėda region. Among other ways, selling at fairs of organic food products, that are common in the largest towns, is the most popular form.

3.2. Processors and processing problems

It is typical for Lithuania, that the processing of organic food is often fulfilled by enterprise which has also the certificate for organic production (Gutkauskas, 2004). About 30 % of organic food processors-respondents answered that they buy raw material for products abroad, and 70 % do so from local organic farms including the raw materials grown by themselves (Fig. 4a).

![Figure 4: Enterprises according to the origin place of raw material production (a) and the importance of special equipments (b) in % (Inquiry in 2006)](image-url)
About 70% of respondents-processors are satisfied with recent quantities of raw materials, but 30% are not, and complain of it shortage, particularly during some seasons.

One of the reason of small number of processing enterprises of organic food in country is, according to respondents, lack of necessary equipments for different processing operations (Fig. 4b). The equipments were not a problem for 40% of respondent-enterprises, but 50% agreed that they are necessary in all operations, while 10% needed them only for separate operations.

There is a tendency to process a bigger assortment of organic products instead of narrow specialisation nowadays: about 60% of respondent-enterprises were processing different kinds of products, while 40% - one kind.

Concerning competition among enterprises, 40% of respondents answered, that they don’t have competitors in their branch today, while 60% answered positively.

About 60% of respondent-enterprises sell the products in Lithuania, 30% sell in Lithuania and abroad, and 10% - to foreign countries. Thus, majority of respondent-enterprises do work for the local market. 80% of respondents foresee a good perspective for organic food production and processing, however 20% were sceptic, and explained that by low purchasing capacity of consumers.

### 3.3. Consumer attitudes and expectations

The great majority of the organic farms in Klaipėda county are located within 20-30 km radius of Klaipėda and are specialised mostly in crop husbandry – growing different field crops, mainly cereals. This is in line with product demand from institutional kitchens and individuals in Klaipėda town. The majority of interviewed respondent-institutions would prefer to buy organically grown fruits, vegetables and milk products (Table 1). Most hospitals and other public kitchens (but not school kitchens) also prefer organic meat products. The majority of hospitals as well as kindergarten and school kitchens are ready to buy organic bread and other confectionary products as well (if they are available). The majority of hospital kitchens are also interested in buying medical herbs.

#### Table 1: Preference of organically grown food products in Klaipėda town institutional kitchens in % of respondent-institutions by category (Kondrotaitė, 2003; Inquiry in 2003)

<table>
<thead>
<tr>
<th>Preferable organic food products</th>
<th>Hospital kitchens</th>
<th>Kitchens in kindergartens and schools</th>
<th>Other public kitchens</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk and milk products</td>
<td>100</td>
<td>69</td>
<td>85</td>
</tr>
<tr>
<td>Bread and confectionary products</td>
<td>70</td>
<td>62</td>
<td>50</td>
</tr>
<tr>
<td>Fruits and vegetables and their products</td>
<td>100</td>
<td>85</td>
<td>85</td>
</tr>
<tr>
<td>Meat products</td>
<td>70</td>
<td>46</td>
<td>70</td>
</tr>
<tr>
<td>Honey and other bee products</td>
<td>30</td>
<td>15</td>
<td>35</td>
</tr>
<tr>
<td>Medical herbs</td>
<td>70</td>
<td>38</td>
<td>35</td>
</tr>
</tbody>
</table>
Researching the interests and problems of organic food producers, processors and consumers

All the individual respondents prioritise buying organically grown fruits, vegetables and meat products, while men are also willing to buy milk products and women, honey (Buciene and Eidukeviciene, 2005).

There is a rather big demand for organic meat and milk products in the respondent-institutions, but there are only 4 farms in Klaipėda region ready to provide such products, and they are not able to meet all the demand, particularly for meat. Thus there is a good reason for new organic farmers in the region to choose animal husbandry production (both meat and milk) in the near future. However slaughterhouses, dairy and other processing facilities would have to be available as well.

There is a difference in institutional and individual respondents willingness to pay a higher price for organic products as compared with traditionally grown. About 73 % of respondent institutions are motivated to pay 5-10 % extra, but this differed by institutional category.

One of the respondent-hospital kitchens said they would refuse to pay a higher price for organic food products, but the other two said they would be willing to pay a somewhat higher price for organically grown vegetables, fruits and milk products. The majority of kitchens in kindergartens and schools said they were prepared to pay a higher price for organic vegetables and milk products but the majority said not more than 10 % extra. Other public kitchens were in general not prepared to pay a higher price except for certain kinds of products.

Among individual respondents 55 % of the female and 25 % of the male-respondents said they were willing to pay up to 25 % higher price for organically grown food products (Eidukevičienė and Bučienė, 2005).

About 66 % of the women-respondents and only 20% of the men-respondents consider it reasonable that organic milk products are sold for a higher price. Corresponding percentages for other products are: medical herbs - 62 % of the women respondents and 44 % of the men; honey – 80% and 27 % respectively. Concerning the price for meat and cereal products, most of the respondents (both men and women) are not willing to pay more than for conventionally grown products.

Also there is a large number of consumers (40 - 46 % of all respondents) who said they didn’t yet know whether or not they are prepared to pay a higher price for organic food products.

The age of consumers and education level is also important. There is a greater willingness to pay for organic food products among younger and middle age groups: eg. 57% of the 31 to 40 year old and 61% of the 41 to 50 year old respondents (Fig. 5).
The majority (75%) of the oldest group (>60 years of age) didn’t think so or hesitated to answer. This can perhaps be explained by the low incomes (pensions) this group is receiving.

The respondents educational level also seems to influence their attitude to the price level: respondents with higher education (62%) and university education (57%) were more willing to pay a higher price for organic food products, while the majority (60%) of respondents with primary and basic education were against it. However in general people with a higher education have a higher salary.

The majority of individual respondents prefer to buy the organic products in the specialized shops and shop centres instead of market places due to better storage capacities.

Higher educated respondents were better informed about where they could purchase organic products in Klaipėda: 70% of all education groups were informed whereas 75% of those with primary education did not know where to buy organic food. In general women were better informed than men (66% against 58%) about where to purchase organic products in Klaipėda.

4 Discussions and conclusions

The surveys showed the differences in demand of local organic food products among the institutional kitchens by their category as well as among individual-respondents according to gender, age and education/disposable income. Half of the interviewed institutions preferred to buy organically grown vegetables and dairy products, and another half – vegetables, meat and dairy products. According to Finnish authors (Paananen & Forsman 2003), the public kitchens have the greatest potential as a market channel for local food. All the individual respondents prioritised to buy organic fruits, vegetables and meat, while men-respondents added to this list dairy products and women-respondents –herbs and honey. This corresponds with results obtained in other European countries, that organic vegetables and dairy products are of biggest demand among population groups (Liivaauk, 1999). The food price and quality were recognised as the main factors influencing customer’s decision to buy or not. The same criteria for organic food have been emphasised by other research (Liivaauk, 1999). The majority of
individual respondents prefer to buy the organic products in the specialized shops and shop centres instead of market places due to better storage capacities. In other findings (Wier and Calverley, 2002; Cummings 2003) different opinions on the best trading places are stressed, mainly depending on the local traditions. However, in Europe the majority of organic products are sold by supermarkets (Hamm and Gronefeld, 2004). This may be due to lack of other efficient marketing channels or alternatively, the consumers’ preference for convenience in purchasing food (Bähr et al., 2004).

The farmer-producer survey revealed one important local organic food market problem in the Western Lithuania region - lack of processing facilities for some organically grown products like milk and meat. This provides a possible direction for the new organic farms appearing in the region. One of the reason of small number of processing enterprises of organic food in country is, according to respondents, lack of necessary equipments for different processing operations, thus more efforts and supply needed to be put to the processing sector in near future.

According to inquiry today farmers prefer to sell their products directly to consumers (delivery at door) or at local market places. At the same time sales to the public kitchens did not start yet, probably because of lack of information among producers on the demand of different products for such institutions. These direct sales seem to be a good and sustainable perspective to extend organic food services in the local market in near future.

In general this overview revealed that an increase in number of organic farms does not automatically result in a more vital local organic food market, and that the existing ties among the actors of organic food chain are weak or sometimes absent. The situation could perhaps be changed by spreading the information on problems and raising awareness among the consumers, producers, processors and regional authorities as well as by providing economic stimulus, organising training activities and further research on the problems of more sustainable production and consumption of food.

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FOOD Power in Global Food Governance

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852 million people suffer from hunger and 6 million children are starving and dying from malnutrition in our world every year. This occurs in spite of a sufficient level of food production. The Food and Agriculture Organization of the United Nations has calculated that we could feed twice as many people as today’s global population with the current amount of food produced. Thus, hunger alleviation is a problem of distribution, and this problem remains despite 60 years of development politics, national as well as international, and despite a “right to food” that is codified in the United Nations Declaration on Human Rights.

Thus, the question arises who controls global food governance or rather whose interests are being pursued by it. When trying to answer this question, we can notice that a shift in the control of global food politics that is currently taking place. It is a shift from a governance regime dominated by powerful states and agriculture and food corporations to a governance regime dominated by the corporations, in this case the food retail companies, which are increasingly independent from governmental power. In the context of this analysis, a governance regime is to be understood as a historical and policy field specific organization and control of political decisions resulting from the socio-economic and institutional relationships between state and non-state actors (see also McMichael, 2000).

In the following, two illustrations will be used to support the thesis presented above: Global food aid politics will be presented as an example of the old governance regime, and the changing role of food retail companies as a core element of the new governance regime. In doing so, the analysis consciously begins with a policy area which is very closely linked to the hunger problem. The analysis will then adopt a broader focus however, as required by the research question on the control of global food governance, which transcends the hunger problem in a narrow sense. At the end, the analysis will bring the insights concerning the new governance regime back to the hunger problem, however.

Two caveats concerning the paper need to be mentioned. First, I do not argue that the states and companies of the North are the only ones responsible for the existence of hunger in the world. An undersupply of food
to the population in developing countries also results from local
governmental failure, war and of course natural disasters. However,
according to my thesis, global food governance just is not pursuing the
interests of the starving population either.

Second, the regime change I will identify in connection to the food retail
corporations is also supported by the economic and political rise of India and
China. However this aspect will not be elaborated in the context of this
paper, due to time and space constraints.

Let me start by defining the theoretical framework for the analysis: This
framework is based on three assumptions:

1. It is assumed that governmental and non-governmental actors play
an important role in global governance. In other words, this analysis
follows the governance approach and defines global governance as
“multi-actor, multi-level political decision-making” (Rosenau and
Czempiel, 1992).
2. It is assumed that a harmony of interests of the actors involved
cannot be implied in global governance (Messner and Nuscheler, 1996,
2003). That means that global governance too is always about
competition of potentially conflicting interests in which the relative
power of the actors involved can be of vital importance. In other words,
if global governance is multi-actor, multi-level political decision
making, one has to ask who decides, how and in whose interests? That in
turn shows that an analytical governance approach is used instead of a
functionalist one that would primarily focus on the effectiveness and the
efficiency of predisposed solutions (Fuchs, 2005a).
3. And finally it is assumed that actors exercise power, among other
things, with institutional resources and by creating structural constraints,
as well as with ideas and norms. That means that a power-based
approach is pursued, which is located for example close to the work of
Stephen Lukes (1974, 2004) on the three faces of power (see also Fuchs,
2005a, 2005b, Levy and Egan, 2000). In this perspective, actors exercise
power when they influence other actors’ decisions, i.e. when A gets B to
do something he would otherwise not have done. Actors also exercise
power by influencing other actors’ policy options, i.e. by preventing
other actors from having certain options at all. This kind of power is
normally called structural power and it can exist as agenda-setting power
as well as rule-setting power. And finally, actors exercise power by
influencing other actors’ perception concerning their own interests and
thereby their preferences. This power is normally referred to as
discursive power. As we will see, actors’ structural and discursive power
will be especially important in this analysis.

Based on this theoretical framework consisting of an analytic governance
approach in combination with the power-based perspective presented above,
I will now analyze the governance regimes.
As mentioned above, the old governance regime was characterized by the dominance and interdependence of powerful states and companies and it can exemplary be illustrated with the global food aid.

Let me present some facts concerning food aid: Its current volume is about 8.2 million tons of food per year, representing about 2% of the food traded globally. Of course, 2% are a very small amount of the food traded globally, but the situation changes if we consider that 51% of the total food aid goes to Sub-Saharan Africa. That means that food aid plays a more important role in these countries than the 2% might suggest.

Food aid in its current form and function is not uncontroversial. This is due to the fact that it can potentially destroy the existence of local farmers, because it frequently is supplied ‘in-kind’ (Murphy and McAfee, 2005). Moreover, food aid often is provided when there is a corresponding surplus in the North and not when there is demand for it in the South. Even in cases in which food aid is not handed out to the population for free, there is often the problem of monetarization by non-governmental organizations or governments that have received the food aid (Murphy, 2005). In the case of monetarization, food aid is sold at local markets, often at cheaper prices than local products. In addition, even if the local farmers are not affected because they cannot offer any products to the local markets due to a drought for example, regional markets and accordingly other developing countries’ chances for export are affected still. The size of this problem becomes clear when we consider that 80% of the global food aid is currently provided ‘in kind’. For example in the United States 75% of the food aid has to consist of American products by law, and in reality this percentage is often much higher (Oxfam, 2005). Until last year, even Canada had a minimum requirement of 90% of domestic procurement (it has been lowered to 50% now) and Japan uses food aid to reduce rice surpluses, as well. Furthermore, from a global perspective this kind of food aid is too expensive. Costs are often 30-70% above market prices.

Another source of controversy concerning food aid is the fact that it is frequently used to open up new markets (Grain, 2005). For example during the 2002 famine, the United States provided numerous African countries with food aid containing genetically modified corn. The US also refused to mill this corn, which would have prevented a mingling with local corn. Some of the affected countries initially rejected the food aid. In the end, only Zambia stuck with this rejection. Still, this is a clear case in which the United States tried to open the affected countries’ agriculture for genetically modified organisms.

To what extent does food aid in its current form and function reflect the dominance of powerful states? On the one hand these states and their national legislation set the parameters for food aid: They decide the granting and form of food aid. Moreover, they also determine the agricultural subsidies that are responsible for the surplus production in the north.

Furthermore, these states significantly influence the rules set by international organizations. The Food Aid Convention reflects the structural power exercised by the dominant states. The Food Aid Convention was
agreed in 1967 and was supposed to guarantee the international capacity to react to food crises by ensuring a stable flow of food aid independent of fluctuations in price or supply. In the context of the negotiations and renegotiations (every five years) on the Food Aid Convention, for a long time, the industrialized countries (lately particularly the United States) refused to go beyond the agreed upon best practice policy and to adopt mandatory rules as well as sanctioning mechanisms. Eventually, the renegotiations were completely discontinued in 1999 to await the Doha Round of the WTO.

Ultimately, in the negotiations of the Doha Round of the WTO, the United States again refused to approve the necessary food aid reforms, for instance to base food aid on demand and not on supply or grant financial aid instead of in kind deliveries. However, it must be said that the US had made their acceptance of these reforms conditional on a further reduction of agricultural subsidies by the EU, which however the EU was not willing to accept.

Beyond this rule-setting power, powerful states also exercise agenda-setting power in the field of food aid. Again, the United States plays an especially prominent role here. On the one hand, this is due to the fact that it currently provides more than 50% of global food aid (Murphy and McAfee, 2005). On the other hand, the United States increasingly forces concessions from developing countries by offering bilateral trade agreements. And in these bilateral trade agreements the asymmetry of power between the involved countries is of course clearly larger than in multilateral trade agreements, as for instance in the context of the WTO, where the United States simultaneously faces many developing countries and not just one.

Finally, powerful states also pursue their interests in global food aid governance by exercising discursive power. This takes place for instance, by emphasizing the aspect of aid in food aid. In this context, the United States accused the Zambian government as well as the EU (which had criticized the delivery of GMO corn as food aid) of preferring to let millions of people starve rather than being willing to help.

Having described the influence of powerful states this analysis will now focus on corporate influence on this governance regime. That influence reveals itself in terms of overwhelming market power. Some figures to illustrate this: 3-6 companies control 80-90% of the global grain market, 85-90% of the global corn and coffee markets, 85% of the global cocoa market and so on. Monsanto dominates 90% of the global market for genetically modified seeds (ActionAid International, 2005). Another figure concerning the agro-chemical industry: In 1992, there were 12 companies in that field, in 2003 6 remained as a result of mergers and acquisition (op. cit.). But this is only market power, i.e. economic power. What can be said specifically about political power, i.e. the political influence of agro-food corporations?

This influence can be seen, for example, in lobbying, campaign donations and technical consulting. For instance in the United States, donations of millions of dollars by Monsanto, ArcherDanielMidlands, Nestle and others
can be observed at the federal and state level. Furthermore a disproportionately large presence of company representatives in committees and commissions at the national and international level can be shown. In international negotiations on food standards in the 90s’, more companies than states were present, the delegations of the big companies were larger than those of most states and the total number of company representatives was five times as large as those of civil society representatives (Skair, 2002).

At the same time, the exercise of structural and discursive power by corporate actors can be shown. Corporations exercise rule-setting power in public-private partnerships (PPPs), for example with USAID or the GTZ, as well as with the World Bank and local/regional programs. In these PPPs, corporations participate in setting rules and standards and determining the focus of programs. Furthermore, they exercise structural and discursive power by strategically promoting scientists from developing countries whom they can offer research funding and research stays abroad and who in turn become important ambassadors of the companies’ interests, for example for the gen-tech industry, in their countries. And finally, companies exercise discursive power through public relations campaigns in which they engage in the framing of political decisions, actors and social norms, such as the politics of risk. An important aspect of these public relations campaigns is the safeguarding of their own political legitimacy and social acceptance through a self-portrayal as indispensable global provider of food or as good “corporate citizens”, which they emphasize for example by the free provision of biotechnology to African research institutes.

According to this paper's thesis, this regime, characterized by the power of some states and companies from the agriculture and food industry, is in flux. I argue that there is a new development to which we have to turn our attention. Moreover, this development or rather this new regime both has serious political implications and is, from a political science perspective, linked to new scientific necessities.

The new governance regime is characterized by the dominance and increasing autonomy of agro-food corporations, especially food retail companies. This situation has resulted from three trends as well as the favorable position of the food retailers resulting from their proximity to the customer. The first of these trends is the development of an oligopoly (Burch and Lawrence, 2005) (Konefal et al., 2005). For a long time the concentration of the food retail sector, i.e. at the end of the product chain, was lower than in its preceding parts. That has changed rapidly in the last 10 to 15 years. At the moment, we can recognize ten large internationally operating supermarket chains whose market share has constantly increased in the last two decades.

At the same time, a new form of retail company has developed, characterized by the control of the product chain from farm to shelf. The underlying complex logistic task is made possible, among other things, by new technologies of supply-chain management, with which shipments are
traced by GPS and deliveries are handled in short time windows defined by the minute (Burch and Lawrence, 2005).

Finally, the third trend is the development of competition that is not only based on price but also on quality (Konefal et al., 2005). Food scandals and an increased health awareness combined with shrinking time budgets of consumers in the north have led to the emergence of new markets. Although these markets are still referred to as “niche markets,” they are the markets where most of the money will be earned in the near future. Thus, the large retail chains have responded to this development by expanding their own products and supply chains.

What can we say about the power of these companies in the new governance regime? Again, let me start with the economic power. The market share of the respective three largest retail chains in European countries ranges from 40% in Great Britain to over 80% in Finland and Ireland, and the large countries are following the trends of the smaller ones (Konefal et al., 2005). 110 buying desks act as a Nadelöhr between 3.2 million agricultural companies and the consumer (MacMillan, 2005). In the United States, the five largest supermarket chains have more than doubled their market share between 1992 retail chains 2000.

The market power reflected in these numbers and trends, first and foremost, implies the ability of these retail chains to put pressure on suppliers in terms of prices. Importantly, the ability to exercise this pressure today reaches all the way to farmers in developing countries. For the future, economists predict the existence of six large supermarket chains that will dominate global markets and whose representatives buy on-site and distribute the products to their stores around the world through global networks (MacMillan, 2005).

Again, the political power of these corporations is of special interest, however, particularly their rule-setting and discursive power. The rule-setting power of retail companies is clearly reflected in the development of private standards, i.e. standards of private governance institutions, for instance for food security (Konefal et al., 2005). A prominent standard in this connection is the EUREP-GAP standard which was developed by the European food retail association to determine standards for food security and sustainability. The standards for food security are must-standards, while the standards for sustainability are should-standards. Compliance with these standards by the participating agricultural and food companies is certified through independent auditors.

First of all, it is interesting to note that an international governmental organization with the task to develop food standards has been existing for a long time; the Codex Alimentarius Commission founded in 1962 by the Food and Agriculture Organization of the United Nations and the World Health Organization. The Codex Alimentarius Commission has developed a multitude of food security standards since its creation (Skilair, 2002). In this respect, the retail companies’ development of their own standard is a striking strategy. That strategy can be explained if we look at participation and
transparency in the development of the EUREP-GAP standards. Here, food companies from the industrialized countries, Europe in particular, dominate. In consequence, there is a clear asymmetry between participation of retail companies and the rest of the product chain, between North and South, and between representatives of business and of civil society interests.

If we ignore questions of participation and transparency, for the moment, we may appreciate the development of private food security standards, of course. For consumers in the North, these standards promise a protection of food quality, and in this context, the present paper’s critical reflections on these standards (see below) may stand in stark contrast to much of what is written on private food security standards and sustainable consumption. Yet, these private governance institutions have fundamental implications for global agriculture and in this respect they are not an unequivocally positive development. I will discuss these implications shortly. First, however, let me say a bit more on the discursive power of food retail corporations.

Food retailers exercise discursive power, for instance, by emphasizing their role as guardians of consumer interests, which they do with respect to both prices and quality. Furthermore they emphasize their efficiency as market actors in production and distribution but also in the setting and reviewing of standards (Konefal et al., 2005). The core argument concerning standards is that public actors act too slowly and they do not have the necessary expertise to set the most efficient standards. This is a well-known argument made in many other business sectors in a similar way. Finally, and most fundamentally, retail companies’ media presence is fundamental for their discursive power, both as a medium to constantly communicate with consumers and to adequately present and frame themselves.

Talking about rule-setting power and discursive power in food retail automatically leads to the question of consumer power. Of course, this power exists, although not to the degree suggested by the phrase “consumer sovereignty,” which retailers tend to emphasize in their public communication. Among other things, consumer power is limited by the active manipulation of demand through such companies (see media presence), by information asymmetries concerning products, production processes, and actors in the supply chain between consumer and food retailers, and by the high transaction costs, which “political” consumers face. After all, the exercise of market power by consumers does not require just one consumer’s decision, but the mobilization of thousands consumers. Consumers certainly are not free of liability concerning the economic, social and ethical implications of their consumption decisions. Yet, they clearly are in a weaker position within the political framework of the new governance regime than the retail industry is.

Let me briefly summarize the characteristics and consequences of the new governance regime: First, there is a shift of power within the food industry from agriculture and food processing industry to food retailers. Secondly, from a political science perspective, it is particularly interesting that there is a shift in power between corporate actors and the state.
Thirdly, and most importantly from the perspective of the question underlying this paper, there is a shift in the distribution of economic opportunities in global agriculture. This is due to the fact that the implementation and certification costs of the new private standards are so high that NGOs predict that hundreds of thousands of peasants in Africa will lose their livelihood by the implementation of the EUREP-GAP standards (Actionaid International, 2005). That in turn means that these farmers will be driven into the subsistence economy, if no new opportunities – for whatever reasons - arise in the local markets. By the way, such a development would also be significant from a gender perspective, as in most developing countries women are responsible for 60-80% of food production, i.e. they will be particularly affected.

Today, 80% of the global population suffering from hunger are subsistence farmers. In other words, from an economic perspective or rather from a food supply perspective, this is the most fragile population group. Thus, what cannot be expected from the regime change as depicted in this paper is an automatic improvement of the hunger problem or rather assistance in meeting the second Millenium Development Goal: To halve the proportion of people who suffer from hunger by 2015. On the contrary, the new regime has the capability to make it even worse.

Are there any signals for change or reasons for hope? First, it is safe to say that new coalitions in economy and in civil society have formed. An example is the “Breaking the Armlock Alliance” in England in which producers and civil society organizations fight the power of the large retail chains. On the international level, there is the example of Via Campesina, a coalition of agricultural small and medium-sized farm businesses, again in association with civil society actors. Should these new coalitions be able to gather further power, they may be able to force some changes.

Secondly, it remains to be seen whether the dominance of food retailers will lead to a new positioning concerning agricultural subsidies in the North. On the one hand, these retailers benefit from cheap agricultural products, of course. On the other hand, they can buy their products comparatively cheap through their global sourcing networks, and they suffer from trade wars. That is due to the fact that the large retail chains trade both food and other products. In consequence, it remains to be seen what position the food trade will adopt in regard to agricultural subsidies. Should they be less supportive of these subsidies than the agricultural lobby, we may see fundamental changes in world trade rules, which could benefit at least some of the farmers in developing countries.

Thirdly, we certainly can also expect the development of new coalitions at the multilateral level, i.e. in international negotiations and governmental organizations, as a result of the political rise of China and India. The consequences of these coalitions, also concerning the problems of development and hunger, are difficult to predict. China is not known for holding human and social rights in high regard in its foreign policy. At the same time, the competition that China represents could provoke the United States to return to the multilateral negotiation table, and possibly even to use
human and social rights as an instrument to confront China. As mentioned above, it is safe to say that a change in actor constellations and coalitions at the international level will occur. Yet, its consequences remain to be seen. Possibly, this change can represent an opportunity for a fundamental intervention and shift in global food governance in favor of the poorest countries and population groups.

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FOOD  A social practice perspective on sustainable catering

Two case studies on Dutch canteens

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1 Introduction

Throughout Europe there seems to be a growing interest to provide consumers with healthier and sustainable canteen food. In Scandinavia, Great Britain and Italy there are various programmes which try to tackle canteen food at the work place, in schools, day care centres and hospitals. In Great Britain there has been a wave of attention to school-meals, scrutinised especially for their contribution to child obesity and linked to the disregard of adequate sustainability criteria in public procurement (Morgan and Morley, 2002; Morgan, 2004; Pearce et al., 2005). Also in The Netherlands catering services have become a target for sustainable development. The Dutch Ministry of Agriculture for example works together with civil society, private and public actors on developing sustainable procurement criteria for the catering sector and is involved in an organic catering project aimed at company catering and catering in higher education.

European academic research (Mikkelsen et al., 2002; Lassen et al., 2003; Mikkelsen et al., 2005; Morgan and Sonnino, 2006) on sustainable catering focuses mainly on the importance and meaning of sustainable development of communal food consumption practices both for consumer wellbeing, but also for the building of local economies and social fibre. Whereas much of this research focuses primarily on reforming the provisioning system towards the use of organic and/or locally sourced products, we employ a different approach. Our interest lies with analysing food consumption and the turning of consumer consumption patterns toward sustainability, a

1 Not least because of the immensely popular Jamie Oliver who created a media hype with his ‘Feed me better’ campaign (http://www.jamieoliver.com/schooldinners/).
2 The programme on sustainable procurement criteria is an initiative by the Ministry of Environment (VROM), who has involved the Ministry of Agriculture (LNV) as well as a range of public and private parties and NGOs. The Project on Stimulating Organic Catering is linked to the policy document Organic Agriculture 2005-2007 LNV.
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subject on which various contrasting discourses can be found (Jackson, 2005).

To tackle this objective we use the social practices approach (SPA) as a theoretical fundament. The social practices approach (SPA) originates from ecological modernisation theory (Spaargaren, 2002; Spaargaren and Vliet, 2000) and is a theoretical tool used to study and understand the (potential) role of consumption in sustainable development. By placing consumption practices central to analysis and zooming in on the practice itself as it occurs in the socio-technical context of the canteen, SPA allows us to look at the “institutional architecture of everyday choice” (Jackson (2005) citing Wilhite et al., 1996; Ger et al., 1998). This institutional architecture of everyday choice can best be studied at what is called the ‘consumption junction’ (Cowan, 1987), the place where providers and consumers meet, which is shaped by the interaction between the personal and social meanings of food and the provision of goods and services (Spaargaren and van Vliet, 2002; Dagevos and Mommaas, 2003; Dagevos, 2004). Such an analysis of consumption context and meaning might be used to improve the sustainable development strategies of food providers.

In this paper we focus particularly on the role of the consumption context and the caterer (provision) in shaping food consumption at the consumption junction. Using the social practices perceptive we discuss the work related context in which canteen food consumption takes place, focussing on company catering and catering in higher education. Furthermore we seek to analyse how sustainable development strategies are expressed at various consumption junctions. Our research methodology consists of open and semi-structured interviews with caterers, catering experts and visits to various canteens. The material discussed here is only a first step in our consumption junction research. In future research, we wish to further explore the dynamics of sustainable canteen food consumption through consumer research.

In section 3 we will explore the social practice of eating in canteens and explain why it is an interesting and important topic for research. Then (section 3) we shortly discuss two of our case studies to see how catering services shape sustainable provisioning at the consumer-provider interface through information flows and images. In closing we will formulate some preliminary conclusions and hopefully we will have generated some food for thought.

2 Canteen food consumption

2.1 The context of canteen food consumption

Canteen food consumption can be referred to as a ‘communal’ practice which is carried out within a work related context. Partly due to this context the practice has traditionally been organised in a sober and (time) efficient way, since food consumption at work is mainly based on functionality. That is, canteen lunch is associated less with overt enjoyment and leisure and more with necessity, especially when one considers that the average time spent on lunch by Dutch employees is around half an hour (Hendriksen et al., 2003).
Going for lunch is not only associated with a set time and duration, it is also set at a certain location, with a reoccurring menu, constituting a daily routine which is shared with others. In practice it might not be easy to simply visit another canteen especially when a change in ones ‘lunch routine’ requires additional effort and more importantly, extra time. In addition canteen food is seen in a relatively frugal light in comparison with dining at a restaurant for example. It is associated with work-time that is not to be squandered, unless maybe the purpose of the lunch is to have a work discussion or meeting.

In an effort to add value to canteen food services the catering sector has been involved in a general trend of introducing more restaurant-like concepts, adding to the canteen experience by playing upon customer’s need for convenience and pleasure. Amongst others this is achieved by changing once dull canteen surroundings to more convenient and customer friendly settings, termed by caterers as introducing ‘new canteen concepts’. These include offering a wider range of meals and products, for example more luxurious sandwiches and roles based on the types of recipes one finds in restaurants and cafés. It also involves changing the entire set up of the buffet section, making it easier for consumers to walk around and paying more attention to food presentation and personal service. Moreover caterers see this as a survival strategy, to keep attracting customers and as a buffer against ubiquitous and upcoming rivals from the retail sector and specialised or niche competitors (BHeC, 2003).

2.2 Why is sustainable catering important?

Around 2 million meals are served in Dutch canteens each day, worth around 1 billion euros yearly which amounts to 14% of the total return of the out-of-home food services sector. Around half of Dutch employees have access to a canteen in the building where they work. This indicates the importance of the catering sector in terms of market share and volumes traded. Furthermore sustainable development in the catering sector works two ways; it means opportunities for producers and providers of sustainable products, and it means affecting many plates of food. Some even expect the importance of canteen services to increase in coming years where changes in lifestyle and national demographics are expected to increase the importance of daily food services (BHeC, 2003).

However, the current state of sustainable product provisioning in mainstream catering remains poor when one compares it to developments seen in food retail. Whereas for the latter there are various specialised natural food shops, local food box schemes, home delivery services and most Dutch supermarkets now stack a decent range of organic foods, Fair Trade labelled foods and products packaged in bio-degradable packaging, sustainable lunch alternatives in mainstream catering are often thin on the

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3 The BHeC is the Dutch business organisation for the hotel, restaurant and catering sector. It focuses on innovation and knowledge generation and it is authorised to enforce rules and regulations set by the government.
5 Data from the Dutch bureau of statistics and the sector organisation (CBS and BHeC) http://www.bedr-horeca.nl/content.jsp?objectid=9357 16.10.2006.
What might be termed sustainable catering remains niche bound and dependant on client specifications. Unfortunately there are few figures on sustainable product provisioning in Dutch company canteens and education facilities, or on the demand for such products under canteen users. One of the only known figures is that of the turnover created by organic products in the catering sector, which amounts to an average of 3% (Veneca, 2006). Studies show that often the ‘easy’ products like milk and bread are substituted with an organic alternative (Biologica, 2005). Cases of canteens where there is a more systemic or holistic approach toward sustainable provision, in the form of an overall sustainable canteen concept for example, remain the exception rather than the rule.

Given the general state of sustainable provisioning in catering and the relative dependence of the canteen user on canteen provisioning, as discussed previously, we can conclude that on average the Dutch canteen visitor, and more especially the “light-green” consumer, has limited access to a sustainable lunch alternative via mainstream canteen provisioning.

2.3 The role of the provider

The role of the provider in sustainable development strategies becomes clear when we consider that caterer’s decisions affect everything from procurement to the menus and recipes themselves. For example, choosing to serve a high fat or low fat meal or which pricing policy is to be used in the canteen can have a direct effect on consumption patterns. Communication to the canteen-user about the food served is also determined by catering providers. Thus, caterers are not just food providers, but also providers of taste, nutrition, as well as food information and imagery. These aspects constitute part of the consumption junction infrastructure and shape the context of consumption.

In the last years there has been a general trend of privatisation and commercialisation of canteen food in The Netherlands. Developments in regulations on hygiene, quality control and product origin increases the need for expertise and specialisation, a situation which favours the employment of professional caterers. This means that more canteens are being run by professional caterers via what is termed contract catering. With this commercialisation comes the need for more attention to the consumer; catering more specifically for (changing) consumer needs and adapting provisioning to the patterns seen in everyday work and lifestyles (BHeC, 2003). Value adding is naturally part of such a strategy. As mentioned previously, caterers are tapping into what is termed ‘catering concepts’ to change the contextual reference of food catering and consumption. In such a situation, food and its form, i.e. presentation and imagery becomes more important.

Thus, given the above and the characteristics of canteen food consumption discussed earlier, i.e. those pertaining to the work place context and the relatively ‘trapped’ nature of the canteen consumer, we can see that the role of the provider is fairly dominant in determining canteen

7 The term ‘light-green’ consumers is loosely used to describe consumers who are interested in ethical consumption but who do not yet always express this interest in actual buying of ‘green’ products and services. This is not seen as part of their lifestyle.
provisioning. Previous research on the catering sector has pointed out the crucial role of the perception held by the catering manager in the introduction of organic products in the canteen (Soethoudt et al., 2005). These catering managers not only make choices on what foods to buy and prepare but also on how to present them to the consumer. And, according to trends this last point has become more important.

In the next section we look at how two different mainstream caterers shape and contextualise their sustainable provision at the consumption junction.

3 Consumption junction case studies

3.1 Introduction

The following case studies are examples of mainstream Dutch canteens which are relatively progressive on the subject of sustainable catering. These studies have been selected from a pool of canteens which are known for their initiatives to introduce more sustainable sourced food products. The type of sustainable procurement seen here aims mainly at supporting local and regional businesses and farmers, and introducing organic and Fair Trade labelled products into the canteen.

Both descriptions are meant to give an idea of the atmosphere of the canteen, the information and imagery present and the food offered.

3.2 Case study on a university canteen

The catering service at Nijmegen University is known as relatively progressive on the subject of sustainable procurement, which is why it was selected as a case study. The university catering is organised by an independent university service department; the University Restaurant Service. This takes care of all the catering in the university buildings. There is one main canteen or university restaurant on campus which we will focus on here. Besides warm and cold meals at lunch, it provides warm meals in the evening. It is open to students and staff members but also visitors from outside. Meals are subsidised for staff and students. The canteen is very much a multifunctional space; students use the canteen as a meeting place, as a place to study, chat or eat together.

In 2000 the university started to look at the possibilities for introducing more organic products into the canteen. Together with students, staff and the university board the canteen worked on how to introduce organic alternatives. Students organised special campaigns to draw attention to the changes and the reasons behind the introduction of more Fair Trade and organic products in their campus canteen. According to the canteen manager involving different university actors was a successful way to create broad support for the canteen’s sustainable procurement policy.

In subsequent years various produce and products have been substituted with organic and or regionally sourced alternatives, and around 70% of the coffee and tea has switched to Fair Trade. Catering was taken up as a target under the broader environmental care policy of the university, which up until then mostly focused on such issues as energy saving and environmental safety. Even though real sustainable procurement criteria were never
formally adopted by the university, the catering manager is still active in trying to keep sustainability a constant consideration. Using a creative and flexible procurement strategy the catering manager is able to buy regionally sourced foods and organic products (around 10% of the total volume). For example, with the use of large volume packaging for organic milk waste is decreased and money saved.

The catering service has a wide range of foods on offer. There is something for everyone, from salads, to fresh roles to three types of warm meals. There seems to be quite a lot of personal attention to the food offered. The presence of canteen staff and cooks dressed in cook uniforms suggest that professional on site food preparation is a feature of this canteen. Cooks walk in and out of the canteen refilling buffets, the bustling kitchen is half visible from the buffet section and there is a special bar where a cook is preparing fresh roles.

However, besides this apparent attention to personal service the everyday visibility of the locally sourced and organic produce at the consumption junction is limited. The visibility of sustainability characteristics of products is limited to eco-labels on bread roles, on the dairy dispensers (serving milk and sour milk) and some of the fruit juices. No special attention is given to these products or the ideas behind why they were chosen to be put on offer. The website of the restaurant services does give some information, but this is limited to a definition of organic products. Thus, since the initial student campaigns on the introduction of organic and Fair Trade products there has been little public attention to the products on offer.

3.3 Case study local government building

The second canteen to be considered here is the catering service for the employees of a provincial government office in The Netherlands. Unlike the former case this canteen has been contracted to a multinational professional catering company. The main reason for choosing this canteen as a case study is that this particular provincial government is known for its active participation in and contribution to the development and furthering of sustainable public procurement policies making it one of the front running local authorities to be involved in promoting sustainable procurement in The Netherlands. It works together with other local authorities, businesses, NGOs and national authorities on the improvement of sustainability criteria to be used in public procurement decisions.

The canteen is large and spacious, consisting of various buffet islands. There is a wide range of choice between different fresh roles, luxurious sandwiches, salads and warm meals. The weekly menu content is quite diverse and many of the dishes are un-Dutch (i.e. not the standard potatoes, vegetable and meat), consisting of pastas and rice for example. Vegetarian dishes are available. A colour code helps canteen customers to see which dishes contain which type of meat, which contain fish, and which are vegetarian. In addition there is a whole range of different desserts on a separated buffet. The presence of the external catering company is noticeable in the canteen by the glossy company magazine laid out on the tables, the content of which consists of interviews with cooks and customers on work related issues and food.
A social practice perspective on sustainable catering

Around half of the canteen provision is of organic origin. However the visibility of this sustainable provision is, similar to the previous case; limited to the occasional label. An edible eco-label indicates which bread roles are organic, and there is an eco-sign on the milk dispenser. The remainder of organic produce is used as ingredients in salads and warm meals but there is no indication of this on the menus or via other information or imagery. Overall, information informing employees on the procurement criteria considered important by their employer is lacking. These criteria are based on buying products from sustainable agriculture, in line with the province’s policy to decrease agricultural pesticide use in the region, considered necessary to tackle regional problems of ground water pollution.

Thus, canteen food provision is not explicitly connected to regional environmental issues. Although the local government’s public website does give information on the effects of ground water pollution on local drinking water reserves there is little information on their policy on sustainable canteen provisioning.

4 Conclusion

This first analysis of canteen food consumption as a social practice in context and the canteen as a consumption junction, focussing particularly on provision strategies, brought forward three main observations.

1. The case studies reveal that the sustainable provisioning policy is not explicitly communicated at the consumption junction. The main visibility of sustainable product alternatives are in the form of product labels (organic and Fair Trade especially). Besides initial promotion campaigns there is no real strategy to incorporate sustainable aspects into the everyday structures of the consumption junction, either via information or imagery. This means that the decisions made by caterers on sustainable provisioning and the ideas behind these decisions remain relatively ‘invisible’. It seems that the communal or collective context of the canteen remains relatively untapped in framing sustainable consumption in a way as to incorporate some of the values pertaining to environment, social welfare in congruence with economic viability in the work-related context. In other words, if sustainable consumption is expressed in certain for the canteen user identifiable shared company or organisational values, like regional environmental protection, sustainable consumer choices might become less individualised and a more shared responsibility.

2. In both cases caterers try to use catering concepts, or elements from these concepts, to improve the atmosphere in the canteen and add value to the canteen experience. Examples are more personal service and improved recipes. However, notions of sustainability are not explicitly or actively connected to such concepts. In other words, the adding of value to the consumption junction is not connected to sustainability. Such ‘sustainability added value’ might be generated through certain sustainable product provisioning. There is little attention to the food in terms of on and off site imagery; for instance framing provisioning in terms of quality, taste or origin, or through information; on either local or global social and environmental issues.
3. Sustainable development in the Dutch catering sector is most of all the result of the interaction between the caterer and its superiors (such as the owner of the canteen). An adequate feedback loop between the canteen user and these actors is not present. Sustainable provisioning is a choice concerning mainly provision actors making decisions on procurement policy. The demand for sustainable products at the consumption junction is often not accurately researched. It is assumed that the customer being catered for is the average Dutch consumer who has little real interest in sustainable food provisioning. This leaves little room for the notion of the ‘light green’ consumer who might be interested in or appreciative of sustainable food values in a canteen context.

In further research we wish to use our analyses on different consumption junctions to formulate different ways in which sustainable provision might be offered to the canteen consumer. One of our objectives is to compile a list of ‘best practices’ or ‘best strategies’ which are attractive to caterers and identifiable to canteen users, with the aim to further initiatives to eco-modernise canteens. Our research will include interviews with caterers and other important actors involved in decision making processes on canteen food provision, as well as consumer research. The consumer research should give us further insight into the social meanings and function of canteen food and through this an understanding of where the possibilities lie for incorporating sustainability values within the canteen consumption context.

References


A social practice perspective on sustainable catering


FOOD Are Consumers Guided by Selfish or Unselfish Motives When They Buy Organic Food?

John Thøgersen

Abstract

Organic food is produced in a way that reduces harm to the environment and respects the welfare of farm animals. Hence, buying organic food seems to be an act of ethical and environmentally responsible consumer behavior. However, it is often claimed that consumers really buy organic food for selfish reasons, i.e., because they believe organic food is healthier, taste better, or is of superior quality in other ways. This claim has been backed by survey data as well as qualitative interview data. However, I argue here that the claim is actually false and that the evidence backing it reflects post-rationalizations and self-presentation biases on behalf of respondents. I further argue that due to the many and varied ways people defend their self-concept, unobtrusive and indirect methods are the best way to uncover the goals and motives truly guiding this type of behavior. One such method is analyzing how the purchase of organic food relates to the individual consumer’s value priorities, using a comprehensive measurement instrument for values. Following this line of reasoning, the objective of the empirical part of the paper is to answer the question whether buying organic food is related to selfish (self-enhancement) or unselfish (self-transcendence) values? A survey study is reported based on representative samples of 1,000 respondents from each of eight European countries. It is found that the purchase of organic food is more strongly and consistently related to self-transcendence values (i.e., Universalism) than to any other value domain, and that this relationship is significant and positive in seven of the eight analyzed countries and becomes significant in the last country when controlling for availability.

Introduction

Organic food is produced in a way that reduces harm to the environment and respects the welfare of farm animals. Hence, buying organic food seems to be an act of ethical and environmentally responsible consumer behavior. However, it is often claimed that consumers really buy organic food for selfish reasons, i.e., because they believe organic food is healthier, taste better, or is of superior quality in other ways. This claim has been backed by survey data (e.g., Magnusson et al., 2001; Magnusson et al., 2003; McEachern &
McClean, 2002) as well as by qualitative interview data (e.g., Baker et al., 2004; Fotopoulos et al., 2003; Makatouni, 2002; Zanoli & Naspetti, 2002). However, in spite of the impressive evidence, I believe that the claim is false and that the evidence backing it actually reflects post-rationalizations and self-presentation biases rather than respondents’ true motives for buying organic food. In the following, I will unfold the arguments behind this belief and present new empirical evidence supporting the assertion that consumers buying organic food are fundamentally guided by unselfish motives.

3 The arguments

It is often argued that people tend to report an idealized picture of themselves in questionnaires, which differs from their true self as revealed in the shopping situation (e.g., Nancarrow & Brace, 2000). Two kinds of response biases may be responsible for the biased self-reports: Impression management and self-deceptive enhancement (Lalwani et al., 2003). Impression management is a tendency to present one’s actions in the most positive manner in order to control the social images that one projects whereas self-deceptive enhancement is a tendency to provide inflated, yet honestly held self-descriptions. Lalwani et al. (2003) argue that people in individualist cultures have a stronger tendency to self-deception, and people in collectivist cultures a stronger tendency to impression management, than the reverse. If this is true, self-deceptive enhancement should be a more serious threat to the validity of empirical research than impression management in a Western context, although both may contribute to the overall amount of biased responding.

The claim that buying organic food is motivated by self-interest is based either on direct responses to items describing possible beliefs about the consequences of buying organic food (e.g., Magnusson et al., 2003; McEachern & McClean, 2002) or on responses to questions probing into why particular attributes of organic food are important to the subject (e.g., Baker et al., 2004; Fotopoulos et al., 2003; Makatouni, 2002; Zanoli & Naspetti, 2002). The validity of responses emphasizing private benefits such as health or better taste – the most important reasons for buying organic food according to the previously mentioned studies – are questioned by the facts, however: (1) there is (still) little scientific evidence backing health claims regarding organic food, and therefore such claims are hardly ever made in ads or other promotion material, and (2) organic foods usually do not fare particularly well in blind tastes (Scholderer et al., 2004). Hence, it seems that consumers holding positive beliefs about such private benefits must derive them from something other than hard facts or personal experiences. An indication of the source of such inferences can be derived from the frequent finding that beliefs about private and collective benefits of buying organic food are strongly and positively correlated (e.g., Thøgersen, 1997). This suggests that many consumers somehow infer beliefs about private benefits from their beliefs about (documented) collective ones (i.e., that organic food is better for the environment and for animal welfare).

What was mentioned earlier about biased self-reports suggests that such consumer inferences are probably not dispassionate rules-of-thumbs (reflecting, for instance, past experiences of co-occurrence of these attributes) only, but that they most likely are motivated as suggested, for instance, by Festinger’s (1957) cognitive dissonance theory. According to cognitive dis-
sonance theory, unfavourable beliefs about organic foods, such as the fact that they are usually quite a bit more expensive than non-organic, are likely to produce an unpleasant state of arousal (i.e., cognitive dissonance) in consumers who buy them. Being unpleasant, cognitive dissonance motivates consumers to make an effort to reduce it. When the source of the dissonance is a freely chosen behaviour, bolstering (Abelson, 1959; Sherman & Gorkin, 1980) the attitude reflected in the behaviour through selectively adding supporting beliefs to their cognitorium is a common strategy (for a recent review of the evidence, see Harmon-Jones & Mills, 1999). Since important attributes of food products are either subjective (e.g., taste) or difficult to prove or disprove (e.g., healthiness), bolstering seems to offer little resistance in the present case. Hence, I suggest that studies reporting primarily self-interested reasons for buying organic food are flawed by biased self-reports in the form of self-deceptive enhancement. Consumers inflate their beliefs about private benefits of buying organic food, for instance, in order to reduce anxiety produced by knowing that one has paid a premium price for the organic products.

That consumers in this situation are especially inclined to bolster their cognitorium with beliefs about private benefits is suggested, for example, by Aronson’s (1999) revision of cognitive dissonance theory. According to Aronson, cognitive dissonance is not produced by just any inconsistency, but only if the inconsistency threatens important aspects of one’s self-concept, such as being a competent, reliable, and moral person. In such cases, cognitive dissonance motivates an effort specifically targeted at restoring the threatened aspects of the self-concept. In the case of buying organic food, what is threatened is the ability to view oneself as competent and rational, whereas the ability to view oneself as moral and idealistic is hardly at risk. However, if buying organic food lead to important private benefits it might be prudent to do so, even at a premium price. Hence, convincing oneself that organic food is indeed healthy and tasty seems to be an effective strategy for the organic consumer to reduce the threat to his or her self-concept as a rational and competent person arising from knowing that one paid the premium price.

4 How to get around biased self-reports

Due to the many and varied ways people defend their self-concept, only one of which has been elaborated here, unobtrusive and indirect methods may often be better than direct questioning at uncovering the true goals and motives guiding self-relevant behaviors. The method applied in this study is to investigate how the purchase of organic food relates to the individual consumer’s value priorities as measured by a comprehensive instrument, such as the ones developed by Schwartz (1992, 1994, In press; Schwartz et al., 2001). Since correlation is a necessary requirement for being able to claim causal dependence, a survey measuring the behavior of interest together with a comprehensive list of values makes it at least possible to shun out values (motives) that cannot have been involved in guiding the behavior.

During the last two decades, Schwartz and his colleagues have carried out an impressive research project, which has identified a comprehensive and cross culturally valid set of basic human values and developed several comprehensive instruments for measuring basic human values (e.g., Schwartz, 1992, 1994, In press; Schwartz et al., 2001). Based on this work, a
systematic and predictable relationship between human values and behaviour has also been identified in several studies (e.g., Bardi & Schwartz, 2003; Schwartz, 1996). For instance, several studies have confirmed the predicted positive relationship between environmentally responsible behaviours and Universalism (e.g., Karp, 1996; Stern & Dietz, 1994), and based on a cross-lagged panel study it has been confirmed that the main causal influence runs from Universalism to environmentally responsible behaviour, rather than the reverse (Thøgersen & Ölander, 2002). As a framework for the empirical part of this study, a brief overview of Schwartz’s research on human values is presented in the next section.

Based on Schwartz’s value theory, the objective of the empirical part of the paper is to answer the question whether buying organic food is related to selfish (self-enhancement) or to unselfish (self-transcendence) values? A survey was administered in eight Western European countries, thus allowing for an assessment of the cross-cultural validity (in a pan-European context) of the found results.

5 Values

Extant research offers several definitions of human values. According to a fairly representative one, human values are “desirable goals, varying in importance, that serve as guiding principles in people’s lives” (Schwartz & Sagiv, 1995, p. 93). The importance of particular values cannot be properly understood in isolation, but only as part of a structure or system of values, which can be derived from the fundamental prerequisites of human existence.

Schwartz (1992, 1994) suggests that the crucial distinction among values is the type of motivational goal they express. Human values represent responses to three universal requirements with which all individuals and societies must cope: (i) needs of individuals as biological organisms, (ii) requisites of coordinated social interaction, and (iii) requirements for the smooth functioning and survival of groups. From these three requirements, Schwartz derives 10 motivationally distinct types of values and he argues that virtually all items found in lists of values from different cultures can be classified into one of these ten motivational types (see Figure 1). This structuring of the value system has been confirmed by surveys collected from dozens of countries in all inhabited continents of the world (e.g., Schwartz, 1992, 1994).

As it appears from Figure 1, the ten value domains can be arrayed along two dimensions. The first dimension, going from self-enhancement to self-transcendence, reflects the contrast between values oriented toward the pursuit of self-interest and values related to a concern for the welfare of others. The second dimension, contrasting openness to change with conservation of the status quo, reflects the opposition between values motivating individuals to independent action and to challenge themselves both intellectually and emotionally and values favouring submissive self-restriction, preservation of traditional practices and the protection of stability.
Selfish or Unselfish Motives

Figure 1: Schwartz’s ten motivational value domains

Obviously, and according to empirical evidence, not all motivational value types are equally relevant when evaluating a specific action (e.g., Bardi & Schwartz, 2003; Schwartz, In press). For instance, extant research indicates that usually only motivational goals near the poles of the “self-enhancement” versus “self-transcendence” axis of Schwartz’s two dimensional value space are involved in evaluating environmentally responsible behaviours (e.g., Karp, 1996; Stern & Dietz, 1994; Thøgersen & Ölander, 2002). These studies find that pro-environmental action is positively correlated with values near the self-transcendence pole and negatively correlated with values near the self-enhancement pole.

Cross-cultural research has found a remarkably high consensus about the priority given to different basic values across countries (Schwartz & Bardi, 2001). When analyzing average value scores in samples from a large number of countries all over the world, benevolence, self-direction, and universalism values are consistently found to be most important; power, tradition, and stimulation values least important; and security, conformity, achievement, and hedonism are in between. Schwartz and Bardi (2001) report that value hierarchies of 83% of 123 samples correlate at least .80 with this pan-cultural hierarchy. These findings suggest that cross-national variation in consumer behaviour is rarely caused by variation in value priorities. However, differences in the strength of the association between the behaviour and important values held by individuals in different countries may be a contributing factor.

Due to common cultural influences, value priorities tend to be shared to a particularly high degree by people in the same culture. This has led to the conceptualization of cultural values, representing the implicitly or explicitly shared abstract ideas about what is good, right and desirable in a society (Schwartz, 1999). In the currently most comprehensive study of its kind, Schwartz (1999) analyzed the structure of and cross-national differences in cultural values based on data from 49 nations around the world. His analyses
suggest the existence of broad cultural groupings of nations. These groupings seem to depend on geographical proximity, but also on shared language, history, religion, levels of development, cultures contact, and other factors. Among other things, he finds that Western European countries tend to form a (broad) cultural group defined by high scores on the cultural value dimensions “Egalitarianism” and “Intellectual & Affective autonomy”. Hence, although Western European countries actually vary quite a bit on some cultural value dimensions, there are reasons to expect broadly similar value priorities at the aggregate (cultural) level in a sample of Western European countries.

6 Contextual influences on the values-behaviour relationship

The relationship between abstract human values and specific behaviours is usually weak (Eagly & Chaiken, 1993). A significant relationship between values and behaviour can only be expected for fairly involving behaviours (e.g., Celsi & Olson, 1988). Many, perhaps most, everyday consumer purchases are not that involving.

Celsi and Olson (1988) argue that consumer purchase decisions can be self-relevant (i.e., involving) for both situational and intrinsic reasons. Situational self-relevance is obviously context dependent, but so is intrinsic self-relevance, albeit in a more indirect way. A consumer purchase decision achieves intrinsic self-relevance when associations between the purchase and important goals and values of the buyer are salient, which may depend on the culture that the person belongs to. Only in cases where the product serves a very specific human need, in a Maslowian sense, or where its symbolic meaning has become homogenized by intense international trade and communication is there any a priori reason to expect that the decision to buy a particular product is rooted in the same basic values across cultures. It seems likely that such cases exist, but it seems equally likely that there are other cases where the need-solving character of the product is more ambiguous and where its symbolic meanings are related to local rather than to internationally communicated issues. In the latter cases, there is also no reason to expect that the strength of associations between the purchase of the product and specific values is equal across national and cultural contexts or even that the same values guide the purchase in different national and cultural contexts.

7 The present study

7.1 Introduction

In this study, the value-basis of consumers’ purchase of organic food products is investigated in a cross-cultural (pan-European) context.

Organic food was created as a response to concerns about environmental and other problems created by modern, intensive agriculture and it is a rapidly growing product category in many European countries (Willer & Yussefi, 2004). National certification schemes for organic food production require production methods that are less harmful to the environment and more concerned with animal welfare than conventional methods. This imbues organic food with extra symbolic – and potentially involving – dimensions.
In general, food products have well-defined need-serving characteristics. Furthermore, at least in Western Europe there are common institutions (e.g., an EU guideline for certified organic food production) and an at least partly international public and (especially) political discussion on organic food, which increases the chances of developing shared symbolic meanings for the product. The certification schemes for organic food production also means higher costs and therefore higher prices in general. Hence, there are reasons to expect that the purchase of organic food is guided by the same values in different Western European countries. However, the relationship between values and purchase behaviour may not be equally strong in all European countries. For instance, the supply of and the tradition for organic food vary between countries, especially between Northern and Southern Europe. It seems likely that the salience of the values-behaviour relationship is sensitive to contextual factors such as these.

7.2 Method

Survey data were collected in eight Western European countries: Denmark, Finland, Sweden, Germany, UK, Italy, Spain, and Greece, that differ substantially with regard to the market penetration of organic food (Figure 2).

Figure 2: Consumer adoption of organic food in eight countries

The questionnaire contained measures of basic human values and a measure of buying frequency for organic food as a product category (as reported in Figure 2). It also contained measures of the perceived availability of organic food, used as a control variable in some of the following calculations, in addition to questions not used for the present study. The questionnaires were developed in English and translated into the language of each country. In order to check the validity of the translations, questionnaires were back-translated into English.
7.3 Subjects

In each of the eight countries, approximately 1,000 respondents filled out questionnaires distributed by a professional market research company. The research population consisted of individuals at least 18 years old and in charge of or sharing the responsibility for the household’s grocery shopping. If the responsibility was shared, the person with the next birthday was asked to complete the questionnaire. Apart from the requirement to deliver a representative sample, the specific recruitment procedure was left to the market research company and hence differed between countries (random in some, stratified random in other countries). Printed questionnaires were delivered to each respondent either by mail with a prepaid return envelope or by hand, in which case it was collected when the respondent was done answering the questions. A demographic profile of each country sample is shown in Table 1.

Table 1. Demographic profiles by country

<table>
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<tr>
<th>Gender</th>
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<th>SP</th>
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<td>8.2</td>
<td>15.0</td>
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<td>10.8</td>
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<tr>
<td>over 500 000</td>
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<tr>
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<td>17.1</td>
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<td>2 people</td>
<td>28.5</td>
<td>23.8</td>
<td>31.1</td>
<td>37.8</td>
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<td>42.5</td>
<td>42.5</td>
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</tr>
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<td>3 or more</td>
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<td>64.9</td>
<td>58.3</td>
<td>45.0</td>
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</tbody>
</table>

7.4 Variables

Buying behaviour as regards organic food was measured by a single item: “From the following alternatives, please choose the one that best describes your shopping habits as regards organic food: (1) I have never bought, nor considered buying organic food, (2) I have not yet bought, but I have considered buying organic food, (3) I buy organic foods few times a year, (4) I buy organic foods one or a couple of times a month, (5) I buy
organic foods weekly.” In addition to these were two response alternatives which were coded as missing values in the following analyses: “I buy organic foods always when possible” was coded as missing because it was realized ex post that it has an ambiguous time period reference and “I have bought organic foods, but will not any more” was coded as missing because it would have made the scale non-monotonic. Eight percent of the respondents overall chose one of these two options.

For measuring values, a shortened version of Schwartz’s Portrait Value Questionnaire (Schwartz, In press; Schwartz et al., 2001) was used. The PVQ, which was developed as a less demanding alternative to Schwartz’s Value Survey (SVS), includes short verbal portraits of 40 imaginary persons. Each portrait describes a person’s goals, aspirations, or wishes that point implicitly to the importance of a value. For each portrait, respondents are asked: “How much like you is this person?” Responses are given on a five-point graded scale from “very much like me” (coded as 5) to “not like me at all” (coded as 1).

The adapted value instrument covered seven of Schwartz’s ten motivational domains. Power, Conformity, and Tradition were omitted because neither previous research nor a pre-study in four of the eight countries based on means-end chain theory and laddering (Bredahl et al., 2004) indicated any significance for these three motivational domains. Furthermore, in order to keep the questionnaire as brief as possible, the 29 items in the seven motivational domains included in this study were reduced to 17 items.

The hypothesized clustering of value items into motivational domains was tested on a country-by-country basis by means of confirmatory factor analysis using Amos 5.0. Factor loadings ranged from .47 to .93 with an average of .71 and fit statistics were acceptable. In accordance with what can be expected from Schwartz’s value theory, some of the latent variables representing motivational domains are strongly correlated (Table 21), which means that multicollinearity will unavoidably result if they are used simultaneously as predictors in a multivariate statistical analysis.

7.5 Statistical analysis

AMOS 5 (Arbuckle & Wothke, 1999) is used for the statistical analyses (confirmatory factor analysis [CFA] and structural equation modelling [SEM]). The main advantage of CFA and SEM is that it is possible to explicitly account for measurement error when a latent variable of interest is represented by multiple manifest variables. Measures of how well the implied variance-covariance matrix, based on the parameter estimates, reflects the observed sample variance-covariance matrix can be used to determine whether the hypothesized model gives an acceptable representation of the analyzed data. AMOS is one of the first applications that offered Full Information Maximum Likelihood (FIML) to deal with item non-response. Nonresponse (full as well as item) reduces statistical power and may lead to biased parameter estimates. Recent years’ extensive research into ways of dealing with missing data suggests that currently FIML is the most effective method to deal with missingness due to item-non-response, not only because it minimizes the loss of information and, hence, statistical power, but also

1 In order to conserve space, the table only reports correlations between latent factors and the most important fit indices. The rest of the AMOS output can be acquired from the author.
because it leads to the most unbiased parameter estimates (Arbuckle, 1996), and this even in the case of non-normal data (Enders, 2001).

The usual assumptions about uncorrelated error terms and a simple structure factor pattern in the measurement model are applied. When there is only one item representing a latent construct, as with behaviour in the present study, the measurement error cannot be estimated but has to be set to a fixed value. In this case we fixed the error variance to zero.

Table 2. Correlations between value domains

<table>
<thead>
<tr>
<th></th>
<th>Denmark</th>
<th>Finland</th>
<th>Sweden</th>
<th>Germany</th>
<th>UK</th>
<th>Italy</th>
<th>Spain</th>
<th>Greece</th>
<th>Average</th>
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<td>.19</td>
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<td>.08</td>
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<td>.79</td>
<td>.72</td>
<td>.94</td>
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<td>.43</td>
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<tr>
<td>Sti</td>
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</table>

Note: Uni = Universalism, Ben = Benevolence, Hed = Hedonism, Sec = Security, Sti = Stimulation, S-d = Self-direction, Ach = Achievement. $\chi^2$/d.f. = 6.572, TLI = .858, CFI = .904, RMSEA = .026. Correlations > |.06| are significant $p < .05$.

7.6 Results

7.6.1 Assessing measurement invariance

Before conducting other analyses, the multi-item measurement instruments need to be checked for cross-cultural validity across the eight countries. Cross-cultural validity refers to the extent to which data collected by the same multi-item measurement instrument are comparable across different cultural environments (Bredahl, 2001). Measurement invariance is investigated using a procedure proposed by Steenkamp & Baumgartner (1998). They suggest that measurement invariance, including partial invariance, is a matter of degree and suggest a stepwise procedure for revealing the level of measurement invariance.

In the present case, cross-cultural comparisons are limited to the strength of relationships between different constructs. In such cases, it is necessary to assume configural and at least partial metric (or scale) invariance (Steenkamp & Baumgartner, 1998). Configural invariance exists when the patterns
of significant and nonsignificant factors are identical across countries. Configural invariance for multi-item constructs was tested and confirmed by the factor analysis reported in Table 2.

Metric invariance exists when factor loadings are the same across countries. At least one item per latent construct, in addition to the one fixed at unity to define the scale of each latent construct, needs to be metrically invariant in order for cross-national comparisons of structural path coefficients (i.e., structural model regression weights) to be meaningful (Steenkamp & Baumgartner, 1998). Steenkamp and Baumgartner (1998) recommend that invariance constraints only be relaxed when it leads to highly significant improvements in model fit and that researchers evaluate not only chi-square differences, but also changes in alternative indices of model fit, especially those that take model parsimony into account, such as the root mean square of approximation (RMSEA).

Metric invariance was tested by means of nested confirmatory factor analysis. The analysis shows that there is a significant difference in chi-square (232.859, 70 d.f., p < .001) between the free and the restricted (i.e., factor loadings restricted to be equal across countries) model with regard to the seven value domains. A partial metric invariance model where only two factor loadings per latent value construct is restricted to be equal still produce a significant change in chi-square (108.511, 49 d.f., p < .001) compared to the model where only the factor loading fixed at unity to define the scale is set equal. However, with regard to the value constructs found to add significantly to the prediction of behaviour in more than one country, according to the following analyses, it was possible to restrict the necessary factor loadings to be equal across countries without significantly reducing the fit of the model (chi-square difference when one factor loading is restricted in addition to the one fixed at unity to define the scale: Universalism: 13.350, 7 d.f., p = .064, Hedonism: 11.379, 7 d.f., p = .123, Benevolence: 11.771, 7 d.f., p = .108). Furthermore, a number of indices of model fit favour the partial metric invariance model, such as the TLI (partial metric invariance: .864, free: .859). Chi-square per degree of freedom is lower in the partial metric invariance (3.965) than in the free (4.075) model, and so is the RMSEA (partial metric invariance: .026, free: .027). The CFI slightly favours the free model (partial metric invariance: .908, free: .910), but not when adjusted for parsimony (PCFI restricted: .618, free: .583). Hence, it seems justified to assume partial metric invariance in this case.

Table 3 reports the correlations between the latent constructs (motivational value types and buying behaviour) for all eight countries based on the assumption of partial metric invariance.

7.6.2 The values-behaviour relationship

As already mentioned, it is not possible to simultaneously include all value domains as predictors of behaviour due to multicollinearity. Instead, a stepwise procedure is used to identify the values that seem to guide behaviour in this particular case.

First, the bivariate relationships between motivational value domains and behaviour are inspected (Table 3). It appears that in none of the country cases are more than three and in only one case is more than two of the seven included value domains significantly correlated with buying organic food. As in previous studies of environmentally responsible behaviour, Universal-
ism is strongest and most consistently related to buying organic food, the bivariate correlation being significant in seven of the eight countries. Benevolence and hedonism are both significantly correlated with behaviour in two cases, and Self-direction, Security, Achievement, and Stimulation in one case each. Only in one of the eight countries – Spain – are none of the bivariate correlations between values and buying organic food statistically significant.

Table 3. Correlations between value domains and buying organic food

<table>
<thead>
<tr>
<th></th>
<th>Denmark</th>
<th>Finland</th>
<th>Sweden</th>
<th>Germany</th>
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<th>Italy</th>
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<td>Beh - Sti</td>
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<td>.05</td>
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<td>.13</td>
<td>.03</td>
</tr>
<tr>
<td>Beh - S-d</td>
<td>.13***</td>
<td>-.03</td>
<td>.07</td>
<td>-.02</td>
<td>.04</td>
<td>.01</td>
<td>.05</td>
<td>.08</td>
<td>.04</td>
</tr>
<tr>
<td>Beh - Ben</td>
<td>.07*</td>
<td>-.06</td>
<td>-.03</td>
<td>-.06</td>
<td>-.05</td>
<td>.14</td>
<td>.00</td>
<td>.04</td>
<td>-.04</td>
</tr>
<tr>
<td>Beh - Uni</td>
<td>.26***</td>
<td>.30</td>
<td>.39</td>
<td>.34</td>
<td>.32</td>
<td>.18</td>
<td>.05</td>
<td>.16</td>
<td>.25</td>
</tr>
<tr>
<td>Beh - Hed</td>
<td>.07*</td>
<td>-.07</td>
<td>.00</td>
<td>-.09</td>
<td>.01</td>
<td>.09</td>
<td>.01</td>
<td>.00</td>
<td>-.02</td>
</tr>
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</table>

Note: Uni = Universalism, Ben = Benevolence, Hed = Hedonism, Sec = Security, Sti = Stimulation, S-d = Self-direction, Ach = Achievement, Beh = Behaviour. $\chi^2$/d.f. = 6.572, TLI = .858, CFI = .904, RMSEA = .026. Correlations > |.06| are significant $p < .05$.

In the next step, on a country-by-country basis, behaviour was regressed on all value domains being significantly correlated with buying organic food in that country, according to the analysis reported in Table 3. In order to conserve space, the main results of these analyses are just summarized in the text.

In all cases, Universalism is still the strongest and most consistent predictor of buying organic food when other value domains are included. In Denmark and Sweden, Self-direction and Benevolence, respectively – the other value domain being significantly correlated with behaviour in that particular country – were no longer significant when controlling for Universalism.

In the UK, Benevolence was no longer significant when controlling for Universalism and Security. However, in the UK and in four other countries, one additional value domain seems to assist Universalism in guiding the decision whether or not to buy organic food, although in all cases the additional value domain plays a secondary role. The following standardized regression weights were revealed by SEM analyses regressing buying organic food on two values in each of the five countries: Finland: Universalism: .284, Hedonism: -.091; Germany: Universalism: .360, Hedonism: -.187, Italy: Universalism: .163, Achievement: -.134; Greece: Universalism: .110, Stimulation: .076; UK: Universalism: .572, Security: -.351.

The signs of the standardized regression weights reveal that in only one of the eight countries – Greece – are more than one value domain involved in positively motivating the purchase of organic food. The general finding is that the buying of organic food is positively related to and, hence, seems to be basically motivated by Universalism (which includes concern for the natural environment, among other things). This is true also in Greece, but here the buying of organic food is also positively related to Stimulation (which includes valuing trying new and adventurous things), which makes sense considering that organic food is a relatively new concept, particularly in the South of Europe.
In four countries, certain value priorities seem to increase consumers’ propensity to reject organic food. In Finland, Germany, and Italy, people whose value priorities emphasize self-enhancement (Hedonism or Achievement, respectively) are particularly unlikely to buy organic food. In the UK, organic food tend to be rejected by people whose value priorities emphasize Security, a value domain towards the conservation pole of the value space, but only when controlling for Universalism. As with the influence of Stimulation in Greece, the latter can be due to organic food being perceived as a new concept in the UK.

One may wonder why one country – Spain – stands out from the rest with apparently no relationship between consumers’ basic values and the purchase organic food. An answer is suggested by Figure 2, which shows that Spain is the country among the eight where organic food enjoys the lowest market penetration. The low market penetration among other things means a low availability of organic food overall, and perhaps a very uneven availability across the (large) country. A severely restricted availability of organic food is bound to attenuate the statistical relationship between any measure of motivation and behaviour: hardly anyone buys organic irrespective of their motivation to do so (e.g., Guagnano et al., 1995; Ölander & Thøgersen, In press). In addition, in a context where consumers rarely encounter organic food – neither in their physical appearance nor in promotion material – the salience of the value relevance of buying organic food is likely to be low. Our questionnaire contained indicators of the perceived availability of organic food, which can be used to control whether availability explains the deviant result in Spain.

Three indicators for perceived availability were measured on seven-point scales. In a random half of the sample, the measures were taken with reference to fresh tomatoes and in the other half with reference to tomato sauce: (1) Organic tomatoes (tomato sauce) is generally available in the shops where I usually buy foods (1 = strongly disagree – 7 = strongly agree), (2) In general, for me to buy organic tomatoes (tomato sauce) instead of conventional ones (one) would be (1 = difficult – 7 = easy), (3) If I want to, I could easily buy organic tomatoes (tomato sauce) instead of conventional ones (one) (1 = strongly disagree – 7 = strongly agree). A SEM analysis of the relationship between Universalism and buying organic food in Spain when controlling for perceived availability is reported in Table 4.

<table>
<thead>
<tr>
<th>Universalism</th>
<th>B</th>
<th>c.r.</th>
<th>p</th>
<th>beta</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.248</td>
<td>2.332</td>
<td>.02</td>
<td>.09</td>
</tr>
<tr>
<td>Perceived availability</td>
<td>0.348</td>
<td>9.348</td>
<td>.00</td>
<td>.40</td>
</tr>
</tbody>
</table>

Note: The structural model only. R² = .154, χ²/d.f. = 1.225, TLI = .995, CFI = .998, RMSEA = .015.

Table 4 shows that, as predicted, the purchase of organic food in Spain is strongly dominated by availability as (admittedly in an imperfect way) reflected in the perceived availability measure. Further, also as predicted, Universalism is significantly related to buying organic food when (perceived) availability is controlled. Hence, it seems that the deviant result in Spain re-
ported above is a product of restrictive external constraints (i.e., low availability of organic food in most grocery shops) attenuating the relationship between values and behaviour.

8 Discussion

This paper questions the frequent claim that consumers buy organic food mainly for selfish reasons (e.g., health, better taste) and an alternative interpretation of the empirical evidence cited in support of the selfishness hypothesis is offered. I suggest that consumer self-reports of selfish reasons for this behaviour are often inflated; a self-deceptive enhancement bias, which is the result of a desire to protect a self-image as a competent and rational person. This kind of motivated reasoning is predicted, for instance, by cognitive dissonance theory and in particular by Aronson’s self-concept revision of the theory. Since it is especially the person’s self-concept as a competent and rational person that is threatened by the act of buying (expensive) organic food, organic consumers are especially prone to bolster weakly founded beliefs about private benefits, such as organic food being healthy and tasty. Hence, it is argued, consumers may in reality have bought organic food primarily because they were persuaded by its documented benefits for the environment and for animal welfare, that is, for unselfish reasons, but subsequent concerns for protecting (and perhaps projecting) a smart and rational self-image made them inflate possible selfish reasons when asked to report why they buy organic food.

The results from a survey collected in eight European countries lend support to the alternative interpretation. There is no indication in this large data set of the preference for organic food being linked to selfish values. On the contrary, buying organic food is consistently and positively related to how the consumer prioritizes Universalism and in some countries also negatively related to the person’s priorities as regards certain selfish (self-enhancement) values. Only in one of the eight analyzed countries was the relationship between buying organic food and Universalism too weak to materialize in the raw correlations, but it did when controlling for the perceived availability of organic food.

Schwartz (1994, p. 22) defines Universalism as “understanding, appreciation, tolerance, and protection for the welfare of all people and for nature” (emphasis in original). The dominating, and positive, influence of Universalism is consistent with previous research on pro-environmental behaviour (e.g., Karp, 1996; Schwartz, In press; Thøgersen & Ölander, 2002) and it strongly suggests that consumers derive the self-relevance of buying organic food primarily from this being considered a pro-social, pro-environmental behaviour.

In three of the eight countries is the positive relationship between Universalism and behaviour seconded by a negative relationship between values in the self-enhancement quadrant and behaviour. Hence, in these, but not in the other countries, the more consumers strive for pleasure and enjoyment (Finland and Germany) or for personal achievements (Italy) the less likely it is that they buy organic food. As indicated by the reverse sign of the path coefficients for Universalism and these self-enhancement values, the purchase of organic food seems to involve a value conflict for consumers in these countries. At the root of this value conflict is the fact that many consumers experience that buying organic food – in addition to its positively
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evaluated consequences – has some negatively evaluated consequences, especially high prices. That a value conflict appears in some, but not in other countries, indicates that the negatively evaluated attributes are perceived as more important by consumers in some than in other countries. Accounting for the differences in the importance of negatively evaluated attributes of organic food is outside the realms of this paper.

Despite the apparent value conflict in some countries, the pattern of correlations found between basic human values and the purchase of organic food is consistent with the latter being fundamentally guided by unselfish motives. In two countries, Greece and the UK, a (secondary) role was played by value priorities linked to the openness to change-conservation axis of the value space, reflecting that organic food is a relatively new concept, which seems to be perceived as an advantage by some consumers in Greece and as a disadvantage by some consumers in the UK. However, this is only a corollary, which does not shake the general impression of buying organic food being fundamentally guided by unselfish motives.

These findings are especially remarkable in view of the fact that consumers are generally assumed not to be very involved in the purchase of everyday food products. On the contrary, consumers’ food purchase is often treated as a “prototypical example of a habitual behaviour” (Bamberg, 2002, p. 574). Still, it is well known that even mundane everyday purchases may sometimes achieve a higher self-relevance, for personal or for situational reasons. This happens whenever a consumer feels that the purchase of an everyday food product is risky, for instance because of food allergy in the family or because guests are coming to dinner. In cases such as these, mundane purchase behaviours may become imbued with additional meaning and self-relevance, making the association between the specific purchase behaviour and (some) basic value(s) more salient to the consumer. This study suggests that organic food is another example. It seems that the public debate about environmental and health risks associated with the use of chemicals (pesticides, fertilizers, etc.) in modern agriculture and about the welfare of farm animals have increased many European consumers’ perception of environmental, ethical, and other risks associated with food purchases (e.g., Dreezens et al., 2005; Thøgersen & Bredahl, In press; Torjusen et al., 2004). Because the salience of the relevance of food choice to prioritized values (especially Universalism) has increased, so has consumers’ involvement with their choice of food products. Fortunately, and probably one of the important reasons why the market for organic food is growing in many European countries, Universalism is consistently found to be among the three most important values in analyses of average value scores in samples from a large number of countries all over the world (Schwartz & Bardi, 2001).

Our ability to generalize the conclusions from this study is limited by the fact that all of the analyzed countries were from Western Europe. That said, the analyzed group of countries is quite diverse with regard to national food cultures (Askegaard & Madsen, 1998) and, not least, organic food consumption (Figure 2). Hence, although caution is warranted when generalizing results to non-Western cultures, the study clearly demonstrates that the finding that the purchase of organic food is basically guided by unselfish motives cannot be reduced to a national idiosyncrasy.
9 Acknowledgements

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References


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FOOD Environmentally Sustainable Food Consumption – An Institutional Perspective

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Abstract

Increasingly, consumers are attributed agency regarding environmental sustainability. Many people are aware of environmental and ethical aspects of consumption, but this is often not reflected in what they do as consumers. The paper is critical to assumptions of agency building on individual choice, implying that these “inconsistencies” are due to a lack of motivation. In order to understand what people do as consumers and the role they can play in influencing sustainability, we have to recognise that our dealings with food through purchases, cooking, eating and protest are embedded in and expressions of social norms and institutions, influenced by the structure of food provisioning and regulatory systems, as well as public debates. This theoretical argument, based on an institutional understanding of consumption, is underpinned by an empirical illustration: People in the two neighbouring countries Denmark and Norway share a similar engagement and concern regarding sustainability and food risks, but the consumption of organic food is very different. We ask why. Our theoretical perspective directs us towards market structures, food politics and regulation. At this level we find major differences between the two countries, resulting in highly diverging distribution systems and availability of organic food, different attention given in public discourse, mobilisation and political debates (and research), and different normative evaluations regarding organic versus conventional food. The empirical example illustrates the need of considering such institutions and arenas for understanding consumer agency, but also the importance of the interrelations between them – in terms of exchanging money, goods and information as well as the division of responsibility, power and trust.

1 Introduction

While the notion of the European citizen is still important in the discourse on food regulation, over the last years there have been increasing references to “the consumer”. In several fields of food related policy, consumers are attributed agency and are seen as responsible, through their choices, for a number of societal issues: health, food quality, animal welfare in the agro-business and environmental sustainability. Policy papers are explicitly referring to consumer choice and consumers’ own responsibility through ‘informed choice’ and labelling strategies (EU Commission, 2000, Reisch, 2004). The widespread usage of the term ‘consumer’ has coincided with neo-liberal precepts, thereby envisaging the consumer as an isolated self-interested individual. Indeed, this kind of consumer has been the model for neo-classical Homo Oeconomicus, an abstract and universal agent, conceived of as a set of preferences constrained by a given budgetary level and linked to an environment defined in terms of the goods available, the relative prices of these goods, and information made available about them. Such ideas seem, explicitly or implicitly, to have influenced studies of sustainable consumption. We argue that this model is insufficient and even misleading for understanding the roles and responsibilities of consumers. It is evident from several studies of environmental and ethical issues that there are vast variations in consumption practices – across countries and between social groups. An individual, utilitarian approach is of little use to analyse such variations, nor is it helpful for understanding the stability and consistency in food choice often found within national and cultural contexts - or the large-scale shifts in food choice that also occur. We will argue that a conception of food consumption understood as socially and institutionally created sets of practices represents a viable approach to such questions.

Many contemporary theories of consumption suggest that the consumer is far from being a champion of individualistic forward-looking choices, based on deliberate calculation of self interest. Food consumption can be fully appreciated as a form of social action only by leaving behind the idea that such action may be modelled exclusively as a conscious decision at the point of purchase. So as to avoid conceptualizing consumption as a series of abstract and individualistic decisions, we have to consider that consumption practices happen within social institutions like the family, work, and the marketplace and that these practices are themselves institutionalised. By this we mean that there are predictable societal patterns of behaviour related to food provisioning and consumption, emerging from social structures, norms and conventions, and formed by the particular contexts and situations within which consumption takes place. Food represents an intersection between public arenas and the private sphere, the collective and the individual. Meal structure and cuisine will affect how people do their food provisioning, but the character of various forms of supply as well as governance structures will also have significant influence on people’s expectations and actions. Sustainable food consumption takes place within and with relation to these arenas.

We start out by discussing in some more detail the issue of consumer choice, followed by an outline of the concept of consumption as practice. A model of ‘triangular affairs’ is described, where consumption is involved in institutionalised interrelations between consumers, provisioners and regulators. The empirical viability of this approach is explored with the case
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of organic food, a prominent issue in discussions of sustainable consumption. We present a simple comparison of Denmark and Norway, two neighbouring countries with highly diverging patterns of organic consumption. The key question is ‘why?’, and we find that while consumer concerns and attitudes are quite similar, the institutional contexts are different with regard to market structure as well as regulation and politics.

2 Food consumption as individual choice

In neoclassical economic theory consumption “is the sole end and purpose of all production” (Adam Smith, The Wealth of Nations 1776, here quoted from Söderlind, 2001, 6) and the system of production is seen as responding as a servant to the needs and wishes of consumers (Fine & Leopold, 1993; Friedman & Friedman, 1981). These sovereign consumers are seen as rational choosers, driven by an individual utilitarian orientation, seeking to maximize personal benefits at the lowest possible cost. This conceptualisation implies a tendency to see individual consumers as independent and autonomous actors and their choices of consumer goods as driven solely by their individual needs and demands.

While economic theory takes needs and demand for granted, giving them little attention, consumer research has focussed much more on preferences, i.e. on how consumer needs and demands are constituted. One widely used model for this kind of study is the ‘Theory of Planned Behaviour’ proposed by Ajzen and Fishbein (Ajzen & Fishbein, 1980; Ajzen, 1991) which offers a systematic framework for empirical investigation. Studies like these are based on a notion of reasoned action and planned behaviour, which assume that choices are reflected and deliberate. In this theory, behaviour is seen as the result of behavioural intention. This is determined by the individuals’ attitudes (is the choice good, beneficial etc?) and the subjective norm (does the individual perceive any social pressure to make the choice?). Extra variables are often added to the model in order to strengthen its predictive power (e.g. habits, knowledge, perceived control) (Shepherd, 1990).

Socio-demographic variables may be included, thus differentiating results and presenting systematic differences in attitudes, social norms and intentions, e.g. related to age, gender and social class (Shepherd & Dennison, 1996; Shepherd & Stockley, 1985). Further, perceptions of risk and danger, credibility of and trust in public authorities and other actors in the food chain may be included too (Jonge et al forthcoming). This type of research appears to see consumer choice as a reflection of aspects of specific products as perceived by different types of individuals often in the light of specific public debates or issues (see eg. Tuorila and Pangborn 1988). Norms and values are a matter of individual priority, not socially structured. Consequently, the rationale for these kinds of studies is to inform actors – whether public policy makers or private commercial actors – who seek to alter the choices people make through persuading them to change their intentions.

This applied purpose is often evident in studies of sustainable consumption, which are generally strongly influenced by cognitive and behavioural models (see eg. Uusitalo 2005). If we look at sustainable food consumption, large parts of the literature refer to such individualistic notions of consumption and the consumer (for recent overviews, see Torjusen et al,
We are here thinking of studies that are explicitly based on cognitive and behavioural models (see eg. Sparks and Shepherd 1992, Thøgersen 1998, Zanoli et al 2002), those using economic conceptual tools like ‘willingness to pay’ (see eg. Grünert and Kristensen 1992, Hansen and Sørensen 1993, Tregear 1994, Harper and Makatouni 2002), as well as a large body of marketing studies with more implicit theoretical foundations.

We will in the following argue that food consumption does not emerge directly from individual intentions and that reflection does not always precede practice. The focus should instead be directed towards (in our case) food as part of our ordinary everyday lives and in interaction with other people as well as with institutional actors. This is not only because it will give a better conceptualisation and understanding of the dynamics of consumption, it is also relevant for more applied purposes.

### 3 Food consumption as sets of practices

Theories of practice are manifold and represent a wide and versatile sociological field. Theories are – with few exceptions - generally not referring to consumption or to food and eating. There is a need, though, to start discussing which implications the concept of practice may have for the study of food consumption. Alan Warde has presented a discussion of consumption as practice, which we see as a valuable starting point. His suggestion is, that consumption be best understood as embedded in particular practices and not as a practice in itself (Warde, 2005). Whereas much food consumption (and consumption and sustainability) research constrains its interests to the choice situation, i.e. basically to market exchange – Warde’s suggestion implies that food consumption must be understood as a much broader phenomenon to be examined as an integral part of daily life. Consumption is thus a process whereby “agents engage in appropriation and appreciation, whether for utilitarian, expressive or contemplative purposes, of goods, services, performances, information or ambience, whether purchased or not, over which the agent has some degree of discretion” (ibid, 137). Consumption is understood as embedded in practice, and practices are constituted outside the individual. Consumption thus occurs as items are appropriated in the course of engaging in particular practices. This notion of practices can therefore account for both social order (emerging from the coordination and the norms that a practice represents) and individuality (differentiation and performance within a practice) (Schatzki, 1996).

In the context of food, the range of relevant practices may be very different in character and will vary according to historical circumstance. Eating is something that everybody does – usually several times every day in a highly routinised manner. It is just something that we ‘normally do’. The normalisation implies predictability and taken-for-grantedness as well as strong normative regulation (Kjærnes and Holm, forthcoming). Still, practices that involve eating are also very diverse. They may, for example, include the practices of making and consuming family meals, of maintaining health, strength and functionality as part of doing other things – work or leisure activities, as well as socialising with others, of pausing and resting, of

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1 Warde’s contribution builds partly on the conceptual framework developed by Pierre Bourdieu (1990).
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celebrating, etc. (Gronow, 2004). Unlike eating, food procurement and preparation may or may not stand out as particular and significant parts of practices in which the individual is involved (because somebody else can take care of it). This introduces an important issue of division of labour and responsibility. Focus is therefore shifted from individual perceptions of particular foods to the logic of situations where food is purchased, cooked, served, and eaten. It also shifts focus from attitudes and gender, age or social class seen as individual properties to institutionalised practices, and how they shape food and eating. The attention is more on how activity generates wants, rather than vice versa.

This understanding does not exclude influences of socio-demographic or cultural background or of personal skills and interests. The point is that this influence takes place within a practice which is already established before the individual enters the scene. This is, of course not deterministic or static. People may and will often challenge or alter practices through their actions, but they will do so with reference to the established practices and the structures that form these practices. Attention is directed towards how groups of people understand a practice, the values to which they aspire, and the procedures they adopt within practices. Social categories will then be socially conditioned rather than representing individual properties. Social differentiation and inequality are not a matter of randomly choosing a lifestyle, but a structurally contingent disposition influenced by economic resources, upbringing, social networks, and cultural codes.

Generally, we have described consumption practices as normalised and highly routinised. But it is important to be aware of processes of change. Following our line of argument, such processes are assumed to be initiated from changes in any of the poles that we have described as well as in the interrelationships between them. In a period of change, links between public attention and mobilisation and individual market behaviour may be important. Swidler (1986) argues that in some situations routinised practices suddenly become explicit and contested, and routines can intermittently break up. New and alternative, often ideologically justified, sets of practices may be established. These will, however, tend to be gradually routinised, eventually also tacit and taken for granted. It follows from our understanding that organic food consumption (in various forms) will also tend to undergo this kind of routinisation and institutionalisation, rather than remaining as a new kind of more ‘reflexive’ consumption.

Practices have a trajectory or path of development, a history. The substantive forms that practices take will always be conditional upon the institutional arrangements characteristic of time, space and social context. The focus is directed towards the routine, ordinary, collective, conventional nature of much consumption, but also towards the fact that practices are internally differentiated. Focus is on use of goods rather than (only) on acquisition. In the area of food, attention is then directed towards menu planning, food preparation, and conduct of meals in different social contexts, which also form an important background for the selection of specific products in a shopping situation. In this paper, however, we will not discuss the role of social norms related to eating any further (for more on this topic, see Kjærnes & Holm, forthcoming). Keeping the perspective of consumption as sets of practices, we will instead address how institutional contexts influence our routine everyday dealings with food.
4 Practices and institutions

Purchases form the most direct connection between commercial systems of provisioning and what we do outside the market sphere. It is one act in a chain of decisions on both the consumer and the supply side. We can only purchase what is available in the shops. The purchase situation and the selection of items on offer are strongly influenced by the character of the distribution and retailing system, whether it is a supermarket, a small shop, or a farmers’ market – which, in turn, is influenced by the structure and character of production and distribution. Purchases are of course not completely predetermined, as commercial actors do what they can to make people select their products instead of those from their competitors. And people will not buy anything - indiscriminately. Consumption practices are not to be reduced to acquisition and most certainly not to the choice of products or to commercial consumption, which is only one way in which goods and services are obtained for the purposes of use (Harvey et al., 2001, 45). Eating and cooking practices represent an appropriation of the purchased goods that, in turn, will influence what we want to buy.

Patterns of food consumption vary in time and space, shaped by, and in turn shaping, the specific context formed by the food provisioning system. This is why we argue that food consumption should be analysed as processes of institutionalisation. The ways in which consumption is institutionalised - the daily routines, the directions and priorities of food consumption, as well as the responsibility, power and resources of ‘the consumer’ – are not static preconditions, but are structures which form the ways consumers’ actions may influence the provisioning system. The socially embedded consumer role forms the foundation for individual and collective action and mobilisation, as well as influencing how consumers appear in broader political alignments.

Instead of analysing markets and politics as a matter of an external ‘context’ our analysis focuses on institutionalised relationships between societal actors. Interrelations influence on and are part of the institutionalisation of consumption. We need to consider the relationships between consumers and the provisioning system and market actors, as well as interrelations with the state and public authorities and, more indirectly, interrelations between the market and the state. Together they form what can be called ‘triangular affaires (Kjørnes, Harvey and Warde, 2006) (see Figure 1), characterised by particular divisions of responsibilities, relations of power, as well as forms and levels of trust. The understanding of the triangular affaires is built up by characterising the poles as well as the complex direct and indirect relationships between them. Each pole of the triad of relationships has its own internal organisation, an organisation that varies considerably if we look at different countries and regions. Consumers of food, for example, are organised in households in ways that vary between countries. Provisioning systems, including the way retail shops sell food to consumers, differ greatly. And finally, state regulatory and political systems are strongly contrasted between countries. Differences in the organisation of the poles internally are developed in interdependency with the other poles of the relational complex.

It should be emphasised that the concept of ‘triangular affaires’ is an analytical device. The schematisation and simplifications are deliberate. So too are the exclusions from the analysis. If we were to do full justice to the
complexity of relationships, many other societal actors would be involved, and there would be a much more differentiated picture of different levels, micro- to macro-, of relational configurations.

![Diagram of System of Food Provisioning and Households/Consumers](image)

**Figure 1. The ‘triangular affaires’ of food consumption**

Organic food, our case here, will partly refer to such triangular affaires as described by the food sector in a country or region, partly create its own sets of institutionalised relationships. Such relationships will be highly decisive for how organic production, consumption and regulation are organised and framed. For example, organic food is sold mainly from ‘reform shops’ in Germany and from the major supermarket chains in the UK (Torjusen et al, 2004). Supermarkets in the UK are competing on a range of issues, including organic food, while the German supermarkets compete mainly on price. Many German consumers are, on their part, highly sceptical towards what the conventional system can deliver, while the British are generally more confident in that respect (Poppe and Kjærnes, 2003).

### 5 Sustainable food consumption practices

Issues of sustainability in relation to food emerge in relation to our everyday lives in many different ways. But it is with the purchase that we are most often encountered with such issues. For food, environmental issues are first of all related to forms of production and transportation; ranging from the use of pesticides and fertilizers, use of water, deforestation, and energy required for meat production to the distance and mode of transport. Contamination and energy are at the focus of attention, but they are very often socially bundled together with other issues, such as animal welfare, social rights, the viability of local communities, food quality, etc. Whether food production is sustainable or not have impacts on the physical and social environment as well as on the human body. In-depth studies of food consumption demonstrate that from the consumers point of view, such effects are often combined in complex ideas of ‘the healthy’ versus ‘the unhealthy’, ‘the natural’ versus ‘the artificial’, ‘the good’ versus ‘the bad’ (Holm & Kildevang 1996; Halkier 2001a). Consequently, consumers develop strategies addressing these issues, which ensure that the foods brought into the household are ‘clean’ or ‘pure’ (Holm 2003). Symbolically and practically, this is often combined into ‘organic’ food production, but
with close association to social mobilisation around ‘slow food’, ‘food miles’, ‘local food’, ‘fair trade’, and ‘farmer’s markets’. All of this is for ordinary people first of all a matter of buying foods with particular labels, from particular food suppliers, or from particular shops. ‘Organic food’ is therefore not a stable and uniform category, but strongly dependent on the situations in which it is produced, presented and used.

Following from our argument, purchase cannot be seen in isolation. Acquisition raises issues of division of labour, relations between the household and other institutions and between members of the household. Still, purchase represents a social context that has to be considered. First, what is available? And how are the various food items sold (type of shop, presentation, price differentiation, etc.)? Also a wider set of interrelations have to be considered, for example, what is the societal distribution of responsibility for environmental and ethical issues? Is this a matter of state policy or is it mainly dealt with on the market via commercialisation? Is it considered to be a private responsibility for ‘the consumer’? Is there any collective mobilisation – and does this mobilisation address consumption issues? The answers to such questions may be taken for granted within a given setting, a given set of triangular affaires, but when looking across for example countries or periods we expect considerable variation.

Sustainable consumption also includes other practices than purchase. Disposal is of course a result of consumption which raises its own set of questions and issues. Food preparation normally requires energy, a limited resource in some places, but for the rich Western consumer hardly a major contributor to the overall over-consumption of energy. We think that for sustainability food preparation and eating should probably be seen first of all as important for determining and framing, practically and normatively, the food items that we acquire. Therefore, the detailed and often overlooked social norms regulating eating practices are important for the structure of meals and dishes, and thus e.g. the relative proportions of animal versus vegetable products and the degree of processing. However, such norms are not static. Sustainable consumption is a matter of politics and social mobilization. Studies of political and ethical consumerism indicate that in many cases there is a link between individualised ‘mobilisation’ in the market in the form of political or ethical consumption, collective mobilisation and public attention (Micheletti 2003). This may also be the case with regard to the development of sustainable food consumption.

6 The consumption of organic food in Denmark and Norway

To illustrate our points about the situated and institutionalised character of sustainable consumption, we have chosen to compare Denmark and Norway. These two Scandinavian countries share many features, historically, politically, and culturally. The neighbouring countries are both welfare states of the social democratic type, with strong emphasis on state intervention. They are also rich countries, with 11-12 per cent of income spent on food, and relatively homogeneous, culturally and economically. The food sectors are in both cases dominated by powerful farmers (farmer coops and interest organisations), a concentrated processing industry and supermarket based distribution systems. The consumption of organic food, however, comes out as very different. We will discuss similarities and differences in the area of
organic food by first turning to public opinion, followed by practices, then sketch the structure of organic food production and state regulation. This cannot in any way be seen as an in-depth analysis, but rather as brief empirical examples exemplifying our theoretical points. 2

Table 1 shows that people’s concerns and interests regarding food related issues are quite similar across the two countries. The emphasis is somewhat different, but there is no tendency of more or less concern. Generally, when asking like this, people come out as generally concerned, with relatively little differentiation between issues. Concerns are not, however, necessarily associated with their own shopping practices. When linking environmental friendliness and shopping, the same survey gives lower, but still high, levels of involvement, here somewhat higher in Denmark than in Norway. When the question about practice is made even more specific and concrete, whether they ‘often’ buy organic products (alternatives ‘sometimes’ and ‘seldom’), this national difference becomes much more accentuated. While there is a considerable proportion of the respondents who regularly buy organic food in Denmark, very few do so in Norway. As will be reflected when discussing production below, the percentage of organic shoppers in Norway is probably overly optimistic.

<table>
<thead>
<tr>
<th>Important for their society</th>
<th>Denmark</th>
<th>Norway</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food poisoning</td>
<td>84</td>
<td>87</td>
</tr>
<tr>
<td>GM food</td>
<td>63</td>
<td>75</td>
</tr>
<tr>
<td>Animal welfare</td>
<td>91</td>
<td>89</td>
</tr>
<tr>
<td>Pesticides</td>
<td>87</td>
<td>82</td>
</tr>
<tr>
<td>Additives (preservatives, colouring)</td>
<td>80</td>
<td>77</td>
</tr>
<tr>
<td>Environmental friendliness important when buying tomatoes</td>
<td>50</td>
<td>42</td>
</tr>
<tr>
<td>Do you buy organic products - often</td>
<td>30</td>
<td>8</td>
</tr>
</tbody>
</table>

Table 1. Concerns for food issues, environmental friendliness, and shopping for organic food in Denmark and Norway (percent) (N=1200 in each country)

This difference regarding organic food on the consumption side is even more evident when turning to the marketing of organic food. In Denmark, the Coop supermarkets already in 1993 launched a large campaign offering reduced prices on organic products. The big supermarket chains (which together have 80-90 per cent of the retail market) have gradually developed centralized market of organic foods. 70 per cent of the organic food is sold through supermarkets. At the same time, there are quite successful alternative distribution channels, especially in the form of box schemes. The marketing of organic food has therefore developed into an extensive, but

2 The differences between the organic sectors in the two countries are reflected even in the availability of relevant, systematic information. While there is quite detailed knowledge of the consumption of organic food in Denmark and also good overviews of the distribution system, such knowledge is much more scarce in Norway – except when it comes to the shares of agricultural production that are organic. These differences make a comparison more difficult, but they do, at the same time, give a good illustration of the different degrees of institutionalisation of this area in the two countries.

3 The source is a representative telephone survey conducted as part of the TRUSTINFOOD project in November 2002 (Poppe and Kjaernes 2003, www.trustinfood.org). The survey was carried out in Denmark, Germany, Great Britain, Italy, Norway, and Portugal.
also heterogeneous system that is also reflected on the consumer side. Only 8-9 per cent of the Danes never buy organic food, while the largest proportion is represented by those who buy organic food sometimes or regularly, but without being characterised as “heavy users” (O’Doherty Jensen & al 2001, Torjusen & al, 2004). We can say that organic consumption in Denmark has become “normalized”, as reflected also in considerable differentiation internally among those who do use organic food.

This is contrasted by Norway, where the big supermarkets (which together have even higher market shares) have been little involved in the promotion of organic food. Few, expensive, and relatively low quality organic products have been on offer, not accompanied by any significant active marketing. Attitudes among consumers are relatively positive, and qualitative studies indicate that availability and price are felt as the major obstacles for buying more organic (Torjusen, 2001). Most of the organic produce has been sold via special shops (Helios), which are few and far between (Vittersø, 2001). This is changing a bit now, as for example reflected in Coop Norway and Norgesgruppen (two of the four totally dominant supermarket chains) launching a campaign this year on organic food. There are clearly very few heavy users and the majority (around two thirds) of the households never buy organic food. In Norway, the consumption of organic food has not in any way become normalized.

In Denmark, 6,5 per cent of agricultural production is organic. The supply is stable and quite diversified. In Norway, the proportions range from 1,7 per cent for dairy products to 0,6 per cent for meat. Added to that, only parts of the production are actually sold as ‘organic’ food. The rest (84 per cent for meat and 52 per cent for dairy products) are distributed and marketed as conventional products.

No directly comparative information on state support to organic production is available. In both countries, the state is heavily involved in direct support to organic production as well as in the development of standardisation and labelling programmes. The impression is that the Danish state was earlier and also more active, compared to the Norwegian state. It must be noted here, however, that while the Danish regulation represents policy support to an overall very intensive, profitable export oriented agricultural sector, Norwegian agriculture is protected by high import tariffs and strongly dependent on state subsidies. (This may be the reason why there are so detailed Norwegian figures on production and so little attention towards distribution and marketing.) If we look at the relationship between consumers and the state, there are also differences. The Danish state is generally very hesitant to intervene in food consumption practices, both regarding giving concrete dietary advice via educational measures and in the form of market regulation. This liberal political approach is very evident for example in nutrition policy. The Norwegian approach is instead characterised by high legitimacy for regulating food consumption, for example reflected in a long history of a nutrition policy that can be characterised by paternalism as well as market intervention.

We can see that one important explanation to the large differences in the consumption of organic food is to be found in the diverging provisioning systems. But it is also important to see this as the outcome of a complexity of relationships between various actors on the provisioning side, the state, and the consumers. We might speculate that while Danish public and
consumer reactions to intensive farming methods coincided with the
legitimacy problems that the producers encountered in export markets with
their price oriented, mass production strategy. Both the state and the retailers
seem to have been relatively sensitive to these changes. The Norwegian
situation is instead characterised by a very strong alliance between a public
thinking that the small-scale, protected farming is the best guarantee of safe
and environmentally sustainable food, and a farming sector that has
developed a clientilistic relationship to the state, legitimised by such issues
as well as rural development etc. In between these poles, there is in Norway
a manufacturing industry and a concentrated retailing sector which thrive on
the (protected) marketing and distribution of standardised food and
competing on price.

7 Conclusion

In this paper, we have argued against individualistic approaches to
sustainable consumption. Instead, a social and institutional understanding is
needed in order to capture how major social processes influence our daily
activities. ‘Practice’ is suggested as a concept that builds on a social
understanding of consumption, encompassing institutional, organisational,
and normative elements. It follows that consumption is seen not only as a
matter of choice in purchase situations, but rather as a series of activities
involving both the acquisition, appropriation, and use of goods. Practice is
seen to be shaped by institutionalised structures, conventions and normative
rules. Individual choice is not ruled out, since the ways in which individuals
engage in practices are not uniform. But individual choice is not the focus.
Rather it is seen as embedded in the events and social contexts in which
practices are organised. This means that when searching for how purchasing
and eating patterns change, we must direct attention towards the social
processes that influence these practices, rather than individual decision-
making. A model is introduced for how consumption is involved in
institutionalised interrelations with provisioning systems, regulators and civil
society.

We have presented a simple comparison of Denmark and Norway, two
countries that in most respects are very similar, but which are quite different
when it comes to consumption of organic food. Our presentation indicates
that explanations to these differences are not to be found in individual
concerns and motivations, but in socio-political and institutional structures
within the respective food sectors. It is quite obvious from the two cases that
these structures are not to be seen as a more or less abstract “context” for
individual decisions, but as institutions that are directly involved in and
influence the organisation of organic food consumption as well as its
normative framing. As a general characteristic, organic food, its production,
distribution, and consumption, comes out as normalised and highly
institutionalised in Denmark, while that is not the case in Norway.

Attempts to promote sustainable food consumption often concentrate on
information and education. There seem to be three important considerations
following from our line of argument.

First, conceptualising buying and eating practices as driven by social
factors means that the logic of how changes take place is not derived from
individual value hierarchies and preferences. Sustainable food consumption
is interpreted and handled within the context of everyday life, usually not as explicit reflections, but as part of the ‘muddling through’ that characterise mundane practices such as everyday eating (Holm & Kildevang, 1996; Halkier 2001b). Organic consumption represent situated events, influenced by strong, socially developed norms and conventions.

Second, influences on purchasing and eating cannot be sought only internally within practices. We have in this paper presented examples of how purchasing and eating are influenced by the institutional context, in our case of organic food first of all by public and private food provisioning systems. Tensions and mismatches may occur between such changes, on the one hand, and the habits and norms of eating, on the other. Tensions, mismatches and failing expectations between consumers and consumption practices, on the one hand, and the organisation and performance of food provisioning systems and regulatory institutions, on the other seem to be a major source of distrust (Kjærnes, Harvey & Warde, 2006, Halkier & Holm, 2003). Alternative buying such as organic food consumption is often seen as expressions of consumer distrust. But this understanding is too limited, we think. Trust is associated with the social relations that are involved and buying organics from big supermarket chains requires trust in that particular form of provisioning and the concrete institutions involved. Buying food through alternative, more personalised channels may take place as the outcome of a lack of trust in such large-scale institutions and systems, but it may also merely reflect the fact that in some countries established forms of small-scale marketing are continued. Such personalised, small-scale forms of provisioning and marketing do not necessarily generate trust.

As a third and final point, the emphasis on the institutionalisation of buying and eating, as opposed to individual choice, does not mean that people are seen as not having agency. Practices are differentiated and flexible regarding how people carry them out, and people may also act in direct opposition to the ‘normality’ of the practices. Importantly, also, institutional contexts constitute strong and powerful frames for practices, but they are not static or impossible to influence. It is, for example, of importance whether or not people as consumers respond to changes in the food supply by boycotting products and demanding organic food, or whether or not they as citizens resist GM food through collective action. The choices people make are formed by social structures, but these are in turn changed through the choices people make.

References
Environmentally Sustainable Food Consumption – An Institutional Perspective


FOOD Sustainable community cooking

Experiences from the interface between production and consumption of sustainable food

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1 Introduction

This paper deals with the sustainable development of food and of nutritional habits. Key questions about sustainable consumption and production of food regard conflicts between the different sectors and contexts of sustainable food. I answer them here with findings from empirical case studies on sustainable community cooking in three European cities (Vienna (Austria), Ferrara (Italy), and Bremen (Germany)). Evaluating community cooking, a growing trend in modern societies, provides relevant experiences for the use for other sustainable consumption and production systems.

2 Sustainability: a comprehensive approach

The Agenda 21, a document adopted by 173 states at the United Nations Conference on Environment and Development in 1992, defines sustainability as an economically, socially and ecologically accountable development which should fit into the different cultural and political contexts all over the world. Sustainability is considered as sustainable development. New forms of governance are required in order to implement normative sustainability ideas in changing societies. (UNCED, 1992)

This paper focuses on the complexity of sustainable development in order to tackle its potentials and limitations. The approach does not reduce complexity, but develops a structured concept and method, which allow to analyse entire political sustainability processes. Therefore the concept is differentiated into two dimensions. They are interconnected in reality. They serve as an analytical tool for the interpretation of political processes.
2.1 The procedural and the material dimension

The concept of sustainability challenges governance to develop and broaden cooperation between state and non-state actors. The Agenda 21 focuses on the involvement of society and different actors in decision making processes. Basically, those actors concerned by a decision should at least be consulted, if not included, in the decision making processes. Decision making demands transparency when new or complementary procedures are introduced into formal democracy. Sustainability encourages the importance of decision making at the regional and local levels. For processes of sustainable development this means that educational and democratic aspects of sustainability have to be included. This procedural dimension ("How?") refers to:

- all kinds of institutions and procedures and their responsibility for representation, participation, conflict resolution and decision making
- the roles different actors play in policy processes
- the levels of policy making (from local to global)
- different policies and sectors involved.

These procedural dynamics are distinguished from the material dimension of sustainability ("What?"). Sustainable development aims to integrate conflicting approaches and to resolve conflicts

- between the three pillars economy, ecology and social / cultural contexts
- concerning intragenerational justice, from the local to the global level
- concerning long-term intergenerational justice
- between genders
- between scientific disciplines
- in and between political and scientific risk assessment
- between reproductive, consumers’ and producers’ needs.

(Biermann, forthcoming)

2.2 The explorative and the normative level of analysis

2.2.1 Explorative analysis

The explorative analysis aims to reconstruct political sustainability processes which are expected to be non-linear and reflexive. Changes in the contexts of those processes are classified as referring or to the procedural or to the material dimension of sustainability. The aim is

1. to cover the various developments in all the contexts involved within the processes and
2. not to state mono-causalities which would reduce the complexity of the determining factors involved.
2.2.2  **Analysis of normative elements**

A second step identifies and reflects upon the accomplished normative aims, i.e. results that were intended or not and that favour or hinder sustainable development.

<table>
<thead>
<tr>
<th>levels of analysis</th>
<th>Procedural Dimension</th>
<th>Material Dimension</th>
</tr>
</thead>
<tbody>
<tr>
<td>explorative analysis</td>
<td>for example: number of groups involved in decision making procedures fostering local production of food</td>
<td>for example: amount of locally produced food consumed in a local community</td>
</tr>
<tr>
<td>analysis of normative</td>
<td>for example: democratic commitment increased or decreased throughout the governance process for local food production</td>
<td>for example: increase of locally produced and processed food as a substitute for food of unspecific origin</td>
</tr>
<tr>
<td>elements</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Data source: own data

The two-step analysis means that first analytic criteria are used which reflect the structure of the comprehensive sustainability concept underlying this research; in a second step, the identified processes and results are evaluated with the aim of identifying normative elements of sustainability. The two-step method can not be developed in detail here. I focus on the findings contributed by this method.

3  **Sustainable food and sustainable community cooking: a conflicting issue**

3.1  **Sustainable food in the procedural and in the material dimension**

This paper draws conclusions about sustainable food on the basis of the sustainability design developed above. Food is regarded as a cross-sectoral policy-field, which allows us to trace the complexity of the sustainability concept. This paper analyses different kinds of sustainable food and nutrition and how sustainable food could be fostered or its use be blocked.

According to the normative sustainability concept, sustainable food should

a) in the material dimension: fit different social needs and daily life requirements, be healthy and environmentally sound and satisfy the needs of the population, according to the cultural habits all over the world. (Brunner and Schönberger, 2005, Empacher and Götz, 1999, Rösch and Heincke, 2001, Simshäuser, 2005, Weller, 2004) This material dimension of

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1 The method is based on network and innovation theories (Meyer-Krahmer, 1998 Weyer, 1997), which are combined with policy-analysis and actor-network approaches (Haraway, 1995, Latour, 1999 Law, 1999 Marsh, 1998). With these approaches material sustainability outcomes are explained by the observed actor constellations, institutional changes and processes, and network and polity developments are at the same time attributed to the implementation of normative sustainability ideas. see Biermann, forthcoming.
sustainability focuses on the quantitative, qualitative and programmatic aspects of food. Furthermore, sustainable food should

b) in the procedural dimension: be ensured through a broad process of defining these needs. This process consists of consultation, discussion, conflict solving and consensus seeking, of political procedures and institutions - all on levels that range from local to global. (Heinelt, 2002, Müller, 2001, Schmalz-Bruns, 2002) This sustainability dimension has to do with procedural aspects. In order to make ideas and their implementation match developments in economic, social, environmental and political spheres, changes over time have to occur. Then sustainability gets to be congruent with sustainable development.²

Because food is referred to in environmental, health, agricultural, industrial, social and trade policies, this cross-sectional policy is expected to be treated by many different actors, including at the local political level. Because sustainable development of food has to be located in different policy fields, administrative and procedural innovations are needed, which change responsibilities of state actors and non-state actors. Responsibilities of non-state actors could be guaranteed through different forms of involvement of food producers, processors, distributors and consumers, but also through different forms of consultation of scientists and the public.

3.2 Research design

This research focuses on three questions:

1. What is sustainable food and how is it interconnected with nutritional habits?
2. Which are the main conflicts between the different sectors involved with the sustainable development of food (economy, ecology, logistics, health, education, culture)?
3. How, by whom and at what costs can these conflicts be resolved?

This paper answers these questions with findings from empirical case studies on sustainable community cooking in three European cities (Vienna (Austria), Ferrara (Italy), and Bremen (Germany)).

Community cooking (here: meals in canteens / cafeterias) is a pivotal form of food consumption, because large quantities of food are used (considerable relevance for production and especially for processing and distribution) and consumed by a large number of persons. Community cooking is becoming more and more economically, socially and environmentally important; it is a trend in modern societies (Eberle, Fritsche, Hayn et al., 2004, 34-46). In 1999 one third of the food in Western Europe was consumed outside of private households; the current trend is towards 50%. In this paper sustainable community cooking, as a hub between production and consumption, is considered as an indicator for sustainable development achievements.

I take empirical data from my study about community cooking in hospitals, kindergartens, homes for the elderly, schools etc. that have suc-

² For empirical research the local level of governance has the advantage of reduced complexity: Various rationalities in local contexts are expected to be represented by single persons and can be traced back to few individuals. At the local level the chances of modulating ongoing developments are limited to small scale developments, because regulation on regional, national and international levels leaves a delimited space to local governance.
Sustainable Community Cooking

cessfully executed a sustainability process with the active involvement of local authorities. The success of a sustainability policy is defined as changing menus and preparation methods by using organic, seasonal and/or regional food, changing knowledge and conscience about nutrition and healthier nutritional habits, changing responsibilities for food policies such as increased involvement of producers, processors, distributors and consumers, and involvement of science and the public in the sustainable development of community cooking.

This paper deals with experiences from three cities which conducted pioneer projects: they put food on the political agenda from the mid-1990s on. Therefore the local handling of nutrition and nutritional habits and the local governance modes in these municipalities differ significantly from other European cities.

3.3 Sustainable development of food: a process of conflict resolution

As sustainability is a very complex concept, sustainable development approaches of food differ from each other. They focus different problems of ecology, economy, of social and cultural responsiveness, of justice and power, and have diverging normative implications. In this chapter, first the most striking conflicts between theses approaches are presented. After that the conflict issues from the case studies are outlined.

3.3.1 Conflicts in sustainable development of food

Not all conflicts between the different sectors and contexts involved in sustainable food can be outlined here. Here only the most important conflicts are mentioned.

When dealing with sustainable food issues, conflicts occur between:

- products of special origin (local or regional production) versus products of a guaranteed high quality (e.g. from organic production or fitting diets) (Parrott, Wilson and Murdoch, 2002)
- ecological soundness achieved through regional versus through organic production (Eberle, Fritsche and Wiegmann, 2005)
- traditional meals versus different “schools” of alternative nutrition (e.g. whole foods, macrobiotic, ayurveda, raw foods)
- vegetarian or vegan nutrition versus (limited) consumption of meat or animal products

In addition, community cooking faces the following conflicts:

- higher costs (e.g. due to a high use of organic products) versus meals affordable for everybody (with mainly conventional ingredients)
- inner quality (quality of raw material) versus outer quality (freshness, processing and serving modes) (Maier, 2002)
- modern lifestyle products versus health and sustainability
- private canteens versus state responsibility for community cooking (e.g. in kindergartens and schools)
These conflicts mainly refer to the material dimension of sustainability. In the procedural dimension the main conflicts are between:

- private versus public/political responsibility for nutrition, nutritional habits and nutritional education
- the significance attributed to food and nutrition in the frame of regulation on agriculture, health, economy, ecology, logistics and/or culture

### 3.3.2 Case study findings

Here the three case studies are outlined with a focus on the main conflicts and their resolutions that the empirical research supported.

**Bremen**

In Bremen, Germany, in the frame of the Local Agenda 21, citizens and politicians discussed how to advance the regional economy; and a project was set up which dealt with regional agriculture. One of the aims was to provide canteens in Bremen with food of local origin. Kindergarten canteens, run by the church, were chosen as pilot kitchens for introducing local products with communal support. The project was expected to result in a reduction of transport expenses, improved logistics of the local food market and a bigger local demand of local products.

The local Agenda 21 group for regional economy in Bremen worked on improving the logistics between farmers and kitchens, to make the kitchens of the town’s kindergartens use regionally produced meat, milk and vegetables. A pilot project was initiated through the help of cross-sectoral co-operation within the town’s administration. Financing was a big problem throughout. But committed persons from the church and from a research institute turned out to be demanding and forceful actors. With the involvement of a local scientific institute, a “virtual marketplace”, a platform to exchange information about the supply of products from the region, was established.

The potential users of this virtual marketplace (farmers, retailers, cooks, kindergarten teachers) were trained in using a computer and communicating via internet. Kindergarten staff was informed about the advantages of fresh products for the health of children and how to integrate fresh products into the meals.

One of the Bremen project’s results is a small reduction of transport kilometres and a small increase of fresh products used in kindergarten canteens. But an environmentally sound logistic of distribution could not be established even after some years of experience with the virtual marketplace. The extension to other canteens in the municipality did not work out. The extension to other canteens in the municipality did not work out.3 The expansion into the region around Bremen is currently being organised.

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3 This is also due to the privatisation of the canteens; calls for tenders in Bremen are not centralised. This means that the communal responsibilities for the canteens are limited to some general set-ups. Another reason is the small importance of food in the German public debate. Food scandals are discussed, but the political focus is on the efficient and cheap supply of food. Food quality and traditions rarely enter the political agenda. Centralisation of the responsibilities for the food procurement could have become one issue during the project in Bremen; but it never became part of the local political agenda.
Ferrara

In Ferrara, the food issue got on the political agenda in the early 1990s, after parents, concerned about the health of their children in nursery schools and kindergartens, protested against the poor quality of food served in communal canteens. The local administration carried out a pilot experiment in two nursery schools. While the main food distributor took on the additional expense for using organic products, the administration shouldered the responsibility for getting to know the market supply, certification guarantees and the difficult logistics of procuring the distributor with the products, as well as for providing the kitchen staff, the consumers and the public with adequate information. The health effects on the children were evaluated by a scientific committee. This was the starting point for a cross-sectoral co-operation that was established within the regional and local administration in order to institute efficient and up-to-date action in the communal community cooking institutions. Local and regional scientists who co-operated with the project proposed to change the national diet (proposed for all school and kindergarten children by the national government) into a diet that fits the regional habits and regional nutritional requirements.

Throughout the years, the network between parents and the administration got closer and parents’ associations gained in importance. Parents, formerly concerned about nutrition in the nursery schools, became members of the local parliament, and hence sustainability gained importance on the political agenda. For the Local Agenda 21 in Ferrara, signed in 1996 and established in the following years, the food policy became a big issue. When eco-procurement was established in this framework in 1999, food procurement became one of the most important and most debated issues of this Local Agenda 21. The city council increased public subsidies for the children’s food step by step, following public pressure and declaring food a sustainability issue with long term importance.

In 1998 it was publicly discussed and decided in the city council that some nursery schools could maintain their own kitchens. Cooking processes were changed due to the newly introduced products of organic quality, diet and menus had to be changed, too. Most of the communal canteens, both those with their own kitchens and those where pre-cooked food is served, are actually served by a large caterer who succeeded in the local calls for tenders / bids.

When more than one third of the products was of organic origin, the project was expanded to all local kindergartens, nursery and elementary schools in Ferrara. There was continuing discussion in Ferrara, especially among members of green and social-democratic parties, about how to optimise nutritional education. Food became healthier because of the increased quality of ingredients and because of the new composition of the meals. The municipality increased subsidies for the canteen meals, and this increase was accepted by parents and by the public. Not only economic and environmental goals were achieved; as nutritional education was fostered, social components gained importance with the process as well. Other goals, like the use of regional products, were not achieved. Educational and informational training and meetings were offered not only for children, but provided also for kitchen staff, parents and members of the local administration.
The years of step-by-step processes reached a peak in 2004, when the proportion of certified organic food reached 80% of the food served in the local schools. This high percentage can be attributed to the fact that for the biggest caterer serving most of these schools, it became more efficient to have only one product line which is nearly fully organic.

The most important aspects for the realisation of the extensive food project in Ferrara are the shared responsibilities in changing network constellations. Kitchen staff, teachers, local administration members, politicians and food distributors were involved in the realisation of the project. They included the protesting parents and the development of the market of organic products in the steering activities. The local city council, in different resolutions, took over their suggestions for organic food, a new composition of meals (not only regarding the quality of the ingredients, but also their different amounts of nutritional values), and education on nutritional habits, and increased the local subsidies for the children’s meals. The project was integrated in the Ferrara Local Agenda 21 network on eco-procurement. The goals for community cooking of the implementing actors (cooks, local school authorities, food distributors, caterers) were taken over by the local city council. This means that goal formulation and strategy implementation were highly interconnected at the local level.4,5

Vienna

In Vienna, Austria, politicians decided to put up an extensive programme for climate protection, and scientists, working on healthy food in research institutes and local hospitals, took the programme and studied the climate impact of organic and non-organic food production. Food became, unexpectedly for the first promoters of the climate issue, an important field for the reduction of CO2 emissions and eco-procurement.

The climate protection programme helped health scientists to build networks with sections of the local administration and some politicians. The health of children was defined a political goal, guaranteed through organic food in public canteens. While eco-procurement actions profited from the professionalism of the health networks, the health protagonists used the climate protection programme for establishing well defined political aims and getting idealistic and financial support for their actions inside their own institutions and in the public debate about Vienna as a sustainable city.

From the local hospitals the use of organic food spread to other community cooking institutions. In these institutions kitchen staff and administrators profited from the experiences made in the hospitals.

In Vienna, in 2004 30% of the served food in all communal hospitals, retirement homes, schools and kindergartens is of certified organic quality. The extension up to 50% is a political aim, but with the actual economic restrictions it is only manageable to hold the standard of 30%.

4 In order not to put too much normative valuation on this aspect: The involvement of implementing actors in the formulation of goals and programmes does not broaden the democratic legitimation of the food policy in Ferrara.
5 Detailed description see: Biermann, 2005
Table 2: Overview over three pilot cases

<table>
<thead>
<tr>
<th></th>
<th>Bremen</th>
<th>Ferrara</th>
<th>Vienna</th>
</tr>
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<td>health</td>
<td>climate</td>
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<td>nursery schools, kindergartens and schools</td>
<td>hospitals, kindergartens, schools, retirement homes</td>
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<td><strong>cooking</strong></td>
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<td></td>
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<tr>
<td><strong>institutions</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>aims</strong></td>
<td>reduction of transport expenses, improved logistics</td>
<td>health, eco-procurement</td>
<td>reduction of CO2-emissions, health</td>
</tr>
<tr>
<td><strong>main actors,</strong></td>
<td>cross-sectoral cooperation in administration, church and scientists</td>
<td>public pressure, commitment of administration, scientists, pioneer caterer</td>
<td>large progressive administration, scientists, commitment of local government</td>
</tr>
<tr>
<td><strong>procedures</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>and institutions</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>main results</strong></td>
<td>virtual market place, more regional products also for the region</td>
<td>health education, up to 80% organic food</td>
<td>30% organic food</td>
</tr>
</tbody>
</table>

Data source: own data

In all three cases the backing from broader programmes and formal democracy was required for the mid- or long-term establishment of the projects.

Health and environmental aspects were the basis policy in all three projects; and while in Vienna the topic food quality and social justice for all children was put on the political agenda, education became an important part of the projects in Ferrara and Bremen. This means that social aspects of the sustainability concept gained importance throughout the three processes.

The sustainable food concept develops from the ideas the first initiators had; this is also due to the fact that legal and food market changes are selectively integrated into the projects. The material dimension of sustainable food is linked to its potential role as contributor to health, environment, regional production and education.

4 Sustainable food and sustainable community cooking: solutions

The presented empirical findings from select local municipalities in Europe are now explicated with a focus on the inherent conflicts and their solutions.

4.1 Conflict resolutions in the procedural dimension

In the case of Bremen, institutional reasons, such as competences of departments, were responsible for pulling the project out from the local frame. The local actors had to integrate themselves into regional networks; the local municipality stepped back.

The local officials and a large part of the public in Ferrara considered healthy food and nutritional education an important issue of local political responsibility. The public or private organisation of canteens in the different educational institutions is still being discussed currently.
In Vienna, initially separate policies and networks had to converge in order to allow sustainable food to enter the political agenda. Though the number of actors and institutions involved in sustainable food increased enormously, the project pioneers fight continuously for political support of the solutions that were found.

Table 3: Conflicting sustainable food issues in the procedural dimension

<table>
<thead>
<tr>
<th>Conflicts</th>
<th>Bremen</th>
<th>Ferrara</th>
<th>Vienna</th>
</tr>
</thead>
<tbody>
<tr>
<td>conflicts</td>
<td>local municipality’s Local Agenda 21 not able to foster sustainable food, though local actors are working on sustainable community cooking</td>
<td>public and local administration’s responsibility for community cooking versus delegation of decisions (concerning the choice of products and meals) to private organizations</td>
<td>no institutional backing for health scientists who wanted to increase food quality</td>
</tr>
<tr>
<td>solutions</td>
<td>regionalization of the former local project</td>
<td>kindergarten kitchens remain public; schools are served by caterers (with increased controls by local authorities)</td>
<td>climate protection programme is expanded onto eco-procurement (including food) and networks fuse</td>
</tr>
<tr>
<td>remaining conflicts</td>
<td>only few local and some regional community cooking institutions participate in the project; municipality has gotten rid of responsibility</td>
<td>continuing public pressure is needed to ensure local municipality’s responsibilities</td>
<td>continuing pressure of health scientists is needed to ensure the implementation of the climate protection programme</td>
</tr>
</tbody>
</table>

Data source: own data

Focusing on the procedural dimension, step-by-step developments in the kitchens and administrations and in politics are identified. The interconnectedness between actors, institutions and networks between these contexts is important for the realization of the projects. The processes are much more complex than just an implementation of political programmes. This is proven by the fact that political programmes on sustainable topics other than food formed the framework for the realisation of sustainable community cooking. Those programmes are influenced strongly from regional and national levels; local aims subordinate and adapt to these programmes.

Scientists helped to integrate the projects into comprehensive local programmes; kitchen staff, teachers and administration members played crucial roles in establishing effective structures for the use of sustainable products and the enlargement of the pilot projects to other community cooking institutions. The central actors are increasingly conscientious about the interdependencies between their roles and the local institutions; they use networks more and more strategically during the processes in order to avoid and resolve conflicts.

4.2 Conflict resolutions in the material dimension

While in the case of Bremen regionally produced food was fostered because of its regional economic and its ecologic impact, the focus in Ferrara and Vienna changed onto organic product quality. This was also due to the
procurement strategies which afforded calls for tenders/bids allowing strictly
defined product quality.

One big conflict in the Bremen project was that a highly developed
logistic did not fulfill the needs of a local project. The expansion of the
project to the region helped the virtual market place to develop, while the
local orientation of the project, and with it the aim of a strengthened local
economy, was diluted.

In Ferrara community cooking meals were changed completely in order
to fulfill health needs. The proportion of meat used in the meals was reduced
and other food traditions were given up. Kitchen staff, parents and teachers
defended the traditional ideas against modern scientific knowledge. Changes
were introduced step by step and education, a big issue in Ferrara and its
region, was fostered in order to resolve the upcoming conflicts.

The convictions about healthy food, shared among health scientists in
Vienna’s hospitals, had to be adapted to the climate protection philosophy
which dominated the sustainability approach of the local policies. Organic
production fulfilled climate protection and health requirements and fit into
the organizational requirements of big community cooking institutions. The
supply structures for many of the involved community cooking institutions
changed: Either producers and retailers obtained a certification or they lost
their business with the city of Vienna. The organic market grew rapidly and
the conditions for the use of organic food in the city’s kitchens increased.

<table>
<thead>
<tr>
<th>Conflicts</th>
<th>Bremen</th>
<th>Ferrara</th>
<th>Vienna</th>
</tr>
</thead>
<tbody>
<tr>
<td>use of local and regional products</td>
<td>use of local and regional products versus highly developed and modern logistics</td>
<td>traditional nutrition versus healthier nutrition</td>
<td>only certified organic products fit the climate protection programme</td>
</tr>
<tr>
<td>regulating the former local project</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>information and nutritional education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>remaining conflicts</td>
<td>notion of region is expanded, aim of reduced transportation distances is only partly achieved</td>
<td>continuing education cannot be guaranteed as economic restraints increase</td>
<td>increased logistical efforts and economic problems in the kitchens; quota of organic food is not always fulfilled</td>
</tr>
</tbody>
</table>

Data source: own data

The conflicts between the use of certified organic versus locally produced
food were resolved differently. In Bremen the local orientation dominated,
while organic food served different aims in Ferrara and Vienna and could be
integrated in the city’s policies.

In Ferrara the food quality was increased due to reduction of food
amounts; but the use of organic products remained limited. The focus on the
public responsibility for healthy food was guaranteed through publicly
organized kitchens and big efforts in nutritional education.

Scientists and “implementing” actors played crucial roles in defining the
choice of the realised aspects of sustainability. They resolved theoretical and
especially practical problems which kind of food to prefer and how to
influence consumers’ choices.

In all the three cases logistical improvements and fostering of nutritional
education became necessary in order to fulfill environmental and health
claims. Social aspects of the sustainability concept gained importance during the processes; education in particular was pivotal to realize economically and environmentally sound nutritional habits.

5 Conclusion

The initial ideas of the implementing actors have been realised only partly in all three cases. The actors worked step-by-step, they changed cooking processes and menus and worked out problems with producers and distributors. This implies that they determined the way food contributed to the normative aims of sustainability. The food projects were integrated in large programmes on other sustainability issues: in Ferrara into the eco-procurement, in Vienna into the climate protection programme and in Bremen, with some effort, into a regional agriculture project.

The most important finding from the case studies in the material dimension of sustainability is that social aspects of the sustainability concept gained importance throughout the three processes. Health and environmental aspects were the policy basis in all three projects; and while in Vienna the topic food quality and social justice for all children was put on the political agenda, education became an important part of the projects in Ferrara and Bremen.

Sustainable community cooking at the interface between production and consumption means that “demand changes supply”, but this occurs in a step-by-step reflexive process with different actors with different steering resources involved with changing strategies. From community cooking, a growing trend in modern societies, relevant experiences can be evaluated for the use for other sustainable consumption and production systems:

Sustainable development strategies do not have to be labelled with sustainability; as the case studies show, complex sustainability strategies are created from programmes with a focus on local economy, health education or climate protection. Information and education programmes are prerequisites for continuing processes and the involvement of actors from different institutional contexts. Sustainability needs their flexibility and their fantasy. Sustainable development can easily be blocked and also manipulated for isolated political aims. The advanced sustainability processes analysed in the empirical cases presented here show that a small leeway was sufficient for the efficient use of existing resources and actor networks. The main actors reached some of their aims by making only small efforts and by adapting to existing programmes and networks. The conflicts they solved on the way were structural conflicts between contexts and sectors, underlying the local policies and sectors in general. During the sustainability processes these conflicts became manifest; they were not resolved in general. They were resolved partly in step-by-step processes which were inserted in the dominating policies of each single local municipality.
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Food Development of a Sustainability Indicator for Agro-Food Consumption and Production:

Efforts of the Food Study Group, the Institute of Life Cycle Assessment, Japan

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1 Introduction

1.1 The Concept of Eco-efficiency in the Food Sector

In order to turn the on-going agro-food consumption and production pattern into a more sustainable mode, quantification of environmental load on concerning products throughout their entire lifecycle is a prerequisite. Moreover, it is necessary to seek acceptable measures in consumption and production patterns that could lead to sustainability. For that reason, a sustainable indicator is necessary to evaluate the adopted measures.

In this paper, we adopted the concept of eco-efficiency (WBCSD, 1992) in development of a sustainability indicator. Eco-efficiency is evaluated by comparing a concerning product’s service value with its environmental loads. The measures that lead to sustainable food system should either: (1) minimise the environmental burden caused by food; or (2) maximize the value of food for consumers, or both. That is why quantification of both environmental burden and value of food is necessary. For former, life cycle assessment (LCA) is used to quantify the environmental burden through the measurements of energy consumption, CO₂ emission, and so forth, from food items or meals. We decided to take life cycle CO₂ emission (LC-CO₂) as representative of the environmental load. On the other hand, quantification of value of food is an obstacle. The definitions of ‘values’ of agro-food products and meal, and how to quantify them are still under
discussion. Value or benefit of food could be nutrient balance, taste, price, easy cooking, safeness, preservation of food resource, production rate, etc. Exploring the feasibility of adopting these evaluation criteria is necessary.

1.2 Establishment of Food Study Group (FSG) in the Institute of Life Cycle Assessment, Japan

The Food Study Group (FSG), a voluntary-based study group formerly established in 2004 in the Society of Non-Traditional Technology’s “Sustainable Consumption Project,” has been sponsored by the Institute of Life Cycle Assessment, Japan. The director of FSG is Dr. Atsushi Inaba of University of Tokyo, and membership includes 36 from various organizations, including academia, national research institutes, consulting companies, and private enterprises. The objectives of FSG for 2005-2006 are: (1) quantification of environmental loads with regard to agro-food consumption and production; and (2) development of a sustainability indicator for agro-food consumption and production. Through these objectives, FSG aims to investigate each production process of agro-food materials (production, supply, processing, consumption, etc.) to find new research themes for the solutions to the current environmental issues.

1.3 Evaluation Scope and Tasks

1.3.1 Evaluation Scope

The evaluation scope of the FSG is as follows:

(1) LCA on food items and meals (LC-CO$_2$)
   - resources collection, production, transportation, consumption and disposing,
   - different types of meals (Japanese, Western, and Chinese)

(2) Comparison of cooking methods (in the same meal)
   - home cooking, processed food and restaurant

(3) Comparison of preservation techniques (in the same food)
   - refrigeration, freezing, drying, retort, can, etc.

(4) Comparison of acquisition procedure (in the same food)
   - Fishery - distant water, offshore water, aquaculture
   - Agriculture - open field, greenhouse cultivation and imported

1.3.2 Tasks

For the development of a sustainability indicator for agro-food consumption and production, not only reduction of environmental burden but also increasing the food value, such as healthiness, nutrient balance, taste, price, easy cooking, safeness, etc., that affect the increase of quality of life, is necessary. For that reason, the FSG had two tasks for 2005-2006 as the following: Task 1: life cycle inventory analysis (hybrid LCA) of food products and meals; and Task 2: discussion on the criteria of food values and quantification.

FSG set forth five meal menus, accumulated inventory data and calculated LC-CO$_2$ for major agro-food products and for five different meals that consist of those products as ingredients.
Conclusions

The purpose of this paper is to introduce the outcome of the Food Study Group’s outcome from its research activities in life cycle inventory analysis and its attempts to quantify food value that will be lead to the development of a sustainability indicator in food sector.

2 Setting of the Model Menus

The model menu for the calculation of LC-CO$_2$ was set based on the consideration of the following: (1) include staple food, main dish, side dish, soup, and high frequency in appearance in the average household’s tables according to Marketing Research Service, Inc.’s (MRS) Menu Census in 1999, 2001 and 2003; and (2) with a variety in styles in cooking, including home cooking, processed food and restaurant. For example, one can assess the difference in LC-CO$_2$ of the same dish in the same menu by altering from home cooked meal to retort or processed meal from a convenience store. MRS announces every other year the top 100 meals that appear in an average household. The menus used for this study are shown in Table 1.

Table 1: The menus used for this study

<table>
<thead>
<tr>
<th>Breakfast</th>
<th>Lunch + Sweets</th>
<th>Supper 1 (Japanese)</th>
<th>Supper 2 (Western)</th>
<th>Supper 3 (Chinese)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toast</td>
<td>Ramen noodle</td>
<td>Rice</td>
<td>Rice</td>
<td>Rice</td>
</tr>
<tr>
<td>Fried egg</td>
<td>Soup</td>
<td>Miso soup</td>
<td>Corn potage soup</td>
<td>Zya zuai row su tan</td>
</tr>
<tr>
<td>salad</td>
<td>Fruit</td>
<td>Grilled fish</td>
<td>Hamburg stake</td>
<td>Fried chicken</td>
</tr>
<tr>
<td>Yogurt</td>
<td>Tea</td>
<td>Chawan mushi</td>
<td>Bean saute and Carrot grasset</td>
<td>Stirred vegetables with thick sauce</td>
</tr>
<tr>
<td>Coffee</td>
<td>Blanemange</td>
<td>Pickles</td>
<td>Potato salad</td>
<td>Desert</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fruits</td>
<td>Fruit</td>
<td>Beer</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Beer</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The amount of each ingredient was determined based on the Health, Labour and Welfare Ministry’s “Japanese Food Guide Spinning Top.” The Guide illustrates the applicable amounts of food items per serving for Japanese adults to stay healthy. We made sure that the amounts of nutrients taken through the model menu are sufficient to the demand of women 30-49 in age with the activity level of “average” (Class II).

The amounts of ingredients for dishes were determined from the conventional recipe books. Then, the weights of each ingredient were calculated into gram-use per four persons, assuming that the average number of family members in a household is close to four. Table 2 shows an example of menu (breakfast). In Table 2, “T” stands for “table spoon” and “t” stands for “tea spoon.”
Table 2: Example Menu: Breakfast

<table>
<thead>
<tr>
<th>Dish</th>
<th>Ingredient</th>
<th>Cooking Measure</th>
<th>gram-use per person</th>
<th>gram-use for four persons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toast</td>
<td>Sliced bread</td>
<td>1 slice</td>
<td>75</td>
<td>300</td>
</tr>
<tr>
<td></td>
<td>Butter or</td>
<td>0.5 T</td>
<td>6</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>margarine</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Strawberry jam</td>
<td>0.5 T</td>
<td>10</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>Egg</td>
<td>1</td>
<td>50</td>
<td>200</td>
</tr>
<tr>
<td></td>
<td>Vegetable oil</td>
<td></td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Salt</td>
<td>0.25</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pepper</td>
<td></td>
<td>A little</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lettuce</td>
<td>40</td>
<td>160</td>
<td></td>
</tr>
<tr>
<td>Salad</td>
<td>Cucumber</td>
<td>20</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tomato</td>
<td>50</td>
<td>200</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mayonnaise</td>
<td>1 T</td>
<td>12</td>
<td>48</td>
</tr>
<tr>
<td></td>
<td>Plain yogurt</td>
<td>100</td>
<td>400</td>
<td></td>
</tr>
<tr>
<td>Yogurt</td>
<td>Coffee</td>
<td>1 T</td>
<td>10</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>Sugar</td>
<td>1 t</td>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Milk</td>
<td>1 t</td>
<td>5</td>
<td>20</td>
</tr>
</tbody>
</table>

3 Life Cycle Inventory Analysis of Food (Hybrid LCA)

The output of FSG in 2005-2006 includes calculation of LC-CO$_2$ for various agro-food products, such as rice, wheat, soybeans, crude sugar, tomato, dried noodle, vegetable oil, refined sugar, cooked rice and meat, and for five different meals that consist of those products as ingredients. A hybrid approach of process LCA and I-O analysis was taken. The survey on imported goods included energy consumption at production stage in the country of origin and ocean transportations.

3.1 LCI of Food Items via Process LCA

Tables 3 shows the results of LCI of agricultural products via process LCA. In the case of imported wheat from the United States arriving to Japan, for example, the LC-CO$_2$ is estimated to be 383.8 g-CO$_2$/kg-wheat. The LC-CO$_2$ of flour based on the imported wheat is estimated to be 520.1 g-CO$_2$/kg-flour (Table 4). The LC-CO$_2$ for other imported items are: soybeans 413 g-CO$_2$/kg-product; and unrefined sugar 232 g-CO$_2$/kg-product. The domestic products are: brown rice 333, cabbage 39, and tomato (758 and 179) without transportation (in g-CO$_2$/kg-product). Notice that the green house grown tomato costs over four times as much CO$_2$ as that of tarpred.

Table 4 and 5 show CO$_2$ emissions of various processed food products. For example, the CO$_2$ emission of bread is 1,013 g-CO$_2$/kg-dry (251.2 g-CO$_2$/loaf). In Japan, a slice of toast is served at a meal and is 1/6 of a loaf. Therefore, the CO$_2$ emission from one serve of toast is 42 g-CO$_2$. It is clear from the results in Table 4 that the CO$_2$ emissions for one serve of toast, wet noodle (49.4 g-CO$_2$/kg-product) and dried noodle (68.2 g-CO$_2$/kg-product) are in the same range. However, the CO$_2$ emission from imported wheat is predominant in noodle production, whereas both wheat and baking are dominant in bread production, indicating that baking process is more energy intensive than noodle drying or frying. The CO$_2$ emissions of soybean oil, refined sugar and steamed rice are in the same range from 580 to 850 g-
Conclusions

CO₂/kg-product. Further, Calculation on beef cattle production revealed its LC-CO₂ to be 10.9 kg-CO₂/kg-beef (data not shown in Table). The results of the inventory analysis suggested that the LC-CO₂ were higher in protein-rich products followed by carbohydrate-rich products.

Table 3: CO₂ emissions of agricultural products (Unit: g-CO₂/kg-product)

<table>
<thead>
<tr>
<th></th>
<th>Wheat</th>
<th>Soybeans</th>
<th>Imported unrefined sugar</th>
<th>Rice (brown rice)</th>
<th>Cabbage</th>
<th>Tomato</th>
<th>Tomato</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>U.S.A.</td>
<td>U.S.A.</td>
<td>Thailand</td>
<td>Domestic</td>
<td>Domestic</td>
<td>Green house</td>
<td>Tapped</td>
</tr>
<tr>
<td>Agricultural process abroad</td>
<td>206</td>
<td>197</td>
<td>146</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inland transportation</td>
<td>84</td>
<td>134</td>
<td>38</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marine transportation</td>
<td>94</td>
<td>82</td>
<td>48</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agricultural process in Japan</td>
<td></td>
<td>333</td>
<td>39</td>
<td>758</td>
<td>179</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transportation</td>
<td></td>
<td>59</td>
<td></td>
<td>152</td>
<td>152</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>384</td>
<td>413</td>
<td>232</td>
<td>392</td>
<td>39</td>
<td>910</td>
<td>331</td>
</tr>
</tbody>
</table>

Table 4: CO₂ emissions of various processed food products (Unit: g-CO₂/kg-product)

<table>
<thead>
<tr>
<th>CO₂ emissions from bread baking</th>
<th>CO₂ emissions from production of wet noodles</th>
<th>CO₂ emissions from production of dried noodles</th>
</tr>
</thead>
<tbody>
<tr>
<td>FU: A loaf of bread</td>
<td>FU: One serve (120g)</td>
<td>FU: One serve (100g)</td>
</tr>
<tr>
<td>Emission (g-CO₂)</td>
<td>Emission (g-CO₂)</td>
<td>Emission (g-CO₂)</td>
</tr>
<tr>
<td></td>
<td>Ratio (%)</td>
<td>Ratio (%)</td>
</tr>
<tr>
<td>Imported Wheat</td>
<td>116</td>
<td>Imported Wheat</td>
</tr>
<tr>
<td></td>
<td>46.2</td>
<td>41.8</td>
</tr>
<tr>
<td>Flour Milling</td>
<td>11.7</td>
<td>Flour Milling</td>
</tr>
<tr>
<td></td>
<td>4.7</td>
<td>4.1</td>
</tr>
<tr>
<td>Other Ingredients</td>
<td>37</td>
<td>Other Ingredients</td>
</tr>
<tr>
<td></td>
<td>14.7</td>
<td>1.0</td>
</tr>
<tr>
<td>Bread Baking</td>
<td>86.5</td>
<td>Noodle Making</td>
</tr>
<tr>
<td></td>
<td>34.4</td>
<td>2.5</td>
</tr>
<tr>
<td>Total</td>
<td>251.2</td>
<td>Total</td>
</tr>
<tr>
<td></td>
<td>100</td>
<td>99.4</td>
</tr>
</tbody>
</table>
Table 5: CO2 emissions of various processed food products (cont’d)

<table>
<thead>
<tr>
<th>CO2 emissions from soybean oil production</th>
<th>CO2 emissions from refined sugar production</th>
<th>CO2 emissions from rice production and cooking (household)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FU: 1 kg-product</td>
<td>FU: 1 kg-product</td>
<td>FU: 1 kg-product</td>
</tr>
<tr>
<td>Emission (g-CO2)</td>
<td>Ratio (%)</td>
<td>Emission (g-CO2)</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>------------------------------------------</td>
<td>----------------------------------------------------------</td>
</tr>
<tr>
<td>Imported Soybeans</td>
<td>432.7</td>
<td>239.0</td>
</tr>
<tr>
<td>Soybean Meal Production</td>
<td>73.4</td>
<td>342</td>
</tr>
<tr>
<td>Degumming</td>
<td>103.1</td>
<td>581.0</td>
</tr>
<tr>
<td>Refining Soybean oil</td>
<td>84.0</td>
<td>598</td>
</tr>
<tr>
<td>Total</td>
<td>593.2</td>
<td>845.0</td>
</tr>
</tbody>
</table>

3.2 LCI on Meals via Hybrid LCA

FSG calculated the CO2 emissions not only of agricultural food products but also house-cooked meals. The CO2 emission was calculated by combining the CO2 emission of the ingredients and that of direct energy consumption through cooking. The CO2 intensity data for ingredients are taken from 3EID based on I-O table in 1995. The CO2 from salt, pepper and soy sauce were considered negligible as they are used in small amounts. For some food items, we chose to use the inventory data that were obtained from our process LCA.

The LC-CO2 on a model meal (Supper 2 – Western) is shown in Table 6. The columns in left hand side are a list of ingredients and weights. The columns in middle are list of CO2 intensities of ingredients and energy consumption via cooking. “Ajinomoto version of LC-CO2 coefficient database” based on the Embodied Energy and Emission Intensity Data for Japan Using Input-Output Tables (3EID) and Input-Output Table Analysis (1995) was used for the calculation of CO2 emissions of ingredients. Direct energy consumption from cooking was measured, and CO2 intensities for energy were obtained from the publications of the Ministry of the Environment. The calculated CO2 emission via process LCA is also included for some food items and listed in the columns in right hand side.

Table 7 shows the summary of LCI results of all the model meals (unit: g-CO2/meal). Among five model meals, the LC-CO2 including ingredients and cooking with I-O data and process LCA for breakfast was the smallest (1,172 g-CO2), and lunch closed to 2,000g-CO2, Supper (Japanese and Chinese) 3,000 g-CO2, and the highest emission was found in Western supper 5,900 g-CO2.
Conclusions

Table 6: LCI on model meals (Supper 2 - Western)

Table 7: Summary of LCI results on meals (Unit: g-CO2/meal)

3.3 Conclusions on LCI

1) Agricultural food products
   • High LC-CO2 for proteins (livestock and marine products)
   • High LC-CO2 for carbohydrates (rice, bread, noodles)

2) Energy consumption in cooking
   • Higher CO2 for boiling, steaming, and simmering, than flying and deep-flying
   • Japanese: 600g-CO2, Western: 400g-CO2, Chinese: 300g-CO2

3) Meals
   • Breakfast: 1,000g-CO2, Lunch: 2,000g-CO2, Supper (Japanese; Chinese): 3,000g-CO2, (Western): 6,000g-CO2

4) LC-CO2 via I-O Table Analysis
   • Though there are some difficulties, the data are useful to acquire a holistic view of the agro-food production and consumption.
4 Development of a Sustainable Indicator for Food

FSG launched in 2005-2006 the discussion on the possible methods of quantifying the value of food. This paper shows a summary of our effort up to date.

The following equation is one of the possible examples toward this end, though this does not necessarily reflect the final views of FSG:

\[
\text{Value} = \frac{T_i}{T_{\text{max}}} * W_T + \frac{B_i}{B_{\text{max}}} * W_B + \frac{H_i}{H_{\text{max}}} * W_H \cdots \quad (\text{Eqn 1})
\]


The procedure is:

1. quantify the rating of each criterion (taste, nutrient balance, health, etc.), and adopt relative evaluation to each criterion among the food items compared (Max=5; Min=0), to normalize the rating, and
2. if necessary, multiply the normalized numbers by weighting factors to derive the values.

One can vary the criteria by objects of evaluation, as the calculated values are object-specific.

4.1 Criteria for Quantification of Values

Choosing the criteria for quantification of values is one of major obstacles. For example, the following criteria could readily come to minds of the members of FSG:

- Economical: price, overall cost, etc.
- Healthy functionality: Dietary fiber contents
- Availability (yearly): Long-life nature, freshness
- Safeness: (How to quantify?)
- Nutrient balance: Weighting, number of serving, or number of food items
- Easy cooking: Cooking time or number of process
- Taste: Sensory evaluation method
- Satisfaction: (Survey?)

However, the question is which to choose as appropriate criteria and how to quantify the value. Report of Home Energy Management Survey Related to Dining (Energy Conservation Centre, Japan, 2005) surveyed consumers’ criteria for dining itself and for food shopping. They are shown in Figure 1 and 2. According to the survey, consumers find value in nutrient balance, home-made, food season and easy cooking for dining. However, when it comes to food shopping, the criteria are price, freshness, expiration date, safeness and season. It is clear from the results that the consumers’ criteria for dining and food items are different. It is indicated that value of food cannot be quantified with just one simple set of criteria, but they need to be discussed in a structured concept and with categorized levels of food from a food item, a meal, to dining including service, because the values of food vary in the consumers attributes, life scenes, situations and occasions, and other possible factors. FSG will have further discussions in this fiscal year on the purpose of the indicator, the subject of evaluation, definition of the...
value of food, application, criteria, and quantification method to develop a sustainable indicator in agro-food sector.

![Figure 1: Consumers’ Criteria for Dining (n=1011) (Energy Conservation Centre, Japan, 2005)](image1)

![Figure 2: Consumers’ Criteria for Food Shopping (n=1014) (Energy Conservation Centre, Japan, 2005)](image2)

5 Overall conclusion

In 2005-2006, FSG evaluated lifecycle CO₂ emission (LC-CO₂) for various agro-food products including grains, meat, and vegetables, and for five different meals that consist of those products as ingredients. A hybrid approach of process LCA and I-O analysis was taken. The survey on imported goods included energy consumption at production stage in the country of origin and ocean transportations. CO₂ emissions induced by cooking were calculated based on the actual measurements of energy consumption. The result suggested that the CO₂ emissions per kg-product for
high protein products (meat, dairy, and fish) tend to be high, followed by high carbohydrate products (rice and bread). With regard to cooking, boiling and steaming tend to emit more CO₂ than stir-frying and deep-frying due to their longer cooking time.

The Food Study Group also had discussions on the method of quantifying food value in hope of producing a novel sustainability indicator in agro-food consumption and production. The specific method for the development of such indicator is underway.

References


Car Purchasing as a Social Practice at the Consumption Junction

The showroom as the place where two worlds meet

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1 Introduction

Sustainable consumption and sustainable mobility are two key topics both in governance debates as in business concerns. In recent years, the growth in mobility has been much higher in the domestic consumption domain than in the business consumption domain. Therefore, as the largest stakeholder group, the potential role of consumers in transitions towards sustainable mobility patterns is not hard to imagine. However, while some progress has been made, most sustainable mobility opportunities have not been received with great enthusiasm by consumers. Even worse, the increasing importance of consumers is doubled by a difficulty to understand them (Dagevos, 2005). Therefore, current systems of mobility are fast becoming one of the most structural problems of our society.

With the use of a practice-oriented approach this paper focuses on one specific element of sustainable mobility: namely new car sales. We analyze the social practice of car-purchasing and describe the dynamics taking place when producer and consumer rationales meet in a showroom. The role of different state, market and civil-society actors in the provisioning of (environmental) information are investigated in direct relationship with access to, and evaluation of, these information flows by citizen-consumers.

This paper presents the initial results of a research programme which aims to contribute to a consumer-oriented mobility policy through the active involvement of consumer groups in environmental policy and practice. We feel there is a need to reformulate generic environmental policy goals into concrete contextual and practice specific heuristics facilitating more sustainable mobility practices.

2 Consumption domains in transition

The large environmental impacts related to daily consumption patterns are by now widely acknowledged in societal, political and academic circles. Importantly, the need to change a primarily producer-led SCP-policy...
towards a more integrated and systemic approach has now also been internationally recognized. It is safe to conclude that the consumerist turn – with its focus on sustainable consumption behaviour, lifestyles, and daily routines – provides a major addition to a focus based solely on increased eco-efficiency of products and services. Furthermore, with the consumerist turn a stronger emphasis was put on consumption issues without lapsing into the social-psychological models which have dominated analyses of unfriendly environmental behaviour up till now (Spaargaren, 2003; Shove and Warde, 1998). With the realisation that production and consumption structures are highly interdependent, the international debate has transcended from the question on which ‘level’ changes in SCP-chains should take place. Generally it is believed that neither a behavioural fix nor a technological fix is a feasible option nowadays. Nevertheless, although major steps have been taken and interesting insights into consumption dynamics have been gained, still challenges and questions remain on the appropriate consumer-oriented environmental policy. Though we have come to realize that consumption is more than individual fulfilling of needs and that consumers act more on the basis of behavioural routines than rational choices, a solid and concrete policy approach on how to direct these routines is lacking. As Hertwich (2006) states: “sustainable consumption research should focus more on how to shape habits and how to improve the availability and acceptance of sustainable solutions (p. 121)”.

This development of a concrete consumer oriented policy-approach to the greening of domestic consumption is one of the main goals of the CONTRAST-project (CONsumption TRAnsitions for suSTainability). In this programme we analyse different possibilities for the active involvement of citizen-consumer groups in transitions towards sustainable consumption in four different consumption domains: everyday mobility, tourism mobility, food consumption and home maintenance. Each domain consists of a multitude of ‘social practices’ which can be described as environmentally-relevant routinized activities which are shared and recognized by groups of people (Spaargaren, 2003; Spaargaren and Van Vliet, 2000). As the title suggests, in this paper we limit ourselves to the social practice of ‘new car purchasing’.

The project aims to analyse the relationship between the systems of provision of environmental innovations, the way different consumer groups get access to these innovations and how these innovations become incorporated in social practices. The social practices, which form the key research objects, have their own distinct dynamics and are embedded in ‘systems of provision’ (Fine and Leopold, 1993), referring to the social and technological context in which the social practice takes place. Furthermore, when analysing individual consumer behaviour, the notion of different consumer lifestyles is of importance for in similar social practices important lifestyle differences may occur. For instance, in an analysis of the energy requirements for household consumption, Vringer (2006) revealed that even in similar socio-economic groups large unexplained differences in total energy-use remained; thus indicating to the importance of (environmental) lifestyle differences. Interestingly though, no relation was found between energy use and socio-psychological factors such as individual values, perception of climate change, and motivation for energy saving. Therefore, we consider the possibilities for sustainable lifestyles and practices within
the wider context in which consumption takes place and sustainable innovations are provided.

Of special interest in the dynamic relationship between access and provision of socio-technical sustainable innovations is the concept of the consumption junction. According to Schwartz-Cowan (1987) the consumption junction is the specific time and place at which the consumer makes choices between competing products. It is thus the location where the provider-logics meet the life world-logics of consumers as end-users of new products and services. Considering the social practice of car purchasing we can see a multitude of possible junctions: showroom, garage, new and second hand car internet sites etc. In the analysis of this social practice we have limited ourselves to one specific site, the (Dutch) showroom, and to new private cars only. We are fully aware of the potential drawbacks to this approach but feel that the choice is justifiable. For one, we feel that this choice is most environmentally relevant; the introduction of greener cars takes place via the major car producers which have the showroom as their main junction. Furthermore, as this case study places a large role on environmental information and its systems of provision, this choice is analytically the most interestingly as most information focuses on new cars. Finally, prior research has indicated that consumers’ experience in the showroom, the technical information that is required there, and the role of the car salesmen are among the most influential factors in car purchasing (Boardman, et al., 2000).

3 The social practice of new car purchasing

3.1 Major relevant trends in car purchasing

Before we describe the consumption junction and the purchasing process itself, we shortly portray important trends that have had a significant influence on this process. The first is the change in information provision. Traditionally the automotive dealers were seen as the dominant source of gaining information, resulting in a situation of consumer-salesperson interfaces in which the salesperson “lead” the customer through the buying process (Reed et al., 2004). The coming of the “information age” had an enormous influence on the purchasing process of complex products, including car purchasing. Marketing research conducted in Germany by TNS Emnid (2004) showed a number of interesting developments in the automotive sector. First of all, the practice of information seeking has shifted in such a way that the majority of the people purchasing a car make use of the internet as a source of information, making the internet one of the most dominant information sources1.

Interesting enough, another related development that can be witnessed is the decrease in customer ties, meaning that formerly fixed customer-supplier relations have become more and more fluid. Though important brand differences remain, in general emotional attachment to a specific brand has

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1 The internet does not only serve as an online information source; it is also increasingly used as a means of purchasing and vending second-hand cars. TNS Emnid claimed that for young adults (between 17 and 29 years) with 70 percent of the car vending being performed on the internet this can now be considered common practice. Millions of new and second-hand cars are currently being offered by private persons and dealers on specially designed internet sites.
lessened as a consequence of increased similarity and decreased quality differences in automobiles. The result is that in the last decade a strongly increased consumer empowerment has taken place. Car vending site Edmunds has summarized this development with its slogan: “negotiate like a pro”. Not only have car salesmen noticed that consumers enter the showroom armoured with a cargo of background information about the automotive sector. The process itself has also changed; in stead of visiting ten different showrooms, most consumers make a pre-selection of approximately three car-types whom they investigate intensively. As a consequence, the role of the salesmen likewise has shifted from leading to guiding, and from salesman to advisor (personal conversation, 2006).

Returning back to the environmental dimension, there have been a number of innovations in environmental information provisioning. Most well-known is the European Union’s labelling directive (1999/94/EC) which forces car-manufacturers and –sellers to provide information on the fuel efficiency of new vehicles. According to Van den Burg (2006) “this regulation can be seen as an example of a new form of governance that seeks to enrol the citizen-consumer in the environmental reform of production and consumption chains (p. 122). However, the provision of environmental information is not limited to the European Union; different state, market and civil society actors provide environmental information tools aiming to influence purchase decisions (p.e. Flemish Ecoscore; FIA / ADAC ECO-test; ECO-top 10).

Finally, an increased demand in size and luxury-levels of cars can be observed. Wilhite and Lutzenhiser (1997) described the escalating demand and the need for larger vehicles in terms of ‘social loading’. Social loading on the one hand refers to emulation due to status marking and status construction, and on the other hand to the increased importance of convenience. Certain consumer items, like automobiles, are oversized for those few occasions that the extra capacity is needed (for example going on holiday with the whole family). As Shove (1998, 2003) indicates, that what starts out as an extra capacity or luxury can soon become normality, thus shifting consumer preferences and expectancies for automobile characteristics.

3.2 Environmental information in the purchasing process

Not surprisingly, the purchase of a car can be defined as form of ‘complex buying behaviour’ (Reed et al., 2004). Given that the car is a high involvement product, the car buying process is a high involvement process, leading to active search and use of information, deliberate evaluation of alternatives, and a careful choice. The search process itself usually includes both ‘internal search’ – retrieval of information based on previous searches and personal experiences – and ‘external search’ – accessing of different types of information sources (Klein and Ford, 2003). So, even though the purchase process, complex as it is, is structured by certain routines and associated beliefs, the decision is not made in a state of ‘practical

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2 Complex buying behaviour means that consumers are highly involved in the purchase; the product itself is expensive, is bought infrequently, is perceived to be risky and is highly self expressive.
Car purchasing as a social practice

consciousness’. Because consumers make their car choice in a discursive state in which they are open to new (environmental) information, in theory, it is possible to influence the purchase routines of consumers towards more sustainable routines.

Unfortunately no sociological research is available on how people buy their cars. Interestingly, as far as we are aware of, the only ethnographic research (publicly) available is an imaginary one by Daniel Miller (2002). Generally, research on car-purchasing decisions tends to focus on individual attitudes and preferences, dislocated from the context in which the actual choice takes place. However, since the automobile is a socio-cultural artefact, wholly imbued with feelings of desires, needs, moralities and expressions of identity, the purchase itself is far from a rational sum of preferences. Many elements all have to be brought together leading to moment of ‘aesthetic totalization’ in which everything comes together in the choice for a particular style and the weighing up of a constellation of values (Miller, 2002).

When we look at stated preferences we can observe that environmental factors currently do not play a major role in consumer car choice (See the bold items in table 1).

<table>
<thead>
<tr>
<th>Most Important (10% - 30%)</th>
<th>(5% - 10%)</th>
<th>Least Important (&lt;5%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price</td>
<td>Performance / Power</td>
<td>Depreciation</td>
</tr>
<tr>
<td>Fuel consumption</td>
<td>Image / Style</td>
<td>Personal experience</td>
</tr>
<tr>
<td>Size / Practicality</td>
<td>Brand name</td>
<td>Sales package</td>
</tr>
<tr>
<td>Reliability</td>
<td>Insurance costs</td>
<td>Dealership</td>
</tr>
<tr>
<td>Comfort</td>
<td>Engine size</td>
<td>Environment</td>
</tr>
<tr>
<td>Safety</td>
<td>Equipment levels</td>
<td>Vehicle emissions</td>
</tr>
<tr>
<td>Running costs</td>
<td></td>
<td>Road Tax</td>
</tr>
<tr>
<td>Style / Appearance</td>
<td></td>
<td>Recommendation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Alternative fuel</td>
</tr>
</tbody>
</table>

Table 1: Factors mentioned as being important in the purchasing decision (Lane, 2005)

So, even although consumers mention sustainability issues as a major consumer concern (p.e. CEA, 2002), the infamous attitude-action gap reveals that consumers’ concern for environmental impact does not often translate into behavioural change (Lane, 2005). Furthermore, even though fuel consumption is mentioned as an important factor, for most car-buyers little effort is expended in comparisons of fuel consumption during the decision-making process (Lane, 2005; Boardman et al., 2000). This brings us to an interesting paradox: although consumers have become more empowered with information in the car purchasing process, and more than ever environmental information is readily available to be used as an environmental tool for consumers’ purchasing decision, these tools are seldom put to effective use.

Prior desk research by Ben Lane (2005) sheds some light on this paradox. First of all, many buyers assume there are no major differences in fuel efficiency within the same vehicle class. By buying a new car, consumers automatically assume to buy a car that has a good energy-efficiency and is in compliance with strict environmental norms. It is also still widely believed
that an environmental choice involves a certain sacrifice: in comfort, in performance or financially. Furthermore, because their knowledge is incomplete the environmental effects of car use are often confusing and complex for consumers. The relationship between fuel efficiency, CO2-emissions and climate change is only very generally understood. Finally, the differences between local and global emissions are often mixed up.

However, another important issue is involved as well. For most people the environment is a complex and abstract issue, which remains detached from everyday life decision-making. According to the primary advisory board of the Dutch Ministry of Housing, Spatial Planning and the Environment (VROM-raad 2005), the technocratic approach of environmental issues has resulted in a growing gap between the ‘environmental professional’ and consumers. The consequences of this gap are revealed by Macnaghten (2003) who states that: ‘people clearly remain detached from ‘expert’ rhetorics on the environment and remain sceptical of the motives of both government and business (p.81)’. In order to deal with environmental issues successfully, we feel they have to be ‘translated’ into society and made personally relevant for consumers, not only by portraying environmental problems, but by showing inspiring visions and personal improvement in quality of life.

3.3 Towards a research framework

Since the showroom, as a major node in the consumption junction, is the place where the consumption choice takes place, the processes in the junction are determined both by consumer and provider logics. However, the showroom itself is shaped by the providers, who are daily involved in the purchasing process. Therefore, (environmental) information presented in the consumption junction is structured by, and embedded with, a strong provider-logic, while the question remains if the information is accessed and comprehended fully by consumers. Surprisingly enough, only limited research has been conducted that connects individual purchasing decision-making with the consumption junction (showroom) and its wider connection in the systems of provision (automotive industry). Combined with the background of the last two paragraphs we feel that environmental information in car purchasing is a key variable worth researching. We investigate the role of different state, market and civil-society actors in the provisioning of information in direct relationship with access to, and evaluation of, these information flows by consumers (see figure 1). We hope to provide insightful information on the fits and misfits in the consumption junction; not only to the misconceptions of consumers, but also to the crucial role of (commitment by) salesmen (Stienstra and Jansen, 2001). Immediately we agree that although information provision is a prerequisite for environmental behaviour, it is not sufficient as a stand-alone measure for sustainable transitions. Regulation and economic incentives should always be present as they pave the way for environmental information tools and stimulate provision of environmental innovations.

Resulting from this chapter, we feel an environmental information tool will only succeed if it meets certain conditions. The ‘social shaping of access’ implicates that one cannot assume that consumers are empowered just by increasing the amount of information available (Van den Burg,
First, the environmental information must be provided actively and in congruence with the search process; most consumers are only passively interested in environmental concerns and will not search for this information by themselves. Secondly, the information must somehow be able to ‘seduce’ consumers to sustainable behaviour. Since, for most people environmental improvement is not a goal as such, there is a need to connect and translate abstract environmental issues to the everyday life-world of consumers (p.e. health, stylization, economic benefits, technological innovation/gadgets). In this research project we try to develop and present different consumer formats, containing environmental information, at the consumption junction that will be able to meet these two conditions.

Figure 1: Framework of environmental information flows in car purchasing

4 Methodology

To meet the goal presented in the previous paragraph, we have decided upon a step-by-step approach in which focus groups play a dominant role. The research, which is being conducted in the Netherlands, is expected to be finished before the end of spring 2007. The strategy is to conduct two provider focus groups, one with car salesmen from an ‘frontrunner’ car manufacturer, and one with salesmen from a ‘laggard’ (in figure 1 the already conducted research is grey-coloured). The frontrunner is a car manufacturer that can objectively be regarded as a manufacturer which has proven to place sustainable innovation as its core objective. We have started the research with a providers focus group to analyse the shaping of the showroom and to investigate the ‘imagined consumer’, that is the view of salesmen on the consumer-logics.

The provider focus group is followed by a consumer focus groups consisting of car purchasers from the same brand as either the frontrunner or the laggard manufacturer. This enables comparisons between the provider focus group and the consumer focus group. The choice of focus group methodology was made because of its specific attributes. In groups of around eight to ten, in this case homogeneous, participants a vivid discussion was facilitated through open questions and group assignments. In everyday
life (including professional life of car salesmen) the normative order of behaviours and opinions is rarely articulated. In focus groups we attempt to tease out taken for granted assumptions and also make apparent that the stability is illusory. It allows us and the participants to question and rethink that what we normally take for granted in order to discuss (future) possibilities and options. On the one hand the focus group provides important research information. On the other hand they can provide information that helps us to formulate better survey questions and enables us to contextualize at least some survey questions within everyday reported experiences of respondents (Bloor et al., 2001).

In this paper we present the outcome of the initial research, which is based on expert interviews and a focus group conducted with Toyota salesmen. Toyota, world’s second-largest manufacturer was selected as a frontrunner because of the role they have played in the environmental reform of the automotive industry. The Prius II, being the first undoubtedly successful sustainable car in the world, had an enormous influence in the automotive sector. Furthermore, Toyota claims to strive to “become a leader and driving force in global regeneration by implementing the most advanced environmental technologies”.

The focus group consisted of seven men and one woman coming from different car dealers in the Netherlands. The focus group took place at Louwman and Parqui in September 2006, which is both the national importer of Toyota, and also provides the training for all Toyota salesmen. The main research question in all four focus groups is: “What is the (potential) role of environmental information in the purchasing process of sustainable cars?” The following aspects have been and will continue to be investigated and discussed in the focus groups in order to formulate an answer to this main question:

- Characteristics of current environmental information provision in the consumption junction
- Evaluation of current available environmental information tools by consumers and producers
• Decisive individual and lifestyle factors of consumers in the evaluation of environmental information
• The role of trust, visibility and transparency of environmental information and environmental claims in consumer decision-making
• The development of different consumer formats connecting with everyday life interests of consumers and tempting consumers to make sustainable car choices
• Possibilities to influence and strengthen these new consumer formats with showroom design

As this is research in progress, the main research question, for now, is difficult to answer. Furthermore, we have to keep in mind that the empirical results are based mostly on ‘one side of story’. However, in the next section the abovementioned aspects will be dealt with successively in order to address fits and misfits, from a provider-perspective, in environmental information provision in car purchasing. Paragraph 5.1 deals with the provision and evaluation of environmental information flows that are currently available inside and outside the showroom. The third aspect (individual and lifestyle factors) can only be addressed adequately after the consumer focus groups have taken place and will mainly be left out of this paper. Paragraph 5.2 reports on the important role of trust, visibility and transparency in environmental information provision. Finally, in the last paragraph new consumer formats for the provision of environmental information are discussed.

5 Initial results

5.1 Examining current information flows

To start, the car salesmen remarked that overall consumer interest regarding environmental aspects of cars in fact has increased in the last ten years. For instance, consumers often want to know if the car they are interested in comes with a diesel particulate filter. Furthermore, the change within the automotive sector itself has been even greater:

“When the catalytic converter was introduced everybody thought it was ridiculous: it made the car more expensive, the performance would go down, people were opposed to it and it was unacceptable. Now everybody who works in the branch just wants to go to very environmentally friendly cars”

Nevertheless, the salesmen remain sober and sceptical about (information concerning) environmental factors being enough to convince consumers to buy sustainable cars. Overall environmental aspects were considered foremost as additional factors; as a bonus.

“Horsepower is important, but if you give the customer a bonus [environment] with which he can sell these HP to his employer or his social surrounding, you can pull him in on that point alone. He can say: I have a new car and it’s clean as well”

“Regarding sustainability and cars there are two things which are important: first the car must be able to perform the same as others and second, it must either not be more expensive or else it must be clear that the extra money can be earned back”
Next, the discussion was focused on the evaluation of current provision of environmental consumer information in car-purchasing. Three information tools were introduced and discussed: the energy-efficiency label, based on the European Union labelling directive; the FIA Ecotest developed by the German automobile club ADAC and provided in the Netherlands by its Dutch sister ANWB; and the ECO Top 10 developed by a Dutch environmental NGO called the Netherlands Society for Nature and the Environment (see also figure 1).

One aspect which became immediately clear was that information not present in the showroom was either unknown or hardly known by the salesmen and quite easily dismissed. The two last mentioned (Eco top 10 and Eco Test) are available only on the website of the corresponding provider and the salesmen expected this information to be unknown and unusable to consumers. Secondly, reactions to the two tests were far from enthusiastic. The first reaction on the ADAC Eco test was:

"But, does it really look like this? Do people get to see it like this? That is just hopeless."

"Nobody is going to read this."

The Eco Top 10 was also not warmly welcomed as an information tool:

"I have seen the test but I find it very disputable"

These information tools were quickly dismissed as unimportant and the discussion soon shifted to the energy efficiency label.

<table>
<thead>
<tr>
<th>Energy class</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hybrid car</td>
<td>- € 6.000</td>
<td>- € 3.000</td>
<td>-</td>
<td>+ € 135</td>
<td>+ € 270</td>
<td>+ € 405</td>
<td>+ € 540</td>
</tr>
<tr>
<td>Non-Hybrid car</td>
<td>- € 1.000</td>
<td>- € 500</td>
<td>-</td>
<td>+ € 135</td>
<td>+ € 270</td>
<td>+ € 405</td>
<td>+ € 540</td>
</tr>
</tbody>
</table>

Table 2: Dutch taxation scheme for new cars
Car purchasing as a social practice

The energy label and the Dutch implementation with relative energy classes elicited heavy emotions from the car salesmen. First of all, the salesmen strongly disagree with the choice to measure solely energy-efficiency in the label.

“The energy label is not an environmental label, however in the heads of the customer...they are”

“The only thing they measure is CO₂, not nitrogen and particulates, while those are much more essential”

Secondly, the salesmen find the relativity of the energy label very difficult to communicate to consumers.

“Explain to customers that even though a car uses less fuel, according to the label it is more harmful. You cannot explain that.”

“In the Netherlands there are cars that run 1 on 4 and are sold with a subsidy of 500 to 1000 euro from the government and are terribly harmful to the environment. While there are also cars that are very environmentally friendly considering the nitrogen and particulates secretion but get a penalty”

“Consider the Corolla hatchback and Corolla station wagon. The wagon uses more fuel, has a higher CO₂ secretion than the hatchback but gets a better label. The customer really gives up at that point”

“But, even to us it is abracadabra”

As a result, the label is often disregarded in the sales process; even more, the sales trainer expressed that during training courses he advises his salesmen not to focus customers’ attention to the energy efficiency label at all.

“I show the label and make clear that they [customers] don’t have to look at the label”

“That is the conclusion I think. You talk around it and continue with other subjects”

In sum, there are strong indications that current information tools do not fit the two conditions set in paragraph 3.3. The new information tools (from NGOs) are provided outside of the showroom and, according to the salesmen, are unattractive and unknown to consumers. Furthermore, the salesmen mentioned that environmental aspects in the smallest sense (presented in abstract numerical configurations) fail to attract the continual interest of consumers. As a consequence, salesmen consider environmental information hard to communicate with existing tools, leading to the counterproductive situation that salesmen evade using environmental information. Though still to be confirmed in the consumer focus groups, this situation is likely to be very detrimental to the effectiveness of current information flows as the salesmen form a major influencing factor in consumer car purchasing decision.
5.2 Mediating environmental information flows

Not only the location, content and shape are important characteristics of environmental information flows; also the source of the information itself is relevant as it relates to trust in, and transparency of, the information. Therefore we steered the discussion to the question how environmental information should be mediated to consumers and who should be the mediator. First of all, though the salesmen are sceptical about the current energy efficiency label, they do perceive environmental information provision a tool which has potential. For one, the salesmen experienced that the current energy label is recognized by large numbers of customers. Furthermore, it has had an impact on the car industry, which is to a much lesser degree comparable with the NCAP crash test:

“The NCAP crash test now has six stars. Well, now every manufacturer wants to be able to attain those six stars. You should be able to do the same with the environment: environmental stars”

However, the salesmen feel that there should be only one clear information tool, with one measuring method to prevent confusion. Again, the salesmen use the NCAP as an example of lack in consistency of information:

“The Kia Carnival was presented in America as the safest car available. That has been communicated here in various magazines. However, half a year later the Euro NCAP organisation puts the Carnival against the wall with only two stars. If you have the same thing with environmental labels, then the customer gets disoriented.”

To keep contradictions in environmental information provision to a minimum, they feel that the source of the information should be the same in all cases. The idea is to ‘keep it simple’ and to use only one type of information system on which different kind of policies can be based, such as price mechanisms and parking regulations (Interview Frank Verstege, 2006). With regard to the question who should mediate the environmental information, the salesmen reached no consensus. Some pointed to the highest government (either European Union or national government) as it has both the data available and seems to some as the most trustworthy agent. Others pointed again to Euro NCAP as an example of a new organisation which has now become an institution in itself. Surprisingly, information coming from the car industry itself and from environmental organisations was considered to be biased and untrustworthy. They especially considered their own position to be universally infamous because research had shown they were often seen by customers as unreliable.

“The information must not come from the automotive sector, cause then people will think: there you have these car sellers again”

“But, also not from Greenpeace or whoever, because that looks like a sort of conflict of interest and I think you should avoid that”

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3 The Euro NCAP is an organisation established in 1997 and has members ranging from ministries of transport, the European Commission, and motoring and consumer organisations.
Finally, another trust-related aspect debated is the hesitations people may express in acquiring new ‘untested’ technologies such as hybrid technology:

“There are still a lot of people who question if it doesn’t break down sooner.”
“Come on! The technology has been on the market for nine years.”
“No, she is right. It is a battery and a mobile phone battery only lasts two years.”
“That is why we give them an eight-year guarantee, over 160.000 km, period!”
“That is what we know, not what the customer knows.”
“And, also customers ask: what happens after those eight years?”

To conclude, information provision potentially can have a cumulative effect on both producer and consumer behaviour. The example of the crash test shows that once a topic has been framed as important it is reiterated through various public sources until it becomes a standard issue in production and consumption routines. We suspect that the effectiveness of the crash test is related to two specific characteristics: first, personal and family safety risks can easily be related to the individual; second, Euro NCAP has used a variety of effective and direct means of communications to present its case. Almost everybody can vividly envision crash test commercials, and the depictions of occupant and pedestrian protection are clear on its supposed meaning (figure 3). We try to learn from the lessons of this case by incorporating the two mentioned characteristics into paragraph three.

![Figure 3: Depiction of Euro NCAP crash tests](image)

Furthermore, interesting is the outcome that the car salesmen unanimously disregarded (environmental) NGOs as untrustworthy while it is generally acknowledged that these NGOs carry a strong consumer trust when environmental claims are involved (Van den Burg, 2006; Van der Schoot, Interview 2006). Especially considering the notorious reputation of car salesmen and the automotive sector in general, NGOs potentially can play an important role in conveying environmental information in a comprehensible and transparent way. NGOs could act as able mediators assisting consumers throughout the car process and helping them to distinguish between green-wash and genuine sustainability. The upcoming consumer focus groups should give more insight into the question if current information flows in the showroom can be improved by bringing new non-producer information flows into the showroom.
5.3 Discussing consumer formats for sustainable car-purchasing

In this final chapter we integrate the information from the former two paragraphs and focus on the construction and evaluation of possible consumer formats for sustainable car purchasing. The construction of different formats springs from the premise that the consumer does not exist, and that different consumers must be addressed in different ways because they are motivated by different factors, experience different barriers for behaviour and are affected in different ways by policy (Anable, 2006). Also, we already indicated that for consumers environmental improvement is not a goal in itself. In order to integrate environmental issues in consumer decision-making they have to be aligned to other consumer concern and/or appeals. Steg and Gifford (2005), for instance, suggest including ‘quality of life’ indicators (p.e. health, safety, money, comfort, identity) and assessments into sustainable transport scenarios. Showing how sustainable transitions can (positively) affect these individual indicators, helps confronting the overall dilemma that sustainable transport transitions may conflict with short-term individual interests.

In the focus group sessions we have presented and will continue to present various themes to connect sustainability with everyday life issues: health and safety; economic profitability; technological innovation; trendy lifestyle. The purpose of these themes is to evaluate possible formats which try to embed environmental performance of cars in a way that gives environmental quality more personal significance to potential car-purchasers. To transfer these themes to consumers we also focused on how changes in showroom design can accentuate these themes. According to Van der Schoot (interview 2006), currently, car dealers express little vision in showroom design; most showrooms look more like warehouses. The showroom must become a place where information and experience come together, where the theme is emphasized with a specific showroom setting, and communication centres on consumers’ life-world experiences.

Because of the limited space here only two possible future theme showrooms will shortly be discussed; they are the summarized outcome of a structured (group) assignment.

Theme 1, focus group outcome: Innovative and technologically pioneering.

The main message is that sustainability should become connected to gadgets and innovations which ‘innovators’ and businessmen like to talk about. The technology should, thus, become a conversation piece. The car is high-tech, powerful and clean, which is communicated and reiterated in the showroom setting. An openwork car or engine can be used to visibly present the new technology in action. Furthermore, interactive touch screen or speech guided computers can be used to present information about the clean technologies. The theme is supported by drawings or paintings with images of future sustainable transport and a clean environment, while the material used in the showroom is modern, such as Kevlar.

Theme 2: Luuk van der Schoot: Health and Environment

The main theme is sustainability in combination to personal and family health. In stead of a system of provision that is structured around one car
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brand; different sustainable cars and products are available in this showroom. For example a big retailer can start a thematic showroom for new cars (comparable to price-fighters and exclusive car-dealers) in which health and environment is the main message. The showroom itself is sustainable design, while the showroom is filled with plants to elicit a sustainable experience. More confronting, information can show how local environmental quality affects children’s health. The showroom is located in close vicinity of other retail-activities, and even the showroom itself can supply other non-automotive products that are attractive to the aimed lifestyle group and fit within the theme. Combined with an increased showroom experience, this would stimulate more frequent visits from potential buyers, p.e. young families.

In sum, this last paragraph it is argued that environmental quality of cars can be communicated more effectively when the information is translated to and connected with more daily life consumer concerns. Though far from finished and based more on brainstorm, we presented two formats which showed how current environmental information provision can be refocused. The importance of presenting these themes lays not in the formats themselves, but in the analytical implication. It is intended as a loose framework for reconsidering the conditions for communicating environmental information in the practice of car-purchasing.

6 Concluding remarks

This paper started from the premise that there is a need to reformulate generic environmental policy goals, such as the prevention of climate change and the improvement of local air quality, into concrete contextual and practice specific heuristics facilitating more sustainable mobility practices. We have taken the first steps through the analysis of the dynamics which take place in the social practice of new car purchasing, and by combining a focus on consumers’ decision-making with an equal emphasis on the influence of the socio-technological context in which the practice takes place. The focus on environmental information was deliberately chosen to investigate the ‘transformative powers of environmental information (Mol, 2005)’ in car purchasing.

Though we presented several initial results, it is too early to give a definite answer to the research question: what is the potential role of environmental information in the practice of car purchasing? For one, the response from the consumers’ focus group must be integrated in the research. Consequentially, the relationship between lifestyle factors and the presented consumer formats are still left out of these results. Nevertheless, we do have presented important conditions which have to be met in order for environmental information to be successful. In short, these conditions are:

a) The information should be actively provided in the search process and in the major node of the consumption junction

b) The information should be communicated in an attractive and comprehensible way, coming from a ‘trustworthy’ source without the claim being contradicted elsewhere
Further research on this last condition may even be the most vital. Though the environmental rationality in production-consumption chains of the automotive sector has increased over the last ten years, consumers’ decisions are still based on other factors then environmental concerns. According to one salesman: “It is quite possible to make a trendy car that is less damaging to the environment, no problem at all, but you cannot sell something that is environmentally friendly as trendy. That is impossible.” He pointed out that the car as an aesthetic, identity-forming, multipurpose artefact sets the boundaries from which to build a sustainable car, not vice versa. This remark elicits a fundamental debate about the possibilities of changing consumer preferences and practices. Yet, we are not as pessimistic about the rigidity of mobility practices as these salesmen. Multiple cases have shown that user preferences and practices in the mobility domain are indeed subject to change (p.e. Geels, 2005; Hoogma et al, 2002). Nevertheless, these same cases indicate this process is slow and not easy to influence.

While it is important that consumers and salesmen are stimulated to use environmental information sources in the purchasing process, the initial results point out that current environmental information flows do not meet the three conditions stated above. Does this make the information flows completely ineffective? No, but it does make them less effective. The example of the Euro NCAP safety tests shows that when these conditions are met, it can become a topic which, through continued framing and reiteration, becomes a standard issue in automotive production-consumption chains. Furthermore, we have started formulating new consumer formats which, through a different system of provision based not solely on current brand-structures, do meet the set conditions. The relevance of these new formats is still to be tested in the upcoming consumer focus groups.

Will these new informational formats be enough to convince consumers to purchase sustainable cars? Certainly not, the complexity of the car-buying process and the car being a high-involvement product limits the possibility of environmental governance through information alone. In an act of open-heartedness, even the car salesmen admitted that without European Union standards we would still be driving around in cars with the environmental performance of decades past. Nevertheless, as Mol (2005) states: “an informational mode of environmental reform points at the possibilities and practices to use environmental information to visualize, emphasize, communicate and coordinate ecological interests and rationalities in products, production and consumption (p. 115)”. Thus, environmental information, especially when connected with price mechanism, can lead to a spotlight effect that directs the attention of consumers and producers to eco-efficient products (Van den Burg, 2006). Furthermore, it does make it possible to ‘visualize, emphasize and communicate’ how sustainable mobility transitions can positively affect quality of life of individual consumers, thereby confronting the aforementioned dilemma of conflicting individual short-term interests. Therefore, these consumer formats empower...
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us with information and communication tools to involve different lifestyle
groups of consumers in long-term sustainable mobility transitions.

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MOB Transition Management, Sustainable Systems Innovation, and the Challenge of Countervailing Trends

The Case of Personal Aeromobility

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1 Introduction

During the past decade, the concept of transition management has gained prominence among scholars and policymakers interested in sustainable systems innovation. This field of applied research has coalesced around awareness that the most prevalent sustainability tools and strategies are geared principally toward fostering modest, incremental improvements in materials- and energy-use practices over relatively short time intervals. Proponents of transition management have sought to address this problem by cultivating a more expansive planning horizon—typically one or two generations in length—to allow for more imaginative consideration of how to ambitiously transform entire sociotechnical systems for producing and consuming food, for generating and utilizing energy, and for meeting societal needs for mobility (see, e.g., Rotmans et al 2001; Martens & Rotmans 2002; Smith 2005).

The literature on transitions toward more sustainable systems of mobility emphasizes the need to conduct small-scale niche experiments with technologies such as battery-electric vehicles, urban “smart” cars, fuel-cell powered transport modes, and power-assisted bicycles (Brown et al 2003; Brown & Carbone 2004; Elzen et al 2004; Hekkert & van den Hoed 2004; Truffer et al 2002; van den Hoed and Vergragt 2004; Vergragt 2004; Kemp & Rotmans 2004; van den Bosch et al 2005; Geels 2005a, 2005b; see also Dearing 2000; Hård and Knie 2001; Cohen 2006; Rajan 2006). The tendency has been to emphasize motive designs that are highly compact, lightweight, and able to function without the direct input of fossil fuels. There is furthermore efforts to foster alternative vehicle-ownership arrangements (Cervero & Tsai 2004; Loose et al 2006), as well as to encourage these use of Internet-based applications for e-shopping, telecommuting, and videoconferencing (Moktarian 2002; Arnfalk & Kogg 2003; Hackney et al 2006).

Despite growing appreciation for some of these developments, various nascent ventures to nurture more sustainable systems of mobility have not seriously challenged the current transport paradigm due to...
insufficient capitalization, marketing entrepreneurship, supporting infrastructure, or public-policy facilitation. Analysts of sustainable mobility have moreover been largely preoccupied with surface transport—focusing primarily on substitutes for the internal combustion engine—and have turned their gaze away from the growing pattern of aeromobility, as well as the interface between air and surface transport (for notable exceptions, see Longhurst et al. 1996; Graham & Guyer 1999, 2000; Upham 2001; Kaszewski & Sheate 2004). A separate group of scholars with interest primarily in the sustainability implications of global tourism has begun to explore the implications of the expanding availability of low-cost air travel (Janič 1999; Høyer 2000; Gössling 2002; Frändberg & Vilhelson 2003; Shaw & Thomas 2006). The intent of this paper is to draw attention to several emerging developments within the realm of aviation that are likely to undermine efforts to foster more sustainable mobility practices. A second objective is to illustrate the essential inseparability of surface and air transport in discussions of the future movement of people and goods.

The next section provides an overview and synthesis of the literature on mobility transitions. This discussion is followed by a description of the expanding range of options for personal aeromobility and reviews ongoing planning initiatives in the United States to design and implement the next generation of air transport based upon the use of very light jets (VLJs). The concluding section considers the implications of these developments on efforts to foster sustainable mobility.

2 Transition Management and Mobility

Mobility specialists working within the ambit of transition management emphasize that the creation of more sustainable transport systems is only partly dependent on the design of more energy-efficient vehicles. To achieve the multifold reductions in fuel use and greenhouse emissions currently deemed necessary, while simultaneously expanding global access to affordable mobility services, one must also be attentive to the laws, rules, norms, regulatory incentives, and user practices that define the contemporary mobility system (see, e.g., Rotmans et al. 2001; Elzen et al. 2004; Geels 2005a). Policy programs must be predicated upon a sophisticated understanding of the full range of political, social, and cultural factors that are integral to current arrangements and an appreciation of how in combination they have guaranteed the resilience of dominant designs.

The literature on transition management and mobility that has accumulated over the past decade can be divided into four categories. The first approach is retrospective and seeks to identify the historical factors responsible for driving the sociotechnical evolution of mobility systems in earlier eras. A second strand is more pragmatic and focuses on the diffusion of innovations occurring at the interface between automotive engineering and public policy, most notably battery electric vehicles, alternative fuels, and fuel cells. A third, less prosaic thread of work considers small-scale experimental developments taking place outside of mainstream public view. A final strand of inquiry employs foresighting and backcasting techniques to chart plausible transitions through which prospective mobility innovation might progress over the next several decades.1

The first perspective on sustainable system innovation and mobility has been developed in large part by Frank Geels (2005a; 2005b) and is grounded in historical studies of the evolution of transport over the last two centuries.
The aim of constructing detailed retrospective research on past transitions such as the displacement of sailing ships by steam vessels and the replacement of horse-drawn carriages by automobiles is to give credence to the inherent mutuality between the social and technological dimensions of important societal services. While it is oftentimes difficult to envisage a future that does not include currently entrenched sociotechnical systems, these detailed views backward are instructive in demonstrating how accreting, multi-level changes can accumulate over time to produce potent alternatives with the capacity to supplant more powerful rivals.

The second approach is more overtly purposeful and examines the relative tradeoffs and future prospects of battery-electric vehicles, gas-electric hybrids, fuel cells, and other technologies presently foremost on the policy agenda (Truffer et al. 2002; Hekkert & van den Hoed 2004; van den Hoed & Vergragt 2004; Vergragt 2004; van den Bosch et al. 2005; see also Kemp & Rotmans 2004). Scholars of transition management observe that current public enthusiasm for gas-electric hybrids stems from the fact that these vehicles (most notably the Toyota Prius) offer a workable strategy for achieving modest improvements in fuel economy without having to first resolve any of the politically divisive contradictions embodied in the contemporary surface transport system. A major concern that some observers have of this trend is that the current mode of hybridization has the potential to lock in suboptimal outcomes. This technology has the potential to relieve some of the urgency for systemic adjustments, to dampen opportunities for useful social learning, and to delay the timeframe for the commercial-scale implementation of more sweeping design changes. This perspective also highlights how, from the standpoint of powerful institutional actors, gas-electric hybrids have already yielded significant benefits. For instance, the Prius and its competitors provide realistic consumer alternatives and the commercial availability of these models has been partly instrumental in derailing more ambitious initiatives such California’s Zero-Emission Vehicle Mandate (Dyerson & Pilkington 2005; Majumdar 2005).

The third perspective focuses on a range of entrepreneurial activities being pursued by small groups of highly creative individuals who are committed to engendering expansive new conceptions of mobility. For example, Brown & Carbone (2004) assess the engineering and promotional strategies behind two small electric cars called Sparrow and Gizmo. Researchers working within this perspective have also examined the potential of an innovative three-wheel electric bicycle dubbed Mitka that was developed during the 1990s at the Delft University of Technology (Berchicci & Vergragt 2002; Brown et al. 2003). Common to all of these imaginative vehicles has been the seemingly diffident circumstances under which these design projects evolved and the obstacles that the sponsors now face in securing market viability. Despite the long odds of achieving financial success, these intriguing mobility technologies have the potential to inspire extreme innovation in personal mobility.

A final example of work on mobility transitions is represented by the work of Boelie Elzen and his colleagues (2004) to develop plausible stepwise trajectories of mobility-related innovation over the next fifty years. One of their envisioned pathways consists of four successive periods. An initial decade-long phase (2000-2010) begins with partial uptake of small electric cars and hybrid-electric vehicles as automobile usage costs increase due to higher taxes, tolls, and congestion charges. These changes provide the
basis in the subsequent period (2010-2020) for the introduction of fuel-cell buses, the expanded use of biofuels, and the further market penetration of compact electric cars. In the third phase, climate change continues to impose escalating costs on society and in response a new type of long-distance vehicle powered by a fuel cell begins to gain popularity and, in tandem with this development, opportunities start to emerge to integrate automatic vehicle guidance systems (AVG) into the overall surface transport system. Finally, in the last phase of the anticipated transition, AVG becomes more widespread and its growing use helps to reduce congestion. This situation prompts an increase in vehicle ownership after an extended period during which sales had stagnated or declined. However, because the automobile fleet is comprised of small electric cars, hybrids, and hydrogen-powered long-distance vehicles there is little additional burden in terms of greenhouse gas emissions.

The foregoing discussion highlights the extent to which transition management has achieved notable prominence in recent years. The stature of this approach to is particularly evident in northern Europe where it accords quite closely with current policy programs that privilege sustainability and innovation as cornerstones of comparative advantage (see, e.g., Rifkin 2004). The following section highlights several emergent trends in air travel that will likely pose real challenges on efforts to foster more sustainable mobility practices. At the moment, the United States is the crucible for these activities, but there are already indications that wider diffusion is beginning to take hold.

3 The Growth of Personal Aeromobility

While a century ago the possibility of jetting at 35,000 feet was still a distant dream, we have in the present day come to experience such journeys, in the vast majority of cases, as mundane and uneventful. For most travelers, the impressive grandeur and stateliness of PanAm’s Clippers gave way long ago to the discomfort and petty aggravation of economy class (for an overview, see Hepperheimer 1998). The monotony of the experience is at least partly attributable to the fact that commercial airplanes these days provide an extremely safe, affordable, and accessible form of long-distance transport. Hundreds of thousands of passengers around the world now board scheduled aircraft every day with nary a thought of the enormous organizational and technological obstacles that are daily overcome to make mass air travel a practicable and reasonably reliable means of mobility. The normalization of this mode of transport is marked by exponential increases in both passenger volumes and travel distances over the past several decades (Figures 1 and 2).

This growth in air travel has ironically taken place in the face of protracted financial distress on the part of the airline industry throughout much of this period. Beset by a litany of problems including aging equipment, high labor costs, soaring fuel prices, weather delays, ever-changing security protocols, discount startups, customer-friendly reservation systems, and persnickety passengers, besieged managers have had to confront one disabling dilemma after another. Amiﬆ this upheaval and disarray, resourceful travelers have long sought to defect from the mainstay commercial companies and in recent years opportunities for them to do so have become more readily available (see, e.g., Gottdiener 2001; Fallows 2002).
Disenchantment from the major carriers does not in and of itself represent anything new. Private airplanes have been, of course, a staple form of transport for a select circle of jet-set celebrities, corporate executives, and political figures for some time. Private aircraft have long enabled these individuals to preserve their luminous public personae while also providing protection from the indignities of commercial flights. However,
technological innovation and marketing inventiveness have now combined with an array of exogenous circumstances to erode the elitism typically associated with personal aeromobility and on-demand air travel is now on the verge of becoming a more conventional mode of transport.

First, aircraft manufacturers are starting to mass produce a new class of very light jets (VLJs) that can accommodate 4-6 passengers and have a range of about 1,000 miles. One of these models, the new Eclipse 500 can be purchased for as little as US$1.4 million and the slightly more spacious Adam A700 is priced at about US$2.25 million. Though these aircraft are outfitted with Spartan comforts, they are less expensive and faster than the propeller-driven planes that they are displacing. The VLJ market is primed to expand with the entry of the Brazilian aircraft manufacturer, Embraer. The company is scheduled to introduce over the next couple of years a line of more sumptuous small airplanes including its four-seat Phenom 100 (priced at US$2.85 million) and its nine-seat Phenom 300 (priced at US$6.65 million) that will also compete with more familiar small aircraft manufacturers like Bombardier, Cessna, and Raytheon. While it is difficult to get a handle on current sales volumes because orders are routinely placed and canceled, the firms at the center of this activity are in the process of substantially expanding production capacity. Albuquerque-based Eclipse Aviation is planning to manufacture upwards of 500 airplanes per year with sales aimed at both individuals and corporate fleets.

Second, pioneers in the field of personal aviation have developed a number of novel marketing strategies that spread the acquisition and operating costs of customized flight services across small groups of passengers without compromising the convenience, expediency, or status of individual, on-demand air travel. Despite prices that are marginally higher than a first-class seat on a scheduled airline, most people deem the superior experience, especially in terms of time savings, to be more than sufficient to compensate for a modest premium.

Finally, the expanding popularity of personal aviation is attributable to a favorable pattern of exogenous circumstances. Swelling corporate profitability during the last few years and anxieties about terrorism have given affluent travelers license to upgrade from the mainstay commercial carriers. It is simultaneously important not to disregard the status striving that has long been associated with transport choice and, in its current manifestation, personal aviation has become the new “ultimate toy.” One beleaguered executive who had grown quite attached to this mode of travel was recently quoted as saying, “You can fool around with my stock options all you want, but don’t fool around with my airplane” (Fabrikant 2006).

The system for personal aeromobility is currently organized into four primary segments: business/personal airplane ownership, fractional aircraft ownership, flight-time cards, and air taxis. Because an expanding number of companies offer multiple services and travelers tend to upgrade to higher (and more expensive) alternatives over time, there is necessarily some overlap in these categories.

**Business/personal airplane ownership**

Fueled by the economic exuberance of the mid-1990s, there was an appreciable increase in sales of private airplanes as personal aeromobility became financially accessible to a new cadre of entrepreneurs, corporate managers, and other frequent travelers. Spurred by the introduction of more affordable entry-level aircraft and robust demand for larger and more lavish jets, the market for business airplanes has been growing at an annual rate of
approximately 15 percent (NBAA 2004). In the United States, the number of companies with their own flight operations grew by 70 percent between 1991 and 2003 (Figure 3).

Figure 3

![United States Companies Operating Fixed Wing Turbine Business Aircraft and Number of Aircraft, 1991-2003](image)

The extent to which personal airplane ownership has correspondingly grown is more elusive to ascertain because of data and definitional disparities, the greater demands for confidentiality maintained by this facet of the market, and the inevitable difficulties of disaggregating business and personal travel. Nonetheless, by one measure the number of hours flown by private individuals traveling for non-business purposes is twice as large as it is for business-only travel.8

This growing fleet of private aircraft does not for the most part utilize customary commercial airports, but rather relies on the extensive network of small public use general aviation facilities that exists outside of the major air-traffic system. For instance, in the United States there are approximately 5,400 of these landing fields situated in diverse geographic locations: adjacent to major metropolitan cities, in suburban communities, and in rural areas. These airports have typically been used by recreational pilots, flight schools, and agricultural service companies and have a vast amount of latent and underutilized capacity. Moreover, reaching these facilities does not generally entail a time-consuming journey to the periphery of a major metropolitan city or multiple connections from a secondary or tertiary commercial origin/destination. Point-to-point (or “doorstep to destination” in expert parlance) travel between two general aviation airports via a business or personal airplane is often substantially quicker and more convenient than the scheduled alternative.

**Fractional airplane ownership**

The concept of fractional airplane ownership is roughly analogous to a car-sharing cooperative or a holiday timeshare and offers a workable, legal scheme for otherwise unaffiliated people (or parties) to jointly own an
aerial craft (Rolf 2001). Launched in 1986, this segment of the personal aeromobility market has likewise experienced exponential growth and as of 2003 there were more than 6,000 fractional shares outstanding (Figure 4).

Figure 4

![Total Number of Fractional Shares, 1986-2003](image)

Source: National Business Aviation Association

The largest company selling fractional shares, with control of approximately half of the existing market, is NetJets based in Woodbridge, New Jersey. Owner-passengers typically purchase a 1/8 share and then pay a monthly maintenance fee and an hourly flight-time charge. The company has its fleet of 550 planes positioned around the world to provide clients with on-demand air travel. With six hours advance notice, NetJets will deliver a fully outfitted aircraft to a specified airport and fly its owner-passengers to a chosen destination.

To ensure high service quality and responsiveness in the face of rapid growth firms in the fractional airplane industry have developed sophisticated operational software that enables managers to employ aircraft and personnel in a cost-effective manner (see e.g., Martin et al. 2003). Because owner-passengers are apt to provide very narrow call windows for prospective trips, management companies must continuously and accurately anticipate where their airplanes and crews will be needed—or be prepared to provide expensive charter replacements in cases where they are unable to meet their contractual obligations.

**Flight-time cards**

Pioneered by New York-based Marquis Jet, one of the most recent innovations in personal aeromobility entails the sale of flight-time cards (or jet cards) that allow travelers to purchase a preset number of on-demand flight hours without having to incur the expenses of aircraft ownership and maintenance. The cost of a flight-time card can be as low as $100,000 for 25 hours on a Cessna Citation V Ultra—an amount that translates into about $4,000 for a one-hour flight between Boston and Chicago. While this “fare” is certainly expensive in comparison to the $1,000 it would normally cost for an immediate-purchase first-class seat on a commercial airline, the enhanced
comfort, personalized service, efficient security procedures, and ability to utilize convenient general aviation airports has made flight-time cards a sensible option for an expanding number of travelers. The fact that pricing is predicated not on the number of passengers, but rather on the length of the trip means that the effective per-person cost is reduced when a family or small group travels together. On this basis, personal aeromobility increasingly becomes less of a luxury and more of a routine and reasonable means of transport.

**Air taxis**

There are indications that a market for on-demand flying taxi service (also known as personal or executive jet or “air limousine” service) is beginning to emerge and the Federal Aviation Administration in the United States forecasts that more than 1,650 VLJs will be in the air by 2010 (Wald 2006; see also http://airtaxiflights.com/index.html). The essential idea is to use small, relatively inexpensive microjets such as the Eclipse 500 to provide customized flights for short-distance trips. One new company, the Florida-based DayJet, outlines the rationale behind its point-to-point service in the following terms:

What is DayJet all about? It’s about flexibility, convenience and control. But most of all, it’s about time. *Your* time. DayJet gives you back the valuable time you need to become more productive in business, while enjoying a better balance between work and your personal life. With DayJet, more timely and efficient business travel is just on the horizon (italics in original) (see http://www.dayjet.com).

With an initial investor-based capitalization of US$18.5 million, DayJet has developed a network of so-called “DayPorts™” that link together the cities of Boca Raton, Gainesville, Lakeland, Pensacola, and Tallahassee. These airports are deemed to be underserved by commercial airlines and the aim is to provide up to six passengers with the opportunity to travel between them on an on-demand basis (Johnson 2005). The company’s current plans call for expanding its services to nearly 100 cities over the next couple of years (Asker 2005). DayJet’s pricing is projected to be about 25 percent higher than regularly scheduled commercial flights and will be determined through the use of a complex computer algorithm that allows passengers to identify their origin, destination, and departure time via the company website. The on-line system will search the inventory of aircraft, assess its already-scheduled commitments, and in seconds provide prospective travelers with a bone fide fare. Passengers with some flexibility in their travel plans—for instance a four-hour departure window—will be rewarded with a lower price.

Another air-taxi company, SATSair, is based in Danville, Virginia and Greenville, South Carolina and offers on-demand flights across a nine-state region stretching from Pennsylvania to Georgia. For US$395 per flying hour (equal to approximately 220 flight miles or US$1.80 per flight mile), one of the company’s planes will pick up to four passengers from a departure airport and transport them anywhere within its service area (Fallows 2005). Another entrant into the air-taxi market in the United States is Connecticut-
based POGO Jet operating under the direction of ex-American Airlines CEO Robert Crandall. Other startups are located in the Midwest and Plains states.

Developments in Europe have been more measured, but a new Swiss-based company, JetBird, has recently announced that it plans to provide similar on-demand air service from its headquarters in Zurich beginning in 2009 with a fleet of fifteen Embraer Phenom 100 VLFs. The company’s business plan calls for the annual addition of 20 aircraft and to eventually serve 800 European destinations (Wall and Taverna 2006; see also Taverna and Flottau 2003).

It is notable that small companies are not the only firms seeking to develop the market for on-demand personal aeromobility. The mainstay commercial airlines are also beginning to take an active interest and in some instances are forming partnerships with the forerunners in the field. For instance, NetJets has entered into a collaborative arrangement with Lufthansa Private Jet, a subsidiary of the large German airline. The joint venture will be based in Munich and provide service to a 1,000 European airports. A flight from Munich to Lugano is set to cost between €4,550 and €5,650 depending on the aircraft type and a flight from Dublin to Billund in the west of Denmark will be priced at €9,530 (Baker 2005).

4 The Small Aircraft Transportation System

The growth in personal aeromobility is often deemed to be the result of the status- and convenience-seeking behavior of affluent travelers for whom the out-of-pocket price is, at best a peripheral consideration. However, many of the developments outlined in the prior section have been influenced directly or indirectly a series of research and development efforts carried out by the National Aeronautics and Space Administration (NASA) and other federal agencies responsible for aviation policy and planning. One particular noteworthy initiative was carried out under the aegis of the Small Aircraft Transportation System Project (SATS), a US$69 million five-year program that ended in 2005 (Bowen & Hansen 2000; Tarry & Bowen 2001; McGrath & Young 2002; Nickerson et al 2002; Young 2002; El-Kasaby et al 2003; Moussavi and Vargas 2003; Holmes et al 2004; Trani et al 2003; see also Transportation Research Board 2002).10

SATS evolved out of a predecessor program, the Advanced General Aviation Transport Experiments (AGATE), and was conducted as a public-private partnership involving NASA, the Federal Aviation Administration, and the National Consortium for Aviation Mobility. The aims of the proof-of-concept project were to demonstrate the capacity of a new generation of aviation technologies (principally related to safety at airports without control towers and ground-based radar systems), to substantially expand the national air-transport system, and to relieve both highway and airport congestion through more extensive reliance on public use general aviation airports.11

Based on single-pilot aircraft with the capacity for 4-10 passengers, the SATS project sought to advance the goal of making point-to-point air travel safe, affordable, and accessible.

The publicly articulated policy objective for a distributed commercial system of small jets in the United States is that this mode of air service could help to reinvigorate lagging rural regions. SATS officials and researchers have sought to advance the project by regularly suggesting that affordable air taxis could revive the economic fortunes of remote communities by providing new forms of transport connectivity. For the past three decades air
travel to more than 140 rural communities has been supported by the federal Department of Transportation’s Essential Air Service Program. This program provides commercial carriers with a subsidy to offset the high costs of maintaining flights to small, isolated cities. Despite attempts by aviation policymakers to scale back funding or to reduce the number of eligible communities, political champions have continually derailed these efforts. This ultimately untenable arrangement has, however, provided an important impetus to seek new solutions.

It is highly notable that SATS has not been pursued exclusively as a technical engineering exercise and the aviation specialists that have been at the forefront of this initiative have demonstrated a respectful sense of caution about the challenges of developing a small aircraft system on a national (or indeed international) scale. The published work on SATS recognizes that efforts to build space in the existing range of travel alternatives for air taxis and other related modes will depend on a broad array of interlinked economic, political, social, and cultural factors. Moreover, the project managers tacitly recognize that implementation will not depend merely on overcoming technological obstacles, but that planners will need to be cognizant of regulatory frameworks, insurance and liability arrangements, operational safety (real and perceived), cost competitiveness, and sensibilities of affected locales. There seems to be stark realization that the viability of a small aircraft system (at least one of any consequential size and scope) will ultimately depend not only on the design of new guidance and control systems, but also on the effectuation of tedious and expansive changes in the broader operational landscape that makes air travel possible.

5 Discussion

The agonizing realignment of iconic automobile manufacturers and the continual financial struggles of the major passenger airlines are overt indications that the current mobility system is being reshaped following decades of relative stability. After an extended period of dependence on combustion-powered automobiles and hub-and-spoke air travel, a remarkably large number of novel ideas are “in the air” including electric-powered urban “smart” cars, shared-ownership schemes, improved intermodal coordination, and personal aeromobility. To get a full view of these changes, however, one must not be singularly preoccupied by activities captured within the frame of “sustainable mobility.” Though sustainability (and its analog, livability) has become embedded in conventional planning practice in many places, the pursuit of outcomes that are consistent with this ideal is fraught with profound conflicts (Godeschalk 2004). Numerous dynamic and often crosscutting forces are at work and current public sentiments surrounding sustainability will likely continue to remain equivocal and ambiguous. The developments pertaining to personal aeromobility described here represent an instance in which sustainability objectives have not been a visible part of the planning equation. Proponents have instead displayed a commitment to customary transport objectives such as time savings, capacity management, and traditional notions of economic development. Such a situation is a reminder of the need to be analytically attentive to other prominent drivers—most notably the quest for greater comfort, convenience, and distinction (see, e.g., Shove 2004). Foresight exercises that privilege one of these dimensions over others run the risk of generating overdetermined and inadequately informed scenarios.
It also merits observing that prevailing patterns of globalization and transnationalization give the trend toward increasing personal aeromobility a strong sense of inexorability and this is reflected in many of the forecasts of future demand. Continued growth in air travel seems inevitable despite public concern in some quarters about the social and environmental problems endangered by current and emergent lifestyle practices (Lassen 2006; see also Høyer 2000; Gottdiener 2001). Optimistic analysts have suggested that new information and communication technologies will make “virtual mobility” a realistic alternative and stem the seemingly relentless expansion of transport by airplane (for a detailed discussion see Arnfalk 2002; Berkhout and Hertin 2004). However, there is little evidence to date to support these claims and the historical record suggests that the obverse outcome is more likely to hold.13

Nevertheless, before we presage a mobility future characterized by pervasive personal aeromobility it is necessary to recognize some of the significant obstacles that still must be overcome. The SATS team has already voiced concern that recent growth in business and personal aircraft is leading to congestion in the aviation system and one NASA study forecasts that a 25 percent increase in traffic could lead to paralysis. There are a variety of other issues that will likely pose problems for the continued growth of private aviation. For instance, some skeptics point to a shortage of trained pilots to fly the growing number of small airplanes and the cost and complex logistics of ensuring adequate aircraft maintenance.14 Other observers point out that at present existing air taxis, despite the use of sophisticated operational software as discussed above, fly empty more than 50 percent of the time because of continued inability to effectively coordinate drop-offs and pick-ups (Wald 2006).

Even in the face of these impediments, the incontrovertible fact remains that point-to-point air transport has long held a tight grip on the public imagination and this form of travel remains a cornerstone of popular visions of the future. While the evolving likelihood of personal aeromobility may be discomfiting from a sustainability standpoint, it is important to be realistic about the pending prospect of this transport mode. A major outstanding question is therefore whether private aviation can be reconciled with efforts to foster a more sustainable future. One plausible scenario might be built around the idea of using power-assisted bicycles and other “sustainable use” vehicles to provide local mobility while travel to more distant destinations is based on small aircraft. There is even the prospect that these airplanes could be equipped with fuel cells or other alternative sources of energy such as biodiesel (see e.g., Wardle 2003; Oman 2004).15 It might even prove feasible to create the next generation of airports as comprehensive intermodal transfer stations that provide seamless and convenient interchange from air to ground transport. One could even consider the possibility of encouraging a prior, forgotten practice of designing aviation facilities that serve as dual-use park-airports (Bednarek 2005).16 The expanding use of smaller, local airports will likely allow landing fields to become reembedded into the fabric of communities instead of perpetuating the contemporary practice of treating them as objectionable land uses situated at the distant reaches of metropolitan areas.

This possible future suggests a need to begin to consider how affordable and readily accessible personal aeromobility will alter work routines and future settlement patterns (Marshall 2003). These implications have thus far been explored in only the most superficial ways, often simply

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in terms of their potential to economically catalyze lagging non-metropolitan regions with poor connectivity to existing transport services. Little consideration has been devoted to the likelihood, for instance, that unchecked personal aeromobility could bring to these locales unprecedented patterns of sprawling low-density development as empty nesters and footloose professionals take advantage of new air travel options. The numerous unfortunate side effects engendered by poorly conceived controlled-access highways during the past half century hold some cautionary lessons. To benefit from this experience, scholars and policymakers interested in transition management and sustainable systems innovation need to resist the impulse to disregard countervailing trends such as private aviation that might clash with their overarching aims.

References


Notes

1 While the taxonomy presented here is outlined in terms of explicit typological categories, it merits observing that the various authors display a notable tendency to contribute to more than one perspective.

2 There is also the related claim that gas-electric hybrids provide a relatively uncomplicated way for consumers to gain familiarity with electric cars and that this trend can pave the way for more thoroughgoing changes involving plug-in hybrids and other alternative-fuel vehicles.

3 The Sparrow was manufactured by Corbin Motors (acquired in 2004 by Myers Motors) and the company designed a related model dubbed the Merlin that never went into production. Images of both vehicles are available at http://www.3wheelers.com/corbin.html. Gizmo is produced by the Oregon-based Neighborhood Electric Vehicle Company (NEVCO). Images of Gizmo are available at http://www.nevco-ev.com.

4 MITKA (an acronym from the Dutch name Mobiliteitsconcept voor individueel transport op de korte) was conceived as part of a collaborative project involving the Design for Sustainability Group at the Delft University of Technology, TNO, and others. Images of MITKA are available at http://www.kathalys.com.

5 Upright electric scooters such as the Segway Human Transporter have also begun to attract considerable interest as urban mobility vehicles (see, e.g., Schrage 2003; Marshall 2003; Shaheen et al 2005). Segway has also begun to publicize the Centaur, a concept prototype that is roughly akin to a miniature off-road four-wheeler (see http://www.segway.com/products/centaur). Also germane in this regard is Toyota’s i-swing, a personal mobility machine that company officials describe as a “wearable vehicle” (see http://www.toyota.co.jp/en/news/05/1011_1.html). Some observers may see a certain similarity between these novel designs and the star-crossed Sinclair C5 that was produced briefly in the UK on a limited commercial basis during the mid-1980s (Thisdell 2005; see also http://www.sinclairc5.com).

6 The single-engine Cirrus SR-22 is priced at US$300,000 and has a cruising speed of 165 knots and a range of 1000 miles. The aircraft is outfitted with its own emergency parachute.

7 A related form of mobility currently undergoing rapid expansion involves the use of helicopters for intraurban transport. Owing to a variety of local factors including unmanageable congestion, fear of crime, and status seeking by business executives, helicopter travel has become a quite prevalent way to move around in São Paulo (Cwerner 2006).

8 This observation is gleaned from data reported by the National Business Aviation Association (6.5 million flight hours for business purposes vs 11.0
million flight hours for personal purposes in 2002). At slight variation, the General Aviation Manufacturers Association (GAMA) claims that 70 percent of the flight hours on general aviation aircraft are for business and commercial purposes (see http://web.nbaa.org/public/news/stats/factbook/2004/section4.php#01). Another estimate is offered by Trebey (2006) who recently reported that 80 percent of private aviation is for leisure purposes.

9 Other companies selling fractional airplane ownership include FlexJet (a subsidiary of Bombardier), Flight Options (a subsidiary of Raytheon), and CitationShares (a jointly owned subsidiary of Textron and TAG Aviation) (Fabrikant 2006).

10 The successor organization to SATS is the Consortium for Aviation System Advancement based in Daytona Beach, Florida (see http://www.casa.aero). A larger scale-coordinating role is being played by the Federal Department of Transportation’s Joint Planning and Development Office under the auspices of its program on the Next Generation Air Transportation System (see http://www.jpdo.aero)

11 NASA reports that 98 percent of the American population lives within 20 miles of an existing general aviation facility (see http://www.asc.nasa.gov/factsheet/SATS_Fact_Sheet.htm).

12 The identification of trends that challenge efforts to foster sustainability is not in and of itself a particularly interesting observation as evidence of countervailing trends is widespread. For instance, despite unprecedented discussion and negotiation, greenhouse gas emissions in most countries have increased rather than decreased over the past decade.

13 Each subsequent advance in long-distance communication capability over the past century—from the telegraph to the telephone to the Internet—has induced demand for travel rather than dampened or substituted for it. For a review of these issues, see Roy & Filiatrault (1998), Arnfalk & Kogg (2003), and Denstadli (2004).

14 Some scenarios of future personal aeromobility are predicated upon technologies that would eliminate the need for a dedicated pilot—a development for which there is obvious precedent. With the streamlining of operational systems, the organization of affordable training programs, and the design of more failsafe control equipment, aircraft pilots will likely become obsolete in much the same way as the automobile chauffeurs of an earlier era. Progress in this direction obviously brings us closer to the prospect of individualized flying machines, long a staple of popular science fiction. See also Robb (2005).

15 It bears observing in this regard that the most significant advances in fuel-cell technology have been achieved in research programs associated with the space shuttle.

16 The prospect of dual-use airport-parks seems to be implicit in the M400 SkyCar being developed by Moller International, a vehicle designed for both
MOB Assessing Scenarios for Sustainable Transport in Australia

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1 Introduction

The transport sector employs nearly 30\% of global energy and burns 95\% of the world’s oil (Sawin, 2004). It is also the world’s fastest growing energy consumer and greenhouse gas producer (EEA, 2006; IEA, 2002), and by 2010 it has been estimated that transport will be the biggest single contributor to greenhouse gas (GHG) emissions in the developed world. This rapid increase in transport energy consumption and, consequently, emissions, is significantly driven by the growing reliance on the private car and the dramatic rises in car ownership, especially in developing countries (Sorkin, 2006; UNEP, 2006). This growth in emissions consequently heightens the global warming potential, causing the attainment of the Kyoto Protocol targets even more difficult.

Australia generates the world’s third largest volume of transport-related carbon dioxide emissions per capita, after the USA and Canada (ABS, 2003c). Net transport emissions in Australia substantially increased by 23\% between 1990 and 2003, growing by about 2\% annually (AGO, 2006b); latest projections indicate that by 2020 these emissions will rise 78\% over the 1990 level (AGO, 2005).

Nearly 90\% of Australia’s transport emissions come from road transport: 55\% from passenger cars and 20\% from trucks and buses (ABS, 2003c). Road transport also accounted for 12\% of Australia’s net GHG emissions, of which 42 MT of CO\(_2\) came from passenger cars (AGO, 2006a).

This paper aims to identify the initiatives of Australian government and private sectors in tackling the unsustainable transport trends. It examines several urban travel scenarios and discusses opportunities for reducing energy consumption in road transport.
2 The Australian Transport Context

Being a geographically vast country with its relatively small population widely dispersed in settlements along the west and east coastal areas, Australia relies heavily on road transport, domestic aviation, coastal shipping, and rail systems. While motor vehicles offer a convenient, reliable and fast means of travel, the associated air pollution and GHG emissions, plus the noise and traffic congestion, present a major concern. The impact levels depend on how many motor vehicles are on the road, how frequently they are used, what type and how old the vehicle is, whether the vehicle is air-conditioned, how often they are serviced or maintained.

Australians also enjoy one of the highest rates of car ownership in the world, with more than 10.9 million passenger vehicles registered in Australia in 2005, amounting to 537 cars per 1,000 resident population (ABS, 2005). In Australia, the “car culture” is the dominant paradigm (Mason & Rissel, 2002) and motorcar dependency seems to be the norm.

A survey of Australian transport use and habits of motor vehicle owners (ABS, 2003b) showed that three-quarters of the population use cars to go to work or to study. Almost 9 out of 10 of households have one or more cars. Couples with dependent children and households with members all aged over 15 years were more likely to own two or more vehicles.

Half of the cars travel between 10,000 and 39,999 km a year, while 17% run for less than 10,000 km and 8% more than 40,000 km. Airconditioning, now a standard option in Australian vehicles, uses extra fuel and increases exhaust emissions. Only 12% of households had vehicles which are non-airconditioned.

The ABS study also showed that only 12% of Australians over 18 use public transport. Around 24% of these riders are people aged 18-24 years, who use public transport because they do not own a car, have problems with parking, or find trains and buses convenient and comfortable. Only 4% cited environmental concern. The 81% of Australians who do not use public transport report poor access and timing among other reasons.

Around 5% of people walk or cycle to work or study. Sixty-nine percent walk or ride because of the proximity of their homes to their places of work or study. Half the respondents do so for exercise or health reasons while 19% cite cost savings. Seven out of 10 respondents said they didn’t walk or cycle due to distance.

Of the people driving to work or study, 83% did not have passengers with them. Almost half said that others did not require transport, or they worked or studied in different direction or location, or their work or study hours did not match with prospective passengers.

Clearly Australian transport practices, linked to longstanding automobile dependency, need to improve if we are to significantly reduce the level of GHG emissions from road transport.

3 Attempts towards Sustainable Urban Transport

Efforts to mitigate the diverse environmental impacts of transport are on the regular agenda of government, community and private sectors in Australia. The main focus is on the GHG reduction from transport use, as they are far-reaching and impacts globally more than locally. As much of Australia’s transport energy is derived from non-renewable sources,
management of fuel use, and minimising road transport travel demand and vehicle kilometres travelled, constitute the core strategies for decreasing impacts (ABS, 2003c).

3.1 Australian Government Initiatives

Australia’s national strategies for reducing greenhouse gases and other vehicular emissions from the road transport sector are mostly implemented by the Australian Greenhouse Office (www.greenhouse.gov.au). All Australian States and Territories have established government offices for tackling GHG reduction, climate change and sustainable transport issues, and most are implementing state-wide strategic plans and policies (Appendix 1) to address concerns on alleviating the environmental load of the transport sector. Government strategies tend to emphasize on the enhancement of public transport services.

3.1.1 Alternative Fuels Conversion Grants

Running from 2000 to 2008, the Alternative Fuels Conversion Programme provides grants of up to 50% of eligible costs to owners of buses and heavy commercial vehicles to convert or upgrade existing vehicles to operate on LPG (liquefied petroleum gas) or NG (natural gas), or to purchase new vehicles running on these fuels.

More recently, in Aug 2006, the Commonwealth Government announced an LPG Vehicle Scheme, which offers rebates of $2,000 for consumers who convert their existing petrol- or diesel-powered cars into the cheaper and greener LPG fuel (called “autogas” in Australia). Buyers of new autogas vehicles are entitled to a $1,000 grant. As of 2003, only 3% of Australian vehicles were using LPG or CNG (ABS, 2003b), but the highly popular new autogas subsidies are likely to increase this proportion.

3.1.2 Fuel Consumption Labelling and Green Vehicle Guide

Since 1997, the Commonwealth Government has introduced mandatory fuel consumption labelling for all new vehicles sold in Australia, similar to fuel efficiency label programs in Japan, the United States, the United Kingdom and Canada (Bradbrook, 1999) and soon the European Union. A model-specific sticker detailing the car’s fuel consumption in litres per 100km, as well as the emission figures for carbon dioxide, is required to be affixed on the vehicle’s windshield. Complementing the label is the Green Vehicle Guide (GVG) website (www.greenvehicleguide.gov.au), similar to the United States GVG (www.epa.gov/greenvehicles). Launched in 2004, the GVG scores motor vehicles with an overall star rating: the more stars, the lower the environmental impact. The star rating represents the sum of the greenhouse score and the air pollution score, which are equally weighted.

The label and GVG help Australians choose which cars are cleaner and more fuel-efficient, therefore are less costly to run and generates fewer greenhouse emissions. Statistically, only 4% of households consider environmental impact when buying vehicles (ABS, 2003b).
3.1.3 National Average CO2 Emissions (NACE) target

The Commonwealth Government and the automotive industry agreed on a voluntary code of practice targeting an 18% improvement on passenger car fuel economy to 6.8 L/100km by 2010. The NACE target is based on the NAFC (National Average Fuel Consumption) scenario models.

3.1.4 TravelSmart and the National Travel Behaviour Change Project

A University of Sydney research on community values shows that Sydneysiders are willing to try new transport options if these meet their time and cost constraints (Affleck, 2002).

Under the banner of the Commonwealth’s Greenhouse Gas Abatement Programme (GGAP), the TravelSmart™ (www.travelsmart.gov.au) and National Travel Behaviour Change (NTBC) projects are being pioneered to help Australians reduce private vehicle use through smart use of transport options. Under these Travel Demand Management programmes, urban residents are encouraged to choose more sustainable travel modes such as walking, cycling, public transport, ride-sharing, or tele-working. They aim to inform and motivate people to find other ways of getting about rather than driving alone in a car, through personal choice and without involving any compelling regulations, fees, or taxes.

TravelSmart promotes “active transport” – walking or cycling done alone or combined with public transport – as the exercise resulting from such physically active modes of travelling are widely believed to also deliver physiological and psychological health benefits. Their website provides downloadable resource kits to enable sustainable travel, for employers, teachers, special events organizers, and universities. These resources include a Bikeability Toolkit which includes checklists and materials to help create physical and social environments that will encourage cycling; and a parent’s guide for starting a Walking School Bus™, where a group of children walk to and from school, chaperoned by one or more adults.

3.1.5 Local Grants for Sustainable Transport Innovations

The State Government of Victoria recently established a Sustainability Fund (www.sustainability.vic.gov.au) for businesses, community groups, councils or NGOs who have practical and innovative ideas that will help make the State more environmentally sustainable and helps Victorians to do more with less. In 2006 among the projects it funded was a grant of $160,000 to help Flo CarShare’s service inner-city Melbourne.

Similarly the NSW Government put up the Climate Action Grants Program (www.environment.nsw.gov.au/grants), to support projects that assist the development and adoption of solutions that reduce GHG emissions or help the NSW community to adapt to the impacts of climate change. In 2006 it awarded $222,000 to Parramatta City Council to promote S-M-Ar-T (Sustainable Movement Around Town) transport options and to introduce the first car-sharing trial in Western Sydney.

Now in its 10th Round, the Queensland Sustainable Energy Innovation Fund QESIF (www.epa.qld.gov.au) assists Queensland organisations in developing innovative technologies that reduce consumption of fossil fuels, greenhouse gas emissions or water consumption. Brisbane City Council’s...
Traffic & Transport Branch was awarded $128,700 to establish the first commercial supplier of biodiesel fuel in Southeast Queensland and evaluate the use of BD100 (100% biodiesel) and BD20 (20% biodiesel/diesel blend) in Brisbane buses and river ferries. Eze Corp got $236,850 to develop a prototype hybrid electric vehicle integrating smart wheel technology.

3.2 Other Australian Initiatives & Concepts

Many think tanks and grassroots communities in Australia are advancing ideas to foster sustainable travel behaviours. These range from multimillion dollar research projects to small and micro business endeavours.

3.2.1 Sydney Overground

The University of Sydney’s Warren Centre research project, Sustainable Transport in Sustainable Cities, acknowledges that mass transport must provide an attractive alternative to the car for the 80% of Sydney trips that are non-work. One of the models the research proposed for meeting the dominant urban travel market demand is an experimental Sydney Overground (Thorp, 2002), an “anytime-anywhere” bus transport concept styled after the London Underground. This comprehensive interchange network, recommended to be run as a large-scale trial in Western Sydney, is an accessible metro-wide grid network of high frequency and reliable bus services, integrated with rail, shared taxis or other services.

3.2.2 Bus Rapid Transit Systems and Guided Buses

Three Australian cities have varying forms of bus rapid transit (BRT) systems whose bus services are of higher quality than an ordinary bus line due to infrastructural and scheduling improvements.

Brisbane has two grade-separated bus-only corridors, the Translink South-East Busway and the Inner-Northern Busway, with three more proposed and expected to be completed in 2012. Sydney has the Liverpool-Parramatta Transitway or T-way, which has 20km of bus-only roads and 10km of bus-only lanes on existing roads. The real-time information displays in T-way stations show details of the next bus: actual arrival times, route numbers, destinations and connecting services. Special technology on T-way roads detect when buses are coming into intersections, so they don’t have to stop at traffic lights, cutting travel time for T-way passengers.

Adelaide has one of only a few guided busways in the world: the O-Bahn Busway, which is the world’s longest and fastest guided bus route, operating reasonably successfully since 1986. Guided buses are steered for part or the entire route by external guidance systems, usually on a dedicated track. Because the track excludes all other traffic, reliable schedules can be maintained on heavily used corridors even during rush hours.

3.2.3 Biofuels Development

There are now 8 biodiesel plants operating across Australia, with an annual capacity of 367 million litres; 6 more are under construction and 2 planned, increasing the capacity by another 620 million litres.
Unfortunately, government biodiesel subsidies are to be phased out by 2011, after the passing of the 2006 Fuel Tax Bill.

In Feb 2005 the first biodiesel retail outlet opened in Sydney, offering various blends to the general public and to qualified fleets. In 2006, Gull in Western Australia introduced biodiesel to 21 of its service stations.

Several local government fleets across Australia use BD20 (blend of 20% biodiesel and 80% diesel), including Sydney, Adelaide, Townsville and Newcastle. All metropolitan trains and most metropolitan buses in Adelaide, as well as 7% of Perth’s bus fleet, operate on a BD5 (5% biodiesel blend).

3.2.4 Travel Blending®, Living Neighbourhoods®, IndiMark™

Australia is a world leader in the development of personalized travel behaviour change programs. Travel Blending®, Living Neighbourhoods® and IndiMark™ are three such community-based tools for lifestyle changes, being delivered under the banner of TravelSmart Australia.

Travel Blending® encourages citizens to reduce car use and make more efficient and environmentally sound transportation choices over time. The technique involves in-depth analysis of people’s travel diaries, where they keep track of their travel for a week, followed by customized suggestions from TravelSmart officers for making small beneficial changes from an expert system; after some weeks of the traveller attempting to minimize car trips, the process of recording data in a second travel diary, analysis and feedback is repeated (Rose & Ampt, 2001; Taylor & Ampt, 2003). Travel Blending® could be done by thinking about activities and travel in advance, by blending modes (alternating travel by car, walking, public transport), by blending activities (trip chaining so that fewer trips are necessary), and by blending over time (making small sustainable changes on a weekly or fortnightly basis). The blending notion can potentially liberate car users from vehicle dependence: for instance, committing to use public transport one day a week reduces everyday car use by 20%. In this approach, benefits to the individual by planning their own travel needs are emphasized, rather than the disbenefits to the community of not doing so. The Travel Blending® tool is now used in several Australian cities, as well as in the UK, USA and Chile.

Travel Blending® trials in Adelaide evolved into the Living Neighbourhoods® project in 1999, which aims to reduce car impacts through partnership between the community and the providers of goods and services in that community, including the government (Ampt, 1999). Everyone in who lives, works, studies, plays, or delivers goods and services to the neighbourhood is presented an opportunity to take part in Travel Blending®, as a result making small changes towards creating a healthier, more vibrant and more sustainable community. In Adelaide’s Living Neighbourhoods®, car trips were reduced by 23% and car driver kilometres went down by 21% (www.greenhouse.gov.au/local/publications/living.html).

Meanwhile in Perth the IndiMark™ (individualized marketing) was being demonstrated. This travel behaviour change method, developed in Europe, relies on individual contact with a significant segment of the target groups who indicate an interest in changing travel behaviour towards more environmentally friendly modes. Tailored tips and incentives are provided to motivate, inform and reinforce change to potential mode switchers.
3.2.5 Car-pooling

Car-pooling – also known as ride-sharing or lift-sharing – is a highly beneficial alternative to the single-occupant automobile: a single engine carrying multiple passengers uses less fuel per trip, saving money and creating less pollution than if each passenger drove their own car. Car-pooling is typically used for commuting to work, often by people who each have a car but travel together.

During peak hours, car-poolers are privileged to use the transit lanes on the major corridors in Sydney, Melbourne and Brisbane, thus improving travel times and decongesting the roads. Transit lanes are the Australian equivalent of the high-occupancy vehicle (HOV) lanes in North America and Europe. T2 transit lanes can be used if there are two or more occupants in the vehicle, while T3 lanes are for three or more occupants. Both lanes can also be used by cyclists, taxis, motorcycles and buses. However, lack of policing of the lanes renders it open to abuse by drivers without passengers.

3.2.6 Car-sharing

Still in its infancy in Australia is the concept of car-sharing, a mechanism that allows a small number of efficiently used shared cars to replace a larger number of less efficiently used privately owned cars (Smyth, Vukic, & Pinzone, 2002). Car-sharing organizations (CSOs) or car clubs manage members’ access to the fleet of shared-use vehicles, like a short-term car rental service. Unlike car-pooling or ride-sharing, car-sharing members do not need to share travel space with unrelated travellers.

Car-sharing schemes are purposely designed to encourage sustainable modes of transport by “filling a mobility gap”. Public transport, walking or cycling are complemented by accessing a car without the need of ownership.

Since its launching in 1987 in Switzerland, car-sharing has been gaining momentum worldwide (Gardner, 2002). In 2005 330,000 individuals worldwide – 22½ times the 2001 total – were sharing 10,570 vehicles through CSOs (Worldwatch, 2006). Studies show that car-sharing has the potential to dramatically reduce the number of vehicles on the road, to the order of 6 to 23 cars in North America (Gardner, 2002; Worldwatch, 2006).


Car-sharing appears to be most suitable in urban communities with high population densities, extreme parking difficulties, good public transport service, high environmental consciousness, and where working, shopping, and leisure activities are accessible by foot or bicycle (Bergmaier et al., 2004; Smyth et al., 2002).
## Table 1: Car-sharing Operations in Australia*

<table>
<thead>
<tr>
<th>Car Types</th>
<th>GoGet Sydney</th>
<th>GoGet Melbourne</th>
<th>Flexicar Melbourne</th>
<th>CharterDrive Sydney</th>
</tr>
</thead>
<tbody>
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<td>9</td>
<td>17</td>
<td>10</td>
</tr>
<tr>
<td>Toyota Yaris 5D Hatchback</td>
<td>31</td>
<td>Toyota Yaris 5D Hatchback</td>
<td>5</td>
<td>Smart fortwo x3</td>
</tr>
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<td>Flexicar</td>
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<td>Sydney</td>
</tr>
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<td>Flexicar</td>
<td>Melbourne</td>
<td>Sydney</td>
</tr>
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<td>Flexicar</td>
<td>Melbourne</td>
<td>Sydney</td>
</tr>
<tr>
<td>Mini Cooper x 1</td>
<td>GoGet</td>
<td>Flexicar</td>
<td>Melbourne</td>
<td>Sydney</td>
</tr>
<tr>
<td>Holden Ute x 1</td>
<td>GoGet</td>
<td>Flexicar</td>
<td>Melbourne</td>
<td>Sydney</td>
</tr>
<tr>
<td>Ford Falcon Wagon x 1</td>
<td>GoGet</td>
<td>Flexicar</td>
<td>Melbourne</td>
<td>Sydney</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No of Members</th>
<th>500</th>
<th>100</th>
<th>500</th>
<th>200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joining Fee</td>
<td>$25</td>
<td>$25</td>
<td>$50</td>
<td>$25</td>
</tr>
<tr>
<td>Monthly Fee</td>
<td>$30 frequent $15 occasional</td>
<td>$30 frequent $15 occasional</td>
<td>$0** flexi-plan</td>
<td>$40 regular $25 frequent $0 occasional</td>
</tr>
<tr>
<td>Per hour Charge</td>
<td>$4.4 frequent $6.6 occasional</td>
<td>$4.4 frequent $6.6 occasional</td>
<td>$12 flexi-plan $11.40 flexi-5</td>
<td>$5.50 regular $7 frequent $12 occasional</td>
</tr>
<tr>
<td>Per km Charge</td>
<td>35c</td>
<td>35c</td>
<td>100km free 15c excess km</td>
<td>&lt;30km free &lt;120km 20c &gt;120km 15c</td>
</tr>
<tr>
<td>Per day Charge</td>
<td>$68 150km free</td>
<td>$68 150km free</td>
<td>$80 flexi-plan $74 flexi-5</td>
<td>$45 regular $50 frequent $65 occasional</td>
</tr>
<tr>
<td>Per night Charge</td>
<td>Free between 12 am – 6 am</td>
<td>Free between 12 am – 6 am</td>
<td>Only 1 hr charge between 11 pm – 7 am</td>
<td>$25 between 5.30 pm to 8.30 am</td>
</tr>
<tr>
<td>Security deposit</td>
<td>$500 fully refundable</td>
<td>$500 fully refundable</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

*Rates data are for personal members only and were obtained from websites, from newspaper reports, telephone communication.

**Flexicar flexi-plan members pay $10 monthly network access fee but no consumable credits; flexi-5/10/20 do not pay monthly access fee and their $50/$100/$200 are consumable credits in one month which go towards paying the per hour charges, per day charges or excess km charges.

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4 Developing and Assessing Scenarios for Sustainable Transport

Nine scenario sets were developed to assess the various modes of daily urban transport in Sydney. In all cases, the functional unit for the assessment is defined as the employment of different transport schemes by a DINK (double income, no kids) couple, both in their 30s, who are high-earning and choose not to have children, enabling them to afford a more expensive consumer lifestyle than those with families. They go on frequent holiday travel, and have a penchant for luxury goods. The couple resides in the Sydney residential suburb of Newtown and work five days a week in the Sydney central business district (CBD), just 5 km north. Their dwelling is a renovated two-storey classic Victorian terrace house with no carspace, only off-street parking. The local retail and dining street, Newtown train station and a Sydney Buses shelter are both just a couple of blocks away.

On Saturday mornings during summer they go sunbathing, surfing or swimming in world-famous Bondi Beach, 11 km away; and on Sunday mornings they go shopping at Marrickville Metro, just 2 km from their home. For both weekend trips, the time spent at the destination is kept standard at 3 hours. The routes for the weekday and weekend trips are shown on Figure 1.

The profiles of the scenario actors and their lifestyles closely match the statistical profile of the working population of in the City of Sydney local government area (ABS, 2003a). The dominant household types are lone persons (35%) and couple only households (21%). The biggest age group is 25-34 (34%) and 43% earn $1,000+ a week. Due to the local employment sources and easy access to public transport, only 27% drive or ride a car to work: 66% of the population use buses, trains, ferries, and taxis; and 6% walk to work. Forty-two percent of households have no vehicles, 44% have one, and 14% own two or more vehicles. Fifty-three percent rent their dwellings; 69% stay in flats and apartments.

![Figure 1. Route travelled in scenarios for weekdays and weekends.](image)
The travelling scenarios are detailed below and their relationships are illustrated in Figure 2.

**Scenario 1: Bus + Car-Sharing.** Couple ride the Sydney Buses CNG bus together to work on weekdays. On the weekends they use GoGet CarShare, using either a 2006 Toyota Yaris (Scenario 1a) or a 2006 Smart forfour (Scenario 1b). Both cars use premium unleaded petrol (PULP).

**Scenario 2: Train + Car-Sharing.** Couple take the CityRail electric train (L, R and S Set Comeng type control motor and trailer carriage) to work on weekdays and book GoGet CarShare on weekends, using either a 2006 Toyota Yaris automatic (Scenario 2a) or a 2006 Smart forfour (Scenario 2b) running on PULP. The electricity supply to run the train comes from black coal fired power stations (90%) and other sources such as hydro, renewable energy and natural gas (10%) ([www.deus.nsw.gov.au](http://www.deus.nsw.gov.au)).

**Scenario 3: Scooter + Car-Sharing.** Each of the couple ride a Honda Today 50 single-person motor scooter to work, and use GoGet CarShare during the weekend. The scooter is fuelled by PULP.

**Scenario 4: Bus + Taxi.** Couple opted not to own a car. They take the Sydney Buses bus together to work, then ride taxicabs (running on LPG) to the beach and to the shopping mall during the weekend. The bus is either a Scania L113CRB running on CNG (Scenario 4a); Mercedes Benz 0405 MkV non-airconditioned running on low sulphur diesel LSD (Scenario 4b) or biodiesel (Scenario 4c). 79% of the Sydney Buses fleet uses LSD; 21% uses CNG. While Sydney Buses do not yet use biodiesel, Scenario 4c assumes a bus using 20% waste cooking oil biodiesel blended with 80% low sulphur diesel.

**Scenario 5: Taxis Only.** Couple do not own a car, and instead share taxicab rides to go to and from work daily, and to and from the beach and shopping mall on weekends. The taxi is a 2006 Ford Falcon running on LPG.

**Scenario 6: Private Car Only, PULP/LPG.** Couple drive to and from work and leisure daily using their private car. The car is a 2006 Toyota Yaris 4-door sedan fuelled either by PULP (Scenario 6a) or by LPG (Scenario 6b).

**Scenario 7: Private Car Only, Hybrid.** Couple drive to and from work and leisure daily using their 2006 Toyota Prius, which is a second generation hybrid running on electric batteries and PULP.

**Scenario 8: Bus Only.** Couple take the bus everyday to all destinations, since they opted not to own a car. The buses in the CBD and to Bondi Beach are all running on CNG.

**Scenario 9: Train + Bus.** Couple opted against car ownership. They ride the train everyday to and from work. To go to the beach they take a train to the City Circle then change to another train bound for Bondi Junction, where they get off and transfer to a bus to Bondi Beach. To go to the mall, they take the bus. The bus runs on CNG.
Assessing Scenarios for Sustainable Transport in Australia

4.1 Economic Assessment

It can be seen from the calculations in Table 2 and in Appendix 2 that the least costly mode for an entire week’s travel is Scenario 8 “Bus Only”. This scenario also shows relatively low travel distance (which is almost the same as the lowest travel distance scenario, Scenario 4 “Bus + Taxi”), However, in terms of the time spent for the entire week’s journeys, Scenario 8 has the longest travel time (6.4 hours). Private cars or taxis take the least travel time, but these scenarios are also the most expensive travel options. It is clear that for all the scenarios there are trade offs between travel time and cost.

Table 2: Weekly time and cost of travel for different scenarios

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Transport Modes for Weekday + Weekend Travel</th>
<th>Total Travel Distance* Per Week (including walking)</th>
<th>Total Travel Time* per Week</th>
<th>Total Cost** for Couple per Week</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bus + Car-Sharing</td>
<td>96.5 km</td>
<td>280 mins</td>
<td>$95.80</td>
</tr>
<tr>
<td>2</td>
<td>Train + Car-Sharing</td>
<td>75.2 km</td>
<td>300 mins</td>
<td>$77.00</td>
</tr>
<tr>
<td>3</td>
<td>Scooter + Car-Sharing</td>
<td>113 km</td>
<td>300 mins</td>
<td>$97.80</td>
</tr>
<tr>
<td>4</td>
<td>Bus + Taxi</td>
<td>74 km</td>
<td>280 mins</td>
<td>$82.60</td>
</tr>
<tr>
<td>5</td>
<td>Taxis Only</td>
<td>81.3 km</td>
<td><strong>110 mins</strong></td>
<td>$185.40</td>
</tr>
<tr>
<td>6</td>
<td>Private Car Only, PULP/LPG</td>
<td>81.3 km</td>
<td><strong>110 mins</strong></td>
<td>$284.10</td>
</tr>
<tr>
<td>7</td>
<td>Private Car Only, Hybrid</td>
<td>81.3 km</td>
<td><strong>110 mins</strong></td>
<td>$363.45</td>
</tr>
<tr>
<td>8</td>
<td>Bus Only</td>
<td>74.84 km</td>
<td>384 mins</td>
<td><strong>$49.30</strong></td>
</tr>
<tr>
<td>9</td>
<td>Train + Bus</td>
<td>100.1 km</td>
<td>346 mins</td>
<td>$56.88</td>
</tr>
</tbody>
</table>

*Data for distance and time are calculated based on www.whereis.com and www.131500.info

**Data for cost for couple is calculated based on the different sources. For public transport scheme, cost is based on fares in Oct 2006. For car-sharing, the cost is based on GoGet Frequent schemes. For private cars and scooter, costs are based on weekly operational cost including depreciation, registration cost, comprehensive insurance, road assistance membership, fuel, tyre, and service and maintenance cost. For private car, parking fees are included. Costs are in Australian Dollar (AUD).
4.2 Lifecycle Emissions Analysis

To assess the environmental impacts of the above scenarios, an LCA study was performed using data from various full lifecycle emissions studies on different Australian vehicles and fuels published by the Australian Greenhouse Office (Beer et al., 2000, 2001, 2004). The analysis is based on the problem definition set in Box 1. The emissions are calculated for both upstream and tailpipe emissions.

The comparative data of the varying emission loads of the schemes are displayed in Table 3. Instead of full LCAs of the schemes, the assessments cover only the greenhouse gas emissions (CO$_2$) and air quality emissions (HC, NO$_x$, CO and PM$_{10}$). Due to the variability of the different types of fleets for public transport and the limitation of data for different types of cars, there are uncertainties as were estimated by Beer et al (2001). To reduce uncertainties, if the accurate characteristics of the particular vehicle are missing, the closest specifications are used.

**Goal definition.** The goal is to compare the emissions from different scenarios of weekly trips. The functional unit is defined as the use of various transport modes for trips done by a couple for one week.

**Scope.** The assessment will only cover the fuel consumption analysis and instead of doing full LCA, the study focuses on the Lifecycle Emissions Analysis, including greenhouse gas and air quality emissions.

**Box 1: Problem Definition for LCA**

4.2.1 Inventory analysis of fuel characteristics

The different fuel types used in the scenarios are evaluated, and an estimation of the energy required to travel (in MJ) using the different transport modes was made, based on the fuel consumption. Subsequently, the GHG emissions as well as other air quality pollutants are calculated.

The emissions for the cars and taxis are calculated for the couple only, but for trains and buses the total energy consumption is divided according to the average seating capacity of the vehicles.

The calculation of the emissions level is based on the following equation

\[
\text{Unit emissions} = \frac{\text{exbodied emission per unit energy}}{\text{fuel consumption}} \times \frac{\text{fuel density}}{\text{total travel distance}}
\]

where unit emissions are kg for total CO$_2$, g for hydrocarbons, g for NO$_x$, g for CO and mg for PM$_{10}$. The exbodied emission per MJ is obtained from LCA reports by Beer et al. (2000, 2001, 2004) for the Australian Greenhouse Office. The emissions are calculated based on the methodology for the National Greenhouse Gas Inventory 2004 (AGO, 2006a). The data tables for the fuel consumption for every vehicle in the scenario is shown on Appendix 4, while the full lifecycle emissions per unit of energy are detailed in Appendix 3.
4.2.2 Emissions impact assessment for the scenarios

Based on the inventory analysis of fuel characteristics above, calculations were made of the total greenhouse gas emissions and air quality pollutants for the different travel scenarios (Table 3).

Table 3: Fuel emissions table for different scenarios

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Transport Mode or Vehicle</th>
<th>Fuel</th>
<th>Total energy consumed (MJ)</th>
<th>Full lifecycle emissions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>CO\textsubscript{2}</td>
</tr>
<tr>
<td>1a</td>
<td>bus</td>
<td>CNG</td>
<td>53</td>
<td>3.52</td>
</tr>
<tr>
<td></td>
<td>car-sharing Yaris</td>
<td>PULP</td>
<td>64</td>
<td>5.66</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Total</td>
<td>9.19</td>
</tr>
<tr>
<td>1b</td>
<td>bus</td>
<td>CNG</td>
<td>53</td>
<td>3.52</td>
</tr>
<tr>
<td></td>
<td>car-sharing Smart</td>
<td>PULP</td>
<td>47</td>
<td>4.17</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Total</td>
<td>7.70</td>
</tr>
<tr>
<td>2a</td>
<td>Train</td>
<td>Electric</td>
<td>5</td>
<td>1.27</td>
</tr>
<tr>
<td></td>
<td>car-sharing Yaris</td>
<td>PULP</td>
<td>64</td>
<td>5.66</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Total</td>
<td>6.93</td>
</tr>
<tr>
<td>2b</td>
<td>Train</td>
<td>Electric</td>
<td>5</td>
<td>1.27</td>
</tr>
<tr>
<td></td>
<td>car-sharing Smart</td>
<td>PULP</td>
<td>47</td>
<td>4.17</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Total</td>
<td>5.44</td>
</tr>
<tr>
<td>3a</td>
<td>Motor scooter</td>
<td>PULP</td>
<td>64</td>
<td>5.66</td>
</tr>
<tr>
<td></td>
<td>car-sharing Yaris</td>
<td>PULP</td>
<td>43</td>
<td>3.78</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Total</td>
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</tr>
<tr>
<td>3b</td>
<td>motor scooter</td>
<td>PULP</td>
<td>47</td>
<td>4.17</td>
</tr>
<tr>
<td></td>
<td>car-sharing - Smart</td>
<td>PULP</td>
<td>43</td>
<td>3.78</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Total</td>
<td>7.96</td>
</tr>
<tr>
<td>4a</td>
<td>bus</td>
<td>CNG</td>
<td>53</td>
<td>3.52</td>
</tr>
<tr>
<td></td>
<td>taxi</td>
<td>LPG</td>
<td>100</td>
<td>7.66</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Total</td>
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</tr>
<tr>
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<td>bus</td>
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<td>33</td>
<td>2.86</td>
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<tr>
<td></td>
<td>taxi</td>
<td>LPG</td>
<td>100</td>
<td>7.66</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Total</td>
<td>10.52</td>
</tr>
<tr>
<td>4c</td>
<td>bus</td>
<td>LDV</td>
<td>42</td>
<td>3.63</td>
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<td>taxi</td>
<td>LPG</td>
<td>100</td>
<td>7.66</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Total</td>
<td>11.29</td>
</tr>
<tr>
<td>5</td>
<td>taxi</td>
<td>LPG</td>
<td>314</td>
<td>23.95</td>
</tr>
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<td>6a</td>
<td>Private car Yaris</td>
<td>PULP</td>
<td>218</td>
<td>19.38</td>
</tr>
<tr>
<td>6b</td>
<td>Private car Yaris</td>
<td>LPG</td>
<td>217</td>
<td>16.61</td>
</tr>
<tr>
<td>7</td>
<td>Private car Prius</td>
<td>Hybrid Electric + PULP</td>
<td>9.86</td>
<td>N/A</td>
</tr>
<tr>
<td>8</td>
<td>Bus</td>
<td>CNG</td>
<td>82</td>
<td>5.43</td>
</tr>
<tr>
<td></td>
<td>Train</td>
<td>Electric</td>
<td>7</td>
<td>1.66</td>
</tr>
<tr>
<td></td>
<td>Bus</td>
<td>CNG</td>
<td>11</td>
<td>0.70</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Total</td>
<td>2.36</td>
</tr>
</tbody>
</table>

4.3 Discussions

Looking at the comprehensive results of both the economic and environmental assessments, it can be seen that Scenario 8 “Bus Only” offers the most benefits. This scenario gives the lowest cost for the couple as well as the lowest level of two air quality pollutants (hydrocarbons and micro particles). In spite of these advantages, Scenario 8 takes the longest time for travelling: more than 3 times that of travelling by car or taxi. This time factor could diminish the willingness of passengers to consider the “bus only” option.

The second best environmental performance came from Scenario 9 “Train + Bus”. It also offers considerably inexpensive travel cost – only 1/5 of the cost of driving in a petrol car – yet has significantly long duration to travel, only slightly less than the “bus only” option.
These results demonstrate that using public transport is beneficial to both the traveller’s budget and the environment. Not only does it reduce GHG emissions and air pollution by reducing the number of automotive engines on the road, it saves money and delivers other benefits. Greater Sydney commuters use public transport to avoid parking problems (46%) or because they do not have a car (26%); roughly a fifth of them said public transport was faster, cheaper, less stressful, and allows them to enjoy time to read and relax (TPDC, 2006).

However, given that Australia has a strong “car culture”, the modal shift from private cars to public transport would prove to be a major challenge. The dependency, norms, values, convenience, privacy, practicality, and travel time are some of the impediments. A survey of 9,200 households in the Sydney Greater Metropolitan Area (TPDC, 2006) identified that speed is the most important factor why residents prefer to use private vehicles to go to work. The other important factors are the unavailability or inaccessibility of bus or train services, problems experienced while using public transport, and waiting time constraints.

As the Transport and Population Data Centre study shows (TPDC, 2006), the proportion of trips by modes of transport did not change much for the last five years. New strategies should be sought to achieve the ideal state of sustainable urban transport. Use of alternative fuels is a promising option. Converting the car’s fuel system to LPG may provide economic benefit, however it appears from the calculations that the emission reduction is trivial (Scenario 6a and 6b) and the energy consumption is still almost the same. Biodiesel is also important as it could substitute the non-renewable fossil fuels. Nevertheless, BD20 has not shown a remarkable performance in terms of the emissions level (see comparison between CNG, LSD and BD20 bus in Scenario 4a, 4b and 4c); currently it is also more expensive, about 13% more than PULP. The petrol/electric hybrid engine system (Scenario 7) shows an outstanding environmental performance, but it is also the most expensive option. For this reason, only the most committed environmentalists often invest in this kind of vehicle.

Another strategy for sustainable urban transport is to encourage smart choices of transport, such as via Travel Blending®. Therefore, instead of totally avoiding the use of car, people are motivated to change their travel behaviour through their own personal choice. This may result in a combination of different modes of transport. For instance, Scenario 2b “Train + Car-Sharing” using Smart cars results in relatively low emission levels. It is not the best, but it offers moderate performance in all aspects (travel distance, travel time, cost and emission levels).

Car-sharing organizations argue that being a member of car-sharing delivers both monetary and non-monetary benefits, such as enjoying the freedom of a car without the costs and hassles of owning one. However, there are perceived inconveniences in car-sharing, such as: a booking is required to access the vehicle; the car may not be available when needed; members will need to walk or cycle or transit to access the car in its parking location; all belongings should be removed when returning the car; previous user may be late in returning the car, or may leave the car untidy, dirty, or with an empty fuel tank.

From a survey of 68 GoGet members (Timbrell, 2004), it would appear that the above drawbacks are not actual concerns of car-sharing members.
None of the survey respondents complained about the cleanliness of the car, both exterior and interior. Furthermore, none ever thought that other users are not considerate in terms of using the car. Only one in 68 found difficulty with the online or telephone booking system. Ninety percent said that they always get the car when they need it.

The Life Cycle Emissions Analysis used for this environmental assessment is not without shortcomings. Doing a sustainability appraisal based on emissions alone would be neglecting other factors such as material intensity, travel blending effects, land use impact, and social impacts. Those aspects are fairly important for weighing up the overall effects of various transport modes, particularly of a car-sharing system.

Car-sharing ventures are considered to be a good example of meeting people’s needs with services, rather than goods (Gardner, 2002): in other words, it is a product-service system (PSS). In a PSS, the product ownership structure is shifted from an individual owner to a third party or organization that delivers a service offering the same benefits and function fulfilment as a product but with reduced material intensity. By encouraging users to share a communal car among several people, a car-sharing scheme discourages private vehicle ownership.

Mont (2002) contends that PSSs will influence the improvement of both sustainable production and consumption. European cases show that one car-sharing fleet has replaced between 4 and 10 private cars (Bergmaier et al., 2004); at least 3 US cities have replaced their municipal fleets with car-sharing services (Shaheen, Cohen, & Roberts, 2005). Car-sharing schemes have the potential of trimming down vehicle-kilometres of travel (vkt) per person, because members manage their travel demand and “consume” only the transport options when they need them. While shared cars might have higher annual mileage than private cars, the mileage is shared by many members driving on just one vehicle, and resulting in a lower per capita vkt. Because car-sharing members use private cars less, they double their use of public transport (MOSES, 2005).

If car-sharing takes off, demand for individually owned vehicles will not be as much and less materials will be necessary for delivering the benefits of mobility. By reducing the number of cars on the road, there is also less space occupied and required for parking, so it improves the land use impacts (Bergmaier et al., 2004).

Governments at all levels in Australia are starting to take interest in car-sharing scheme. The Australian Greenhouse Office commissioned an overview report on car-sharing (Bergmaier et al., 2004), to determine the factors for running a successful CSO. Recently, the Victorian Greenhouse Strategy and the City of Melbourne Small Business Development Grants also awarded a total subsidy of $220,000 to GoGet and Flo CarShare. Several city councils in Melbourne and Sydney areas are also providing CSOs with dedicated on-street parking spaces and street lighting to enable operators to better service their communities. The success of car-sharing in Sydney and Melbourne has prompted the city councils in Brisbane and Adelaide to investigate the feasibility of starting up CSOs in their areas.
5 Conclusion

The economic and ecological assessments of the Australian urban travel scenarios presented in this paper show interesting differences in the costs and impacts of our transport choices. Public transport modes, in particular buses and trains, are the best performers in the assessments by a wide margin, on both the total dollar and total emissions calculations. It is appropriate that Australian State Governments continue to provide policies, strategies or incentives that would encourage the community to ride the train or bus more than ride or drive a car, as well as ensure that the public transport service remains reliable, cost-effective and sustainable. However, sustainable transport plans for Australian cities should go beyond the abatement of traffic congestion, air pollution and greenhouse gases, but also foster changes among citizenry to adopt more sustainable travel behaviours.

It would require major attitudinal changes among Australians to dissociate themselves from their “car culture”. The calculations in our study demonstrate that driving a car, especially one running on petrol, is not only the most expensive way to travel but also the most environmentally impacting. Private car ownership incurs a high financial burden, and, particularly for residents of congested inner Sydney suburbs with good access to public transport, can be quite impractical.

For situations where most mobility needs can be met by walking, cycling or transit, car-sharing can complement the city’s transportation network and offer a more sustainable travelling option. The constant growth in the number and locations of car-sharing organizations throughout Australia shows promise and makes this initiative viable as a sustainable means for getting around. The interest from governments is encouraging, although it is important to note that most car-sharing schemes around the world have grown via a bottom-up approach.

As a product-service system, car-sharing has the potential to considerably lessen demand for vehicles as material products that need to be owned for the satisfaction of wants. Considering the current state of the planet, it can offer a means for communities to move towards more sustainable transportation. With fuel costs being much lower in Australia than in other developed regions such as Europe – as well as average distances travelled often much larger (Bergmaier et al., 2004) – it would certainly take a lot of creativity and determination for all interested parties to help reinvent the private car and help car-sharing gain ground. Supportive policies from government and a more aware and more TravelSmart citizenry will be the keys to pushing car-sharing as a practicable option for sustainable urban transport in Australia.
Appendix 1: Australian State Plans and Policies on Sustainable Transport

<table>
<thead>
<tr>
<th>State</th>
<th>Plan/Strategy</th>
<th>Website</th>
</tr>
</thead>
</table>

Appendix 2. Detailed economic assessment of scenarios.

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Mode of weekday transport</th>
<th>Total Weekday Distance (km)</th>
<th>Total Weekday Time (min)</th>
<th>Total Weekday Cost</th>
<th>Mode of weekend transport</th>
<th>Saturday Distance (km)</th>
<th>Saturday Time (min)</th>
<th>Saturday Cost</th>
<th>Sunday Distance (km)</th>
<th>Sunday Time (min)</th>
<th>Sunday Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>walking + bus</td>
<td>48</td>
<td>240</td>
<td>$27.20</td>
<td>walking + car-sharing</td>
<td>22</td>
<td>6</td>
<td>40</td>
<td>$25.30</td>
<td>4.6</td>
<td>20</td>
</tr>
<tr>
<td>2</td>
<td>walking + train</td>
<td>69.3</td>
<td>220</td>
<td>$46.00</td>
<td>walking + car-sharing</td>
<td>22</td>
<td>6</td>
<td>40</td>
<td>$25.30</td>
<td>4.6</td>
<td>20</td>
</tr>
<tr>
<td>3</td>
<td>scooter</td>
<td>85.8</td>
<td>240</td>
<td>$48.00</td>
<td>walking + car-sharing</td>
<td>22</td>
<td>6</td>
<td>40</td>
<td>$25.30</td>
<td>4.6</td>
<td>20</td>
</tr>
<tr>
<td>4</td>
<td>walking + bus</td>
<td>48</td>
<td>240</td>
<td>$27.20</td>
<td>taxi</td>
<td>22</td>
<td>30</td>
<td>4</td>
<td>$42.80</td>
<td>4.6</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>taxi</td>
<td>55.3</td>
<td>70</td>
<td>$130.00</td>
<td>taxi</td>
<td>22</td>
<td>30</td>
<td>4</td>
<td>$42.80</td>
<td>4.6</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>private car, PULP/LPG</td>
<td>55.3</td>
<td>70</td>
<td>$258.20</td>
<td>private car, PULP/LPG</td>
<td>22</td>
<td>30</td>
<td>4</td>
<td>$14.20</td>
<td>4.6</td>
<td>10</td>
</tr>
<tr>
<td>7</td>
<td>private car, hybrid</td>
<td>55.3</td>
<td>70</td>
<td>$314.95</td>
<td>private car, hybrid</td>
<td>22</td>
<td>30</td>
<td>4</td>
<td>$25.20</td>
<td>4.6</td>
<td>10</td>
</tr>
<tr>
<td>8</td>
<td>walking + bus</td>
<td>48</td>
<td>240</td>
<td>$27.20</td>
<td>walking + train + bus</td>
<td>26</td>
<td>06</td>
<td>100</td>
<td>$5.44</td>
<td>4.7</td>
<td>26</td>
</tr>
<tr>
<td>9</td>
<td>walking + train</td>
<td>69.3</td>
<td>220</td>
<td>$46.00</td>
<td>walking + train + bus</td>
<td>26</td>
<td>06</td>
<td>100</td>
<td>$5.44</td>
<td>4.7</td>
<td>26</td>
</tr>
</tbody>
</table>
Appendix 3. Full life cycle emissions per MJ

<table>
<thead>
<tr>
<th>Unit emissions*</th>
<th>Premium Unleaded Petrol</th>
<th>Electric</th>
<th>Compressed Natural Gas</th>
<th>Liquefied Petroleum Gas</th>
<th>Low Sulphur Diesel</th>
<th>Biodiesel: 100% waste cooking oil</th>
<th>Biodiesel blend: 80% diesel + 20% waste biodiesel</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO₂ kg</td>
<td>0.0888</td>
<td>0.253</td>
<td>0.0665</td>
<td>0.0764</td>
<td>0.0858</td>
<td>0.0062</td>
<td>0.0698</td>
</tr>
<tr>
<td>HC total g</td>
<td>0.17</td>
<td>N/A</td>
<td>0.027</td>
<td>0.102</td>
<td>0.14</td>
<td>0.055</td>
<td>0.1226</td>
</tr>
<tr>
<td>NOₓ total g</td>
<td>0.14</td>
<td>0.14</td>
<td>0.14</td>
<td>0.1444</td>
<td>1.179</td>
<td>1.179</td>
<td>1.071</td>
</tr>
<tr>
<td>PM₁₀ total mg</td>
<td>38.2</td>
<td>15.4</td>
<td>1.1</td>
<td>4.9</td>
<td>40.7</td>
<td>27.5</td>
<td>38.06</td>
</tr>
</tbody>
</table>

*Fuel density and unit emissions data are obtained from Beer et al. (2001).

Appendix 4. Fuel consumption by vehicles in the scenarios

<table>
<thead>
<tr>
<th>Vehicle &amp; Fuel</th>
<th>Fuel Consumption</th>
<th>Unit</th>
<th>Data Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bus CNG</td>
<td>24.25</td>
<td>MJ/km</td>
<td>Average fuel consumption (1.6 km/m³) for Sydney Buses and the typical energy content for natural gas, which is 39 MJ/m³ (Beer et al., 2001).</td>
</tr>
<tr>
<td>Bus Diesel</td>
<td>39.3</td>
<td>L/100 km</td>
<td>Previous study by King and Hensher (1998).</td>
</tr>
<tr>
<td>Bus Biodiesel</td>
<td>58.1</td>
<td>L/100 km</td>
<td>Based on the CO₂ emissions data and the fuel density (Beer et al., 2001).</td>
</tr>
<tr>
<td>Motor scooter Honda Today 50 PULP</td>
<td>1.54</td>
<td>L/100 km</td>
<td>Manufacturers' technical specification brochures and <a href="http://www.GreenVehicle.gov.au">www.GreenVehicle.gov.au</a></td>
</tr>
<tr>
<td>Toyota Yaris PULP</td>
<td>7.6</td>
<td>L/100 km</td>
<td>Manufacturers' technical specification brochures and <a href="http://www.GreenVehicle.gov.au">www.GreenVehicle.gov.au</a></td>
</tr>
<tr>
<td>Smart forfour PULP</td>
<td>10.4</td>
<td>L/100 km</td>
<td>Relative approximation of the fuel consumption ratio between Ford Falcon petrol and Ford Falcon LPG.</td>
</tr>
<tr>
<td>Ford Falcon LPG</td>
<td>15</td>
<td>L/100 km</td>
<td>Manufacturers' technical specification brochures and <a href="http://www.GreenVehicle.gov.au">www.GreenVehicle.gov.au</a></td>
</tr>
<tr>
<td>Train electric</td>
<td>19.77</td>
<td>MJ/km</td>
<td>Adapted from the fuel consumption of the similar train operated in UK (Hobson &amp; Smith, 2001).</td>
</tr>
</tbody>
</table>

References

Assessing Scenarios for Sustainable Transport in Australia


MOB Transitions to sustainable tourism mobility: The Social Practices Approach

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1 Introduction

Tourism produces high economic gains. It is a large industry that creates jobs and is an important contributor to the GDP. In the European union, tourism now accounts for about 4.3% of GDP (WTTC, 2004 in: European Environment Agency, 2005). Dutch citizens spend 29 billion euros on tourism for leisure purposes. That is about 12.4 percent of the total amount spent on consumption. With a share of 3.1 percent, the tourism industry is more important for the Dutch economy compared to agriculture (2.3 percent) (NRIT, 2005). Apart from the macro gains, tourism is an important aspect of people’s lives as well. It is a moment of escape from everyday life where people can relax or have alternative experiences.

However, tourism brings with it some disadvantages as well. For one thing, it is supposed to have a negative impact on the environment. As the European Commission (2005: 38) reports in the EU LIFE project: “Uncontrolled tourism can have a number of negative impacts on the environment. It can lead to an over-exploitation of natural resources and generate significant increases in volumes of waste. It can also create irreversible changes to the landscape and historical and cultural heritage of regions”.

Thus, in this line of thought, it can be said that tourism threatens tourism. If nothing changes, tourism growth will make tourism less and less attractive. Within a deteriorated environment, cultural differences have disappeared, and tourism businesses can no longer deliver the quality tourists are looking for. Therefore governmental institutions as well as businesses in the tourism industry aim for sustainable tourism behaviour. Sustainable development can deliver a way out of the lock-in situation the tourism industry finds itself in.

With respect to sustainability, mobility is the most critical component of tourism (Böhler et al., 2006; Hoyer, 2000; NHTV et al., 2004). First, by definition, there is no tourism without travel. An increase in global tourism thus goes along with an increase in tourist mobility. Second, the transport
element of tourists accounts for between 50% and 75% of the total environmental impact of tourism (NHTV et al., 2004). For instance, Lange (1995, in: Hoyer, 2000) shows that 40-60% of the environmental loads linked to tourism are caused by the transport of tourists. Only 20-30% of the environmental loads are caused by the activities of the tourist industry within the destination area. The remaining 20-30% is caused by the tourists’ leisure and recreational activities (ibid).

The general trend in tourism towards more frequent, further-away trips, for shorter periods of time, has a strong impact on transport demand (NHTV et al., 2004). This creates a sustainability dilemma in tourism. The growth of tourism and therefore of mobility has economic and social benefits, but leads to environmental deterioration as well.

Different (groups of) actors can exert their influence on the practice of holiday making, such as businesses in the tourism industry, governmental agents, NGOs, and citizen-consumers. Especially consumers have a crucial role in this process. The tourism industry is more or less demand-led, which gives tourists a critical position in change processes towards sustainable development of tourism.

The central aim of the research project of which this paper forms a part concerns the transition to sustainable tourism mobility and the role of citizen-consumers as active change agents in this process. In other words, “What are potential roles of citizen-consumers in a transition process to sustainable tourism mobility and how could they influence the tourism industry and the holiday practice in order to set in motion a transition to sustainable tourism mobility?” In this paper we explore the field of tourism research from the perspective of the basic research question, asking ourselves what contribution existing research might deliver here. We come to the conclusion that existing research is hampered by a serious actor-structure cleavage. Next we propose some conceptual solutions to tackle the problem. In the wider research project this solution will be an object of further empirical research.

2 Current sustainable tourism research

Sustainability is a popular field in tourism research. Within that field, different topical lines can be discovered.

2.1 Transport modes

A first line contains research on transport modes, both in a technological and in an organisational sense, and their impact on climate change. As an example of this line of work we can point at Åkerman and Höjer (2006). The authors used a backcasting approach to find out how a future transport system with sustainable levels of CO₂ emissions would look like. They found out that it would be technically possible to reduce fuel intensity for passenger transport modes by between 30% and 75%, using more efficient vehicles, IT-services and a smarter urban planning. Other examples of research concentrating on transport mode aspects are Gössling et al. (2005) and Peeters et al. (2006), analysing the eco-efficiency of tourism and the greenhouse gas emission factors of air transport. Out of their research some structural solutions come to the fore, such as lengthen the period of stay, shorten the distance travelled, and change the mode of transport. These make
tourism more eco-efficient. In this same line of work, Cuijpers and de Haan (2006) analysed the “Free Flight” programme, a suggested solution to the congestion in the air. Free Flight is a new concept in air traffic control (ATC), defined as: “A specific airspace in which pilots can choose their own route, between origin and terminal, on an efficient and safe way, without consulting the ATC” (ibid: 1). Free Flight will shorten flight times and will therefore decrease greenhouse gas emissions. Boon (2006) analysed the effectiveness of several compensation schemes for air transport. He found that “the best a traveller that is dedicated to fly can do, is compensate his emissions with an organisation that invests in non-forestry projects outside Annex I countries and that compensates for the full climate impact of a flight” (ibid.: 15). A second order effect however can be that the possibility to compensate the climate impacts of aviation will lead to an increase in the demand of air travel (Koens in: Boon, 2006). Nevertheless, compensation schemes may also raise awareness of the climate impacts of air travel which may affect both compensators and non-compensators in their decision on future flights. Furthermore it appears that compensation by tourists is increasing, due to travel agencies confronting more and more potential air travellers with the choice of compensating (ibid).

2.2 Attitudes and behaviour

A second and very popular line of research focuses on the beliefs, attitudes and behaviour of individuals, being it tourists, tourism businesses, local government tourism officers, or residents. With respect to climate compensation, Becken (2004) conducted research on the attitudes of tourists and tourism experts towards climate compensation. This resulted in very interesting data on attitudes and reasons for (not) compensating, such as ‘guilt’, ‘I love trees’, and ‘compensating makes no difference’. Consumer attitudes towards sustainable tourism and their willingness to pay for sustainable tourism services have been analysed, among others, by Zschiegner and Yan (2006). They found that positive attitudes towards sustainable tourism do not correlate with economic preferences for sustainable tourism services. Willingness to pay for sustainable tourism services is low. Godfrey (1998) examined the attitudes of public sector tourism managers towards the principles of sustainable tourism and potential obstacles to its implementation. Effective implementation of principles of sustainable tourism requires the involvement of a wide range of people, not least including public sector planners and managers, particularly at the local level. Local governments are responsible for policy statements, management strategies, controlling development, providing information, and limited marketing activity. They are thus key agents in the development and management of tourism activity.

Nilsson and Kümmer (2000) investigated the impact of attitudes and environmental knowledge on driving distance, travel behaviour and acceptance of various traffic restrictions. The most general conclusions are that the intention to behave in an environmentally responsible way may depend to a considerable degree on attitudes related to the environment, the car and to the hazards of traffic. Factual knowledge seemed to play a subordinate role. In other words, “environmental attitudes were more potent than factual knowledge in promoting pro-environmental travel behaviour” (ibid: 229). Friedl et al. (2005) analysed the way in which sustainable
tourism needs to be marketed in an innovative way. Out of a survey a typology of seven traveller types was deduced. One of the conclusions is that these seven traveller types each need a different supply of sustainable holidays and a different way of communicating. ‘Sophisticated cultural travellers’ for example are intrinsically interested in sustainability and want that to be communicated in the holiday offers, while young ‘fun and action seekers’ will be more interested in a party train to a beach, where sustainability is ‘hidden’ in the communication. Böhler et al. (2006) included both actor- as well as behavioural- and structuring aspects in their research; individual characteristics of holiday travellers, holiday travel behaviour, and strategies to change holiday travel behaviour. According to the number of holiday trips and kilometres travelled four travel groups have been identified. The groups vary according to socio-demographics, psychological factors, choice of travel mode and the levels of environmental impact of their behaviour. Böhler et al. (2006) conclude that “strategies aiming at the reduction of the individual’s negative environmental impact have to consider different personal preconditions for travelling as well as the different extent to which people travel” (ibid: 666). Götz et al. (2003) and Schubert (2004) explored mobility-styles in leisure-time conducting a lifestyle approach for a better understanding and shaping of leisure-mobility. Lifestyle-specific orientations, background attitudes and motivations were subjected to analysis. Furthermore, the attitudinal and lifestyle research method was coupled with methods of analysing traffic behaviour. They identified five leisure mobility styles, characterised by different use of transport modes and covered distances. The specific traffic-behaviour of the mobility styles shows diverse CO₂ emissions. Acquired knowledge of target-group specific orientations and motivational factors can be used for influencing behaviour in the direction of sustainability (Götz et al., 2003; Schubert, 2004).

2.3 Modal shift

A third line of research within the field of tourism mobility research is focused on modal shift issues, either aimed at reducing car dependency as such (Robbins and Dickinson, 2006) or at reducing car use by improving the local bus system (Guiver et al., 2006) or by improving train attractiveness (Van Goeverden, 2006). Robbins and Dickinson (2006) analyses the relative merits of car travel over public transport alternatives and identifies the major barriers for modal shift. Local residents, for example, are unwilling to see their car use restricted and modal shift will not be achieved by public transport improvements on their own. Robbins and Dickinson (2006) concludes by stating that policies to reduce the dominant position of the car for domestic tourism travel have not succeeded.

Guiver et al. (2006) examined the role of local bus services in reducing car use at tourist destinations. They describe the characteristics of people who use these buses although they have a car available and provide insights in barriers and incentives associated with modal switches in tourist areas. It appears that personal benefits (e.g.: the views from a double-decker or open-top bus, and not having to drive in an unfamiliar area), rather than environmental concerns generally motivate people with cars to use buses in tourist areas. Van Goeverden (2006) analysed motivations of train passengers and concluded that train attractiveness can be enhanced by
reducing need for transfers, increasing operating speed, suspending obligations for seat reservation, operating more train services with high 'status' and asking modest fares.

2.4 Conclusion

Overlooking the field, two interrelated conclusions can be drawn. First, the broader part of the research can be typified by research either exploring the technological and organisational characteristics of the various transport modes, or exploring the attitudes and behaviours of various groups of travellers (or other agents involved in tourism). In a general social-ontological sense, one could say that this represents a rather neat actor-structure dualism. Either the research is structure- or technology centred leaving individual motives unexposed, or it is actor-centred, concentrating on individual motives, values, beliefs and behaviours, without attention for structuring characteristics and existing technologies. Second, in cases where individual behaviour and technological or organisational aspects of transport modes are researched in interaction with one another (e.g. much of the modal split research), this research remains on a rather generalized level. One correlates a given supply of transport modes with generalised attitudes towards travel functions. What is missing here is the embeddedness of behaviour in specific social contexts.

In structure-centred analyses no attention is given to why consumers would want to adapt to green technologies, and how these innovations could be embedded in consumers’ daily practices. Consumer aspects as well as practices of travel and tourism behaviour remain part of a kind of unelaborated black box, whereas these aspects are extremely important in a transition towards sustainable tourism mobility. For instance, there is a vast recognition of the fact that accomplished advantages for the environment are most of the time counteracted by a growth of consumption (European Commission, 2004; European Environment Agency, 2005; Nilsson and Küller, 2000). The European Commission (2004: 5) states in this respect: “Technological development and innovation have increased resource efficiency and enabled environmental gains. These gains are however often outweighed by increased consumption and changes in lifestyles”. Positive effects on the environment through forms of technological progress are undone by increases in the level of consumption.

Actor-centred research, focusing on people’s attitudes, motives and values, is problematic when these are used to analyse or explain people’s behaviour. As is generally recognised, attitudes do not automatically translate into behaviour. Next to individual characteristics such as attitudes, experiences, opportunities, knowledge, lifestyles, routines and people’s claimed willingness to pay, other aspects such as infrastructure, policies, norms, law, and the structure of supply influence travelling behaviour. The actor centred stream of literature emphasises the importance of considering personal attitudes, values and lifestyles when implementing new strategies towards sustainability. However, structural and technological factors are as important in influencing tourists’ behaviour. Therefore these aspects need to be of consideration as well in order to set in motion a transition towards sustainable tourism mobility.

Where research tries to go beyond the actor-structure dualism, such as in cases where research is focussed on the use of a supply of different transport
modes, this remains on a highly generalized level leaving many contextual differences with regard to tourists’ motivations (attitudes, values, lifestyles, routines) as well as with regard to structuring conditions (rules, regulations, infrastructure, presence of innovative green technologies) out of consideration. These aspects are however important in analysing fits and misfits in a transition towards sustainable tourism mobility and possible role of citizen-consumers as change agents in these processes. For instance, in modal split analyses the focus is on transport modes and how the use of one particular transport mode could be minimised in favour of an environmentally more friendly transport mode. However, a possible important reason for people to go on holiday by airplane is that the plane ticket was part of the holiday package they booked and/or that the destination is too difficult to reach by other means of transport. In other words, tourists are not focused on transport modes as such, they want to go on winter sports, visit their family, or go on a city trip. The chosen mode of transportation is mostly a logical component of a more specific holiday practice (Böhler et al., 2006: 655). For that reason, choice of type of holiday, destination and transport mode should be considered as part of one holiday package (NHTV et al., 2004). Mobility should be analysed as part of specific holiday practices.

To summarise our review of current literature, both technological and structural innovations as well as changes in attitudes are very important in the transition to sustainability. However, most of the time, these elements are analysed separately, within their own line of research. Where these elements are studied in interaction, the research remains on a highly generalised level, leaving the specific components of the interaction underexplored. Hence, in the end, this leads to a situation of ships passing each other in the night, without the different significant components really coming together. In order to study tourism mobility and the possible role of citizen-consumers in a transition towards a more sustainable tourism mobility more profoundly, it is our conviction that the starting point of the analysis should be the holiday practices in which individual characteristics as well as structural characteristics come together in context specific ways. Possibilities for better understanding the tourism industry and tourists’ travelling behaviour lie in combining crucial insights from the three identified bodies of literature in the context of specific holiday practices. Here, these holiday practices can be interpreted as the so-called consumption junction of tourism (Spaargaren, 2006); the time-spatial specific context in which different consumer-logics and provider-logics meet. In the next section we briefly introduce the Social Practices Approach. We regard the approach as a useful conceptual toolkit to bring actor-centric and structure-centric research together in context specific ways. In addition we want to give a first typology of holiday practices, identifying possible empirically grounded contexts for studying the interaction.
3 Between provision and demand: the Social Practices Approach

The Social Practices Approach concerns a contextual approach to consumption behaviour. It was developed by Spaargaren (1997), based on the work of the British sociologist Anthony Giddens on structuration theory, as a reaction to the consumption behaviour literature in which social-psychological research on consumption behaviour left the structuring characteristics of consumption behaviour unexposed, and to economic research that left individual motives for consumption behaviour underexposed. To incorporate contextuality in the analyses of consumption behaviour Spaargaren developed a model of consumption in which not demand or supply is the unit of analysis, but the social practice of consumption is. The Social Practices Approach combines an actor-oriented perspective with a system-of-provision perspective. Its focus is on social practices in which the concrete interactions take place between actors with their lifestyles and routines on the one hand, and the mode of provision with its infrastructure of rules and resources, including norms and values, on the other. Social practices are conceived of as routinized, everyday activities situated in time and space and shared by groups of people as part of her or his everyday life (Spaargaren, 1997, 2006; Spaargaren and Vliet, 2000).

Here, this implies that the starting point is neither the individual tourist, nor technological innovations and structural solutions, but the so-called holiday practice where these two come together. First, by taking the social practice as a unit of analysis, the context-specificity of holiday behaviour is taken into account. Socio-technical innovations are analysed in direct connection with consumption practices; the specific context of people’s individual motives, lifestyles, and routines, and the context of the providers’ network, and their modes of provision (Spaargaren, 2006: 7). Second, consumption behaviour, and tourism behaviour in specific, is not simply a matter of individual choice. Consumption behaviour is instead influenced by a number of interconnected factors such as individuals’ concerns, motives and values, and at the same time prevailing “social, political and moral value systems and institutions [...] that guide human behaviour by imposing obligations, enabling and disabling particular choices” (Berglund and Matti, 2006: 551). Shove (2003: 198) argues with respect to the guiding effect of moral value systems that individual choices are “bound up with and constitutive of social practices governed by norms like respectability, appropriateness, competence, and excellence”.

In social practices, there is a place and time at which consumers and providers ‘meet’ each other: the consumption junction. In consumption junctions different logics – principles that guide reasoning in a situation – are prevailing. Producer-logics of providers which are technology and market oriented, meet the lifeworld-logics of end-users of new products and services (Spaargaren, 2006). In the consumption junction the relationship between inside factors such as the internal time-space organization and the cultural style of the household, and outside factors such as the external systems of provisions and the mobility infrastructure is important (Spaargaren and Vliet, 2000). “Following the suggestion of Schwartz-Cowan (1987), the most promising places to start developing a new synthesis between market- and technology driven innovation perspectives on the one hand and every day life and meaning oriented perspectives on the other, are
to be found at the consumption junction” (Spaargaren, 2006: 7). By confronting supply and demand in the consumption junction of holiday practices, slots – barriers as well as windows of opportunities (Bargeman et al., 2002) – between travellers’ lifestyles, identity and routine behaviour, and providers-logics of tour operators and travel agencies can be identified. In her analysis of holiday routines of Dutch tourists, Bargeman (2001) started off using these insights. In the theoretical background and the model used, the concept of ‘holiday practice’ was introduced, with individual and contextual factors indirectly influencing the holiday practice. However, in the empirical research that followed, this model was only partly operationalised. Due to the unavailability of data, contextual factors, especially those related to the specific holiday practices of Dutch tourists, were underexposed, whereas actor-related factors became overexposed.

All in all, the Social Practices Approach recognizes that consumers and producers shape each other through production-consumption cycles. The SPA framework bridges opposites in consumption behaviour: actor and structure, supply and demand, modes of access and modes of provision. The challenge within the Social Practices Approach is to analyse concrete production-consumption slots in the consumption junction, in order to find clues for possible actor- or demand-based transition trajectories towards a more sustainable development of tourism mobility. These clues might be found in trajectories specific for what could be called pure consumption roles, that is in the role of agents as ‘pure’ consumers; they might also be found in trajectories in which consumer and citizen roles more or less seem to cross borders. Here we think of consumers incorporating citizen rationalities and practices in their role as consumers. In the next sections we further elaborate on how the Social Practices Approach suggests ways in which citizen-consumers might contribute to transition processes.

3.1 Consumers as change agents

Consumers are important change agents because of the fact that consumer behaviour is an important driver in the unsustainable development of tourism. As said above, over and over again it appears that the positive effects of environmental improvements of technologies are undone by a growth in consumption behaviour. In order to reach a state of sustainable tourism mobility therefore, changes in consumption are indispensable.

Consumer behaviour is situated in a certain framework of structuring rules and resources, including norms and values, created by providers of products and services. These influence the travelling behaviour of tourists in holiday practices and are therefore important in the analysis of sustainability slots. Such rules and resources can refer to infrastructures, objects, conventions, uses and practices (Shove, in: Spaargaren and Vliet, 2000). When going on a cycling holiday, for example, the infrastructure of good cycling paths, road maps, the route ways, the availability of accommodation and restaurants are an important source of the rules and resources that make up the structure of the social practice ‘active holiday’.

In this light, Peters (2003) suggests to interpret mobility problems as design problems. A mobility problem does not only involve the vehicles as a technological device; it perhaps more importantly also involves the practice of travelling, the available infrastructure and all other related aspects as well. The challenge on the road to sustainable tourism mobility is to look for
innovative designs, not only for vehicles, but for the activity of travelling and tourism as such. The innovative design must be found in new travel and tourism concepts.

The first person to design a travel and tourism concept was Thomas Cook, the initiator of mass tourism. Thomas Cook’s mission was to make travelling easy, cheap and safe. He saw opportunities for travelling by train for leisure reasons. Out of multiple railway companies and their supply he organised together the cheapest arrangements for his tourists. Next to that, he gave people a reason to travel by producing destination myths, and by producing his own magazine, advertising his arrangements and myths. According to Peters (2003), by doing this, Thomas Cook has created a ‘passage’ by connecting diverging elements in a network. In order to be able to travel quick and safe a spatio-temporal order needed to be created in which the problems travellers can run into while travelling were solved.

This theory of design and passages leads to a new way to explain the success or failure of innovations. A successful innovation is characterised by the creation of a new passage, understood as a social practice. The example of Thomas Cook shows that in creating his passage, this opportunity for a new practise, he took people’s lifestyles and routine behaviours into account.

In the same line of thought, Van der Duim (2005) speaks of modes of ordering in tourism that are to be seen as coherent sets of strategic notions about the way tourism should be practised. He adds to this that modes of ordering not only consist of sets of ideas, but also include certain sets of practices, certain ways of performing tourism, and that these modes of ordering imply particular ways of integrating with other projects and modes of ordering. In terms of the Social Practices Approach, these modes of ordering can be referred to as specific sets of rules and resources, structuring specific social tourism and travelling practices.

Superficially, it might seem that in the midst of these structuring elements of infrastructures, of passages and modes of ordering, there are no possibilities for consumers to act as active change agents. The Social Practices Approach however takes as one of its starting points that consumers are not passive, impotent receivers of structuring elements. As said, the Social Practices Approach is based on the concept of duality of structure, developed by Giddens (1984). With ‘duality of structure’ Giddens refers to the fact that structures not only constrain behaviour, but enable it as well. Structure is both the medium and outcome of the conduct it recursively organizes; the structural properties of social systems do not exist outside of action but are chronically implicated in its production and reproduction (Giddens, 1984). Structures influence actors at the same time that actors influence structures. Structures, such as a specific supply of tourism products and services, and of green innovations such as eco-labels and climate compensation programmes, influence consumers’ opportunities. But these structures will only continue to exist if they are enacted recursively by consumers through their behaviour.

However, the Social Practices Approach takes it that consumers can only be enabled and tempted to choose sustainable tourism products and services, and make use of green technologies and initiatives such as eco-labelling and climate compensation, if these ‘fit’ their consumption practice. In order to have an effect on their travelling behaviour, socio-technical innovations in the direction of sustainable tourism mobility need to be embedded in
travellers’ lifestyles and routines. All in all, to set in motion a transition to sustainable tourism mobility, systems of provision need to incorporate consumer-logics.

To further elaborate on these consumer-logics travellers’ lifestyles and routines in relation to the specific context of their holiday practices need to be analysed. According to Spaargaren (1997) in realising environmental improvements, lifestyles are an important factor. Giddens (1991: 81) defines lifestyle as “a more or less integrated set of practices which an individual embraces, not only because such practices fulfil utilitarian needs, but because they give material form to a particular narrative of self-identity”. In other words lifestyles refer to people’s behaviour, and the storylines behind them. Lifestyles are important because the environmental impacts associated with specific lifestyle characteristics can be reduced. “The development of more sustainable lifestyles implies that actors (are made to) reconsider all the distinct lifestyle segments or sectors from an environmental management perspective [...] and should look for the optimum exchange rate between the economic, ecological, cultural and social capital” (Spaargaren and Vliet, 2000: 57).

But, in order to be effective, socio-technical innovations need not only fit to peoples’ lifestyles, but also to their behaviour routines (Berglund and Matti, 2006; Spaargaren, 1997; Spaargaren and Vliet, 2000). The concept of routinisation is vital in realising a more sustainable tourism mobility behaviour, for most behaviour is habitual, taken for granted and not directly motivated. Routines are an expression of the interaction mechanisms between individuals’ wishes and demands, and structuring effects of rules and regulations. Customary consumption is “governed by collective norms and undertaken in a world of things and sociotechnical systems that have stabilizing effects on routines and habits” (Shove, 2003: 9). In other words, “routine is integral both to the continuity of the personality of the agent as he or she moves along the paths of daily activities, and to the institutions of society, which are such only through their continued reproduction” (Giddens, 1984: 60). Although tourism behaviour may not be a day-to-day experience, it certainly is characterized by routinized behavioural patterns. Bargeman (2001) analysed the working of routines in the ‘holiday choices’ people make, and she found out that people show routine behaviour in both their transport mode, length of stay, accommodation type and travelling companion. The way people look for holiday possibilities, and arrange their holidays, show repeating behavioural patterns as well. Routines therefore are a very important aspect when analysing how socio-technical innovations can enable and tempt consumers in making their holiday practice more sustainable.

To summarize, the Social Practices Approach indicates ways in which consumers can exert their influence in triggering transitions towards a more sustainable tourism mobility, because of the fact that providers incorporate consumer-logics in their supply of products and services. Green innovations will only enable and tempt travellers to make their practice more sustainable if they are in accordance with the lifestyles and routines of travellers, such as enacted within specific holiday practices.
3.2 Citizen-consumers as change agents

The incorporation of more sustainable consumer logics by providers of tourism products and services represents only one possibility for consumers to act as change agents. Furthermore, consumer-led institutional change can be achieved by consumers incorporating citizen-rationalities in their consumption behaviour. Citizen-consumers can in several ways exert their influence and initiate change processes in the holiday practice: through "subpolitical" processes such as social movements, and through forms of "political consumerism".

During the past decades, globalization processes have induced a process of individualization. According to Beck (1994: 14), individualization processes have as their consequence that individuals are no longer able to follow traditional roles and patterns, but have to “produce, stage and cobble together their biography, identity, social networks, commitments and convictions themselves”. As a consequence, institutions are no longer automatically enacted by traditional predictable role-model behaviour. Because of the fact that institutions only exist in their enactment by individual consumers, they have today become more dependent on the private, everyday behaviour of individuals. Thus, politics is no longer only to be found in the accepted political arenas performed by the institutionalised agents such as the parliament, political parties, trade unions and so on (ibid.), politics can also be found in other arenas and performed by other agents. This subpolitical process “is distinguished from politics in that agents outside the political or corporatist system are allowed to appear on the stage of social design” (ibid: 22). Subpolitics are “grass-root oriented, extraparliamentary, not tied to classes or parties, organizationally and programmatically diffuse and feuding” (ibid: 19). Through subpolitical processes citizen-initiative groups, the public sphere, social movements, expert groups, working people on site et cetera have taken power politically (ibid.).

In the tourism domain there is some research with its focus on social movements. McGehee (2002) and McGehee and Santos (2005) analyse how tourism experiences can enhance participation in social movements. Theories of social movements were used to analyse possible changes in networks, increasing self-efficacy, and raising levels of consciousness among participants in volunteer tourism, positively influencing their participation in social movement organizations. Findings indicate that participation in volunteer tourism has a positive effect on both intended post-trip social movement activities and support for activism (McGehee and Santos, 2005: 760).

The fact that taking part in sustainable tourism practices enhances participation in social movements possibly represents a slot for a sustainable development of tourism. Citizen-consumers who undertake sustainable holidays are more inclined to organize themselves in networks and initiate social movements which strive for a sustainable development of tourism. In such a way citizen-consumers act as active change agents, exerting their influence on the practice of tourism and travelling.

Micheletti (2003) and Holzer and Sørensen (2003) further elaborate on the consumer producer interface. Both argue that in their consumption behaviour, consumers can choose their products on the basis of economic...
Desirée Verbeek and Hans Mommaas

aspects alone, but can also take social, ethical and environmental aspects into account. These consumers, actively choosing and refusing certain goods, try to effect social, environmental and/or ethical changes via the marketplace (Sørensen, 2002 in: Holzer and Sørensen, 2003), are referred to as political consumers. With their consumption behaviour consumers can influence the politics of the product and production process (Micheletti, 2003), “Instead of (just) using traditional channels of political participation to effect societal changes, that is, to vote at elections, to be a member of a political party, etc., the green, ethical and political consumers try to use their purchasing power to effect these changes” (Holzer and Sørensen, 2003: 85), for example by expressing their political preferences by boycotts and buycocks. Consumer boycotts are a negative way of subpolitics, because consumers withhold their money from where they previously put it – or at least they threaten to do so. A positive subpolitical process is a buycoott strategy of “buying goods with higher environmental, ethical and social standards than conventional goods in order to effect societal changes” (Holzer and Sørensen, 2003: 86).

More and more political choices are made in the domain of consumption. Consumption is used as a subpolitical strategy (Holzer and Sørensen, 2003; Micheletti, 2003). This means that a new mode of action has evolved; by way of concrete, everyday action citizens can take responsibility for common well being. According to Micheletti, a new form of citizenship emerges, in which politics are exercised through the private rather than through the public domain.

Furthermore, political consumerism can stem from public or private virtues. The former refers to people who intrinsically want to consume in an ethical and ecological sound way. The latter is about consuming the same sustainable and ethically sound product but for individual reasons such as quality and comfort. Applying this to the tourism industry, sustainable tourism can be interesting for people with a public virtue that concern for the environment, and for the well-being, fair income, education and working conditions of local people. Sustainable tourism can be interesting for people with a private virtue as well. A holiday characterised by its sustainability is using environmentally sound transport modes and is most of the times about getting in touch with local culture, nature and people and tourists get the chance to take part in social life. This fits with the wish of many tourists to enjoy the landscape while travelling, experience authenticity and learn about local customs, traditions, cultures et cetera.

According to Micheletti (2003) these political consumerists can organise themselves in a network or initiate a social movement in order to gain more power and influence on corporations. “A social movements is an organized effort by a significant number of people to change (or resist change in) some major aspects of society” (Marshall 1994: 489 in: McGehee, 2002) and they come into being because “people who are aggrieved and have the resources to mobilize seize the political opportunities they perceive” (Klandermans, 2001: 276). Corporations need to take the preferences and interests of the green, ethical and political consumers into account when formulating their business strategies and developing their products and services. On the one hand because these consumers are part of their market, but more importantly, because protests and boycotts negatively impact the image of corporations. In this way it will not be the overriding power of the big companies tourism industry that shape the consumption practices, but this will be a more even
process in which networks of citizen-consumers together with producers and providers (such as transport companies, travel agencies and tour operators) together influence the consumption domain and can develop more sustainable consumption practices.

3.3 Conclusion

As this section indicates, by focusing on the context specific interaction between actors and structures involved in tourism, and thereby on the context specific interaction between demand and supply, and between modes of access and modes of provision, the essence of the Social Practices Approach is to search for slots in the consumption junction which might open 'windows of opportunity' for transitions towards more sustainable tourism practices. These slots are the leads for consumer-led institutional changes.

In order to analyse transitions towards more sustainable tourism practices, we developed a typology of tourism practices based on some interviews with travellers and tour operators’ structure of supply on their websites. A first typology of tourism practices consists of ‘winter sports’, ‘city trips’, ‘active holidays’, ‘family holidays’ and ‘beach holidays’. When comparing beach holidays with winter sports, family holidays, city trips or active holidays, we might expect different travellers to be involved, with diverging lifestyles, in a different surrounding, undertaking a variety of activities, having dissimilar impacts on the environment, using diverse infrastructures, and having arranged their holiday in a different way.

In this section we further elaborated in generic terms on two possible transition paths through which (citizen)-consumers might act as change agents. The first one focuses on the role of consumers by businesses incorporating consumer-logics, lifestyles and routines in their supply of tourism products and services. The second one puts citizen-consumers at the centre stage. Citizen-consumers unite themselves and participate in a social movement or they exert influence through their consumption behaviour via boycotts and buycotts.

4 Conclusions and future research

Because tourism growth rates result in increasing impacts on the environment, in many policy documents, and in some tourism businesses as well, a sustainable development of tourism is aimed for. Because the share of transport in environmental deterioration caused by tourism behaviour is most strikingly, in this article the focus was on how to analyse a transition to a sustainable development of tourism mobility. Taking as its starting point the view of citizen consumers as capable, knowledgeable agents (Giddens, 1984), the central aim of this literature research concerned the role of citizen-consumers as active change agents in this transition process. The research question is as follows: “What are potential roles of citizen-consumers in a transition process to sustainable tourism mobility and how could they influence the tourism industry and the holiday practice in order to set in motion a transition to sustainable tourism mobility?”

The review of the current literature on sustainable tourism (mobility) showed that three lines of research can be distinguished. One stream concentrates on the organisation and technology of transport modes, aiming at policies, climate compensation programmes and technological
innovations. Another stream concentrates on individual actors and their beliefs, values and attitudes towards sustainable holiday behaviour. Because of the fact that the first stream leaves individual characteristics underexposed and the second stream leaves the embeddedness of behaviour in wider society underexposed, we conclude that in order to analyse the roles of citizen-consumers in a transition to sustainable tourism mobility more profoundly these two streams need to be brought together and should complement each other. However, in order to do so properly, we have to go beyond the generalised character of the third stream, looking at the interaction between supply and demand: contextual, practice based characteristics need to be taken into account.

The Social Practices Approach (Spaargaren, 1997) delivers the conceptual tools to develop such a more context-specific analysis of the interaction between individual consumers and structuring rules and resources influencing the consumption practice. The Social Practice Approach first and foremost focuses our attention toward ways in which actors are involved in holiday practices and how the provider- and consumer-logics involved are reciprocally influencing each other. Tourists and the tourism industry meet each other in concrete holiday practices. The Social Practices Approach focuses attention towards the actions of citizen-consumers at the consumption junction in which actors and structures shape consumption behaviour. In general terms two lines of actions are differentiated. The first concentrates on agents in their consumer-role and is aimed at the way in which providers might develop socio-technical innovations that enable and tempt consumers to pro-environmental behaviour. Providers develop their products and services demand-led; they mold them to suit people’s lifestyles and routine behaviour, in other words, thus incorporating consumer-logics. Here, the question is which characteristics of practice specific consumer logics might enable a more sustainable incorporation of tourism mobility. The second line of action focuses on how consumers incorporate citizen-logics in their behaviour. Processes of citizen-consumer-led institutional change can take place through social movement processes, through forms of sub-politics, and through political consumerism. Future research within the research programme of which this analysis forms a part, will be directed at further elaborating the Social Practices Approach, and operationalising it towards empirical research on the consumption domain of tourism.

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In this paper the concepts ‘social practice’ and ‘holiday practice’ are used interchangeably. ‘Social practice’ is the generally used concept in literature. Since the focus in this research is on the tourism domain, we refer to them as ‘holiday practice’ as well.

A concentration of carbon dioxide in the atmosphere of 450 ppm (parts per million) was defined as sustainable (Åkerman and Höjer, 2006).

Forestry projects are not suited for compensation purposes, because trees can only temporarily store CO₂ (Boon, 2006).

Climate compensation needs to take place in countries that currently do not have emission reduction commitments under the Kyoto protocol, otherwise governments would need to do less to each their international commitment, and climate compensation is thus not additional (Boon, 2006).
MOB Cars and Sustainable Consumption

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1 Introduction

Product durability is a key element of both sustainable consumption and production; the longer a product lasts the less often it needs to be replaced, thus reducing overall production and resource use. At the same time, durable products significantly change patterns of consumption. This is even more of an issue in the case of complex and resource-intensive products such as cars. With cars, the initial production and final dismantling phases represent between twenty and thirty percent of total energy input, the remainder being accounted for by the use phase (Nieuwenhuis, 1994). For short-term commercial reasons, the mainstream mass car industry has long resisted the move towards more durable products. For this reason the issue of product durability has not featured prominently in the car industry’s public efforts to move towards a more environmentally-informed agenda. That such a trend has nevertheless happened has been attributable to the pressure to improve product quality in the wake of the Japonisation of the car industry. It has been established (e.g. Porsche 1976, also discussed in Nieuwenhuis 1994) that cars can be made to last 20-30 years without significant additional cost. Yet, some modern products are designed to be more disposable than their predecessors. One example is the MCC Smart ForTwo, which is one of the most modular of modern cars. Here the engine is expected to be replaced rather than repaired if it fails; a major departure from established practice.

It has also become clear that, increasingly, products are discarded not because of a lack of technical durability, but because the consumer has somehow lost his or her emotional attachment to the product (e.g. Chapman 2005). Here I will try and explore this issue in the context of automobility. Linking the issue of emotional attachment to products with the worlds of antiques, and collectibles (where the interrelation among the products create much of the appeal) I explore the classic car phenomenon. It is shown that products built for an expected lifespan of 10-12 years can nevertheless – without too much cost and effort – be made to last many decades, provided

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an owner can be found who is willing to build an emotional attachment to the product. By exploring the nature of this attachment I will attempt to discover to what extent this can be used to inform a model for sustainable consumption of automobility. The classic car movement creates new local support structures far removed from the mainstream mass production car industry and its unsustainable consumption patterns. At the same time it builds the brand values many car firms crave, but often fail to comprehensively support themselves.

2 Durability and Cars

2.1 Introduction

The issue of durability never features prominently when car makers promote their efforts on behalf of environmental improvement, much of which can at best be captured under the umbrella of ‘cleaner production’. Nevertheless, durability has been used by a number of manufacturers to underline the quality of their products. In the late 1970s, Volvo ran an advertisement showing a 1960s Volvo 122S alongside two ‘cubed’ crushed cars. The text read: “An 18-year-old Volvo and two of its contemporaries” (Whyte 1984: 69). In the 1990s Mercedes ran an advertisement which featured Cristóbal Gonzales Rodriguez of Tenerife and his 36 year old Mercedes 180D which had by that time clocked up 1,800,000 km; the caption read “I’d buy a new Mercedes but I haven’t finished with my old one” (The Independent 1994). Outside the mainstream car industry, however, both amateurs and professionals have shown that even ordinary cars have the potential to be very durable indeed (cf. Deutsch 1994, 95ff).

2.2 Technical v Psychological Durability

Cars have increasingly become fashion items, a trend resisted in the early days by Ford, but deliberately introduced by General Motors under Sloan in the 1920s. Henry Ford’s position is set out clearly in the following quote from his book My Life and Work:

“It is considered good manufacturing practice, and not bad ethics, occasionally to change designs so that old models will become obsolete and new ones will have to be bought either because repair parts for the old cannot be had, or because the new model offers a new sales argument which can be used to persuade a consumer to scrap what he has and buy something new. We have been told that this is good business, that it is clever business, that the object of business ought to be to get people to buy frequently and that it is bad business to try and make anything that will last forever,...Our principle of business is precisely to the contrary. We cannot conceive how to serve the consumer unless we make for him something that, as far as we can provide, will last forever. We want to construct some kind of a machine that will last forever. It does not please us to have a buyer’s car wear out or
become obsolete. We want the man who buys one of our products never to have to buy another”. (Ford 1924: 148-9)

Ford was arguing his case both against his main competitors and even his own collaborators inside the company, who were pressing for a replacement of the already ageing Model T. The Model T was eventually replaced in 1927 with the equally durable Model A. Sloan’s position and that of GM is best described by Flink (1988: 234):

“Consumer dissatisfaction with today’s car was engendered by the innovation of the annual model change, which called for major styling revisions every three years, functional or not, with minor annual face-liftings in between. The three-year styling cycle was geared to die-life, so that retooling costs would not be excessive.”

It is clear to even the least informed observer that Sloan won this argument, as the car has become a fashion product, rather than a true durable. In Europe this transformation happened during the 1960s and 1970s, but in the US most of this transformation took place during the 1950s (cf. McCracken, 2005, 53-90). Yet most people still buy their cars used, and are therefore only distant followers of fashion. Still, a hierarchy of modernity exists even here until the car reaches ‘old banger’ or ‘clunker’ status – associated with very low market value – before the final phase when it is finally discarded and scrapped. These final phases deserve a bit more exploration, as the low value becomes a crucial element in the quest for durability. In developed countries, high levels of new car input into the market due to high consumer spending power (as well as the needs of the mass production system; see Nieuwenhuis and Wells 1997 and 2003) leads to low residual value of older cars. This then combines with high labour cost, such that any major repair required by the vehicle – either mechanical or bodywork related (e.g. rust) – becomes uneconomical. This condition of ‘beyond economical repair’ is not absolute and applies differently in different environments. It is caused primarily by high labour cost, but also by the high cost of major components at new prices. A trade does exist in reconditioned or remanufactured items which addresses this to some extent (cf. Steinhilper 1998; Seitz and Peattie 2004), but even such parts are too costly for many of the final owners of cars. Finally, there is in all countries a market in used parts for re-use and this tends to be the principal source of parts for marginal motorists in these final use phases of the car. In many developing countries, the technical ability of car repair craftsmen combined with low labour costs and the high cost of imported car parts often does render such repairs feasible and as a result cars can last much longer. Cuba is a well-known example of such an environment, as is sub-Saharan Africa (cf. Verrips and Meyer 2001).

How the useful life of a car can be extended has been explored by several researchers (cf. Porsche 1976), while the wider issue of product durability and the possibility of turning the car industry towards a product-service approach following other sectors has also been explored (Nieuwenhuis 1994, Deutsch 1994, Kostecki 1998, Morrick and Wattam 2000, Williams 2006). Having established that it is both possible and desirable to extend the
working life of cars for environmental, economic and social reasons, the notion that cars may be discarded for non-technical reasons is a novel one that also needs to be addressed. A helpful analysis on this phenomenon is provided by Chapman (2005). He argues that rather than being discarded for technical reasons, in most modern consumer societies most products are in fact discarded because the owner has ‘fallen out of love’ with the object. As a result, waste sites are full of working machines and serviceable objects: “...waste is nothing more than symptomatic of a failed user/object relationship, where insufficient empathy led to the perfunctory dumping of one by the other” (Chapman 2005, 20)

Chapman blames the prevailing industrial model for this system of consumption:

“...consumers of the 1900s were not born wasteful, they were trained to be so by sales-hungry teachings of a handful of industries bent on market domination.” (Chapman 2005: 9). He must have Sloan and his ilk in mind here.

As we saw above, Henry Ford had already noticed the beginnings of this trend – of which he strongly disapproved – in the early 1920s. Chapman, however moves beyond this and blames the modern situation on an inability of products themselves to keep up with the speed of change in our fast-changing world. He argues that the consumer in the developed world demands:

“...relentless grow and flex, while material possessions remain hopelessly frozen in time. This incapacity for mutual evolution renders most products incapable of sustaining a durable relationship with users.” (Chapman 2005, 20)

As a designer, Chapman lays much of the blame at the door of his own profession, though admitting that designers themselves are rarely free agents, being also under the close scrutiny of the prevailing system. However, he acknowledges that designers can be a key part of any possible solution, a solution involving products that somehow co-evolve with their owners. In fact, some products appear already to be able to do so and I would argue that cars can be such a product, provided they meet certain criteria.

There are a number of older products that appear to retain their value to consumers. In fact their value often increases with time. Some of these items have an inherent value due to their content of precious metals or minerals; jewellery falls into this category and certain types of treasure trove which have an inherent value as well as historical value. Other products rely on other criteria for retaining their value. Paintings have little inherent material value, yet are prized for what they are – the expression of creative genius in the past. A combination of rarity and a near impossibility of being re-created contributes to their value. There are also series-produced products with collectible value, such as Wedgwood porcelain, Chippendale chairs, Tiffany lamps. Lesser and more common antiques and collectibles also retain their value once enough collectors take an interest. McCracken (1988, 112) explains this in the context of ‘displaced meaning’ whereby objects can act as ‘bridges’ to an ideal. Once purchased, the risk of the displaced meaning
being undermined is considerable. However, with collectibles the situation is
different in that they cannot just be bought; “The virtue of pursuing
collectibles rather than merely consumer goods is precisely that they have
their own special scarcity [they] are not available to any one with
means...When goods have this special elusiveness, they can once again
become bridges.” (McCracken 1988, 113).

In some cases these objects enjoy an enhanced value if kept with similar
objects as a ‘collection’ and the ‘collectible’ has become a category in its
own right. The ideal then is to one day see the collection complete; an
elusive dream for most collectors and hence ideal for McCracken’s
‘displaced meaning’. Many of these collectibles cover mass produced
objects. However, another mass produced consumer product that manages to
insinuate its way into the collectible category is the motor car. Not all cars
are ignominiously discarded at the end of their lives. Some cars are able to
move through their ‘old banger’ stage and emerge at the other end, not as
cubed scrap metal, but as a prized possession. How is this achieved and
could it be induced deliberately to extend the life of all or most cars?

3 Historic Vehicles

The historic vehicle or ‘classic car’ phenomenon has grown considerably
over the years. Although some countries have actively discouraged longer
lifespans for cars through scrappage incentives (cf. ECMT 1999;
Nieuwenhuis & Wells 1996), other countries have been able to encourage a
climate where car life expectancy could be extended. Among the latter are
Sweden and the UK (on the case of Sweden see Nieuwenhuis 1994). The
UK is home to the largest concentration of historic vehicles in the EU. Ten
years ago there were already 650,000 vehicles older than 20 years in
existence in the UK (Hart et al. 1997). By 2004 there were 540,000 historic
vehicles owned by members of clubs associated with the FBHVC, of which
406,000 were roadworthy and taxed (Frost et al. 2006b). This represents
1.3% of vehicles in use in the UK. Recent EU-wide research reveals that
there are currently some 1,950,000 historic vehicles owned by club members
in the EU. Because many similar vehicles are run by people who are not
members of clubs, the actual number must be higher, possibly twice that
number. Of the cars owned by club members, just over 1.5 million are
roadworthy and currently registered for road use. Even so, the 1.9 million
represents less than 1% of all vehicles registered in the EU (Frost et al.
2006).

The historic vehicle phenomenon has allowed the development of a
comprehensive support sector, employing more than 27,000 people in the
UK and 55,000 in the EU as a whole (Frost et al. 2006, 9, 2006b, 10). One of
the most prominent firms in this sector is the Morris Minor Centre in Bath
(www.morrisminor.org.uk ), which has as its mission the continuing use and
upgrading to modern standards of the classic Morris Minor (Ware 1982) .
The firm received a National Green Apple Award in 2003 from the UK
Trade and Industry minister for its environmental contribution to the car
industry, thus emphasising that car durability is officially recognised, by the UK government at least, as an environmental issue (MMC 2003).

3.1 Consumption of Classic Cars

In a recent survey carried out on behalf of the UK magazine Practical Classics (2006) readers where asked, among other things, what they enjoyed most about classic motoring. The most popular answers are set out in table 1 and they provide some useful insights. Answer 2 appears at first motivated by purely practical considerations, which to some extent it is; it is also an emotional one, as are the other two most popular answers. Answer 2 implies a loss of control over the workings of modern cars, which creates a barrier between the owner and the product. In fact, modern car manufacturers use various ways to discourage owners from working on their cars. This is perceived as alienating by many owners and classic car use is therefore to some extent a rebellion against this aspect of modern car consumption, a ‘consumer pathology’ perhaps, or a recovering of what has been called by Edward Felten of Princeton University “Freedom to tinker” (www.freedom-to-tinker.com). Such alienation is a barrier to the potential user/object relationship forming and the prospects for a long term relationship therefore seem doomed from the start. Other consumers may be able to cope with this degree of technological alienation, but choose to distance themselves for reasons of voluntary simplification. Voluntary simplifiers (VS) are people who for a variety of reasons – e.g. environmentalism – choose to “...limit expenditures on consumer goods and services, and to cultivate non-materialistic sources of satisfaction and meaning.” (Etzioni 1998, 620) Elgin and Mitchell (1977) identify a number of key values of such voluntary simplifiers and among these is ‘self determination’. This involves a measure of control over technology sufficient to be able to repair the goods themselves.

Table 1: Practical Classics survey results

<table>
<thead>
<tr>
<th>Question</th>
<th>Ranking (from most popular)</th>
<th>Answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>What do you love most about classic motoring?</td>
<td>1</td>
<td>Owning and enjoying an interesting and unusual car</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Having the satisfaction of being able to fix the car myself</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>I’ve finally got to own and drive the car that I lusted after as a kid</td>
</tr>
</tbody>
</table>

(source: Practical Classics 2006: 13-15)

3 I would like to thank the editorial staff of Practical Classics, in particular Matt Wright and Matt Jones, for allowing me full access to the survey results. Where no other reference is given, this is the source of the data, which is based on 1669 responses.
However, voluntary simplifiers also tend to see cars primarily as functional (McDonald et al. 2006, 520, reporting on Australian research) and for this reason tend to drive ‘old cars’ (McDonald et al. 2006, 524). Such people can often be classic car drivers without being part of the classic car movement. Nevertheless, they often rely on the same infrastructure to keep their cars going and they must form a significant proportion of classic car users. However, there are also involuntary simplifiers who are constrained by finances to driving older cars. It is significant that Frost et al. (2006: 11) find that around 60% of historic vehicle owners in the EU have a household income of less than €50,000, while 29% have a household income below €30,000 (Frost et al. 2006: 11). In addition, 45% of historic vehicles in the EU have a value of less than €5,000. For many people the low depreciation, simple maintenance option provided by classic cars allows them low cost access to motoring. This may also be a consideration for others, including VS for whom motoring is a low priority and hence not worthy of high expenditure.

Answer 3 in Table 1 seems a purely nostalgic emotion and a yearning for lost elements of one’s youth. It is interesting for example that over 40% of respondents own one of the popular UK makes of car, notably Triumph, MG, Ford, Austin or Morris. Answer 1 also links in well with theories of culture and consumption. McCracken (1986, 71) summarises this point well: “Consumer goods have a significance that goes beyond their utilitarian character and commercial value. This significance rests largely in their ability to carry and communicate cultural meaning”. In fact, as Wang and Waller (2006, 665) drawing partly on McCracken (1986), clarify, consumer culture only emerges “...when a large portion of a society avidly desires to consume goods and services for symbolic and sensory reasons, rather than functional reasons. To many observers, the car is the core product in this consumer culture. The public display of car ownership is equal only to clothing and jewellery. The car could in fact be seen as the ultimate expression of personal apparel. Jackson (2004: 13) in one of his comprehensive reviews of theories relevant to sustainable consumption puts it thus: “There are few places where the insight that material goods have symbolic value is more naked to the popular scrutiny than in the case of the automobile, which has long been recognised as far more than a means of getting from one place to another”.

McCracken (1986, 71) expands this concept with the notion that this meaning is not fixed: “...the meaning carried by goods has a mobile quality for which prevailing theories make no allowance”. This transitional nature of the cultural meaning of consumer goods is a key element of the classic car phenomenon. Thus a car which has reached ‘old banger’ status can become ‘classic’, while a car which was once ‘cool’ can become ‘uncool’, and later become ‘cool’ again, as new generations attach new meaning to the same object over time. An example of this latter phenomenon is the Ford Capri which started as ‘cool’, rapidly became ‘uncool’ as it pretended to be a sports car which it was not, and is now considered to be ‘cool’ again by younger enthusiasts largely unaware of this historical burden. Within the
UK, the Morris Marina has long been considered one of the least ‘cool’ cars around. Yet these cars now enjoy the attention of an active and growing owners club who have deliberately opposed this image. This could also be an example of consumer pathology, or anti-consumption that often appears to be a feature of the classic car movement. On the other hand it is possible that any object once it becomes rare enough begins to enjoy an inherent rarity value in the minds of consumers and that this in itself is a key element of the appeal, something suggested by answer 1 in Table 1.

McCracken (1986) identifies three locations between which the transfer of meaning takes place: the culturally constituted world; the consumer good itself and the individual consumer. The mechanism by which meaning is transferred between these locations involves advertising, the fashion system and consumer rituals. Consumer rituals are well established within the classic car system and involve shows, rallies and other events, as well as the owners’ care and restoration efforts. There is also a strong personalising element here as many restored cars are often better than that car left the factory originally. In addition, many classic car owners modify their cars over time, thus personalising them even more. This modification trend originally started with the hot-rod phenomenon in the US and has since spread. Modified classics now constitute their own sub-culture within the classic car movement with dedicated magazines such as Retro Cars in the UK.

On the face of it, the advertising system plays no role in promoting classic cars, unlike new cars. In practice, classic cars are often found in advertisements for other products. They thus become linked with other consumer products by association; an association that works both ways, as the advertiser uses the classic car deliberately to create a certain image for the newly promoted product. Similarly in the world of fashion, where certain fashions can become linked with classic cars. Classic cars are also often used in music videos and on CD sleeves. Here the rebellious nature promoted by some music genres uses the old car to rebel against the modern establishment and its consumer culture by choosing an association with an obsolete product. This can range from ‘nostalgist’ Chris Isaak and an early 1960s Cadillac on the front cover of his 1995 CD Forever Blue, to P J Harvey seated in the front passenger seat of another American car on the front cover of her 2004 CD Uh Huh Her. Blink 182 used a VW bus in their evocation of the late 1960s in the video for their song First Date. Other genres, notably rap, take the opposite view and indulge in the most extravagant examples of current automotive culture, suitably modified, or ‘pimped’ – i.e. personalised – as an overt expression of consumer power. Yet some rappers have also used cars such as 1960s Aston Martins in their videos.

We could see classic car owners as a small isolated and atypical consumer group and the numbers would support this view. However, it is clear that at least some of their enthusiasm is shared by society at large, even though most people may not necessarily want to carry the burden of maintenance and repair. Frost et al. (2006: 12) report that Europe’s 700 transport museums attract over 75 million visitors a year, while many classic
car events attract significant numbers of non classic car owning visitors. In addition, many non-owners buy books, models or memorabilia related to classic cars – displaced idealists? (cf. Frost et al. 2006b, 14). Some of the features of historic vehicles, be they nostalgia, or simplicity of construction and use, clearly enjoy broader appeal than may be suggested from counting classic cars in use alone. Some classic car owners are what McCracken (1988, Ch3) calls ‘curatorial consumers’ who look after old cars passed on to them as heirlooms. This is often true for the genuine collectors who own several vehicles with the first vehicle being the one inherited. This is mostly true for the more valuable cars. However, most enthusiasts own only one or two cars. The Practical Classics survey suggests that 54% of respondents own one classic car, while 26% own two cars, only 4% own five or more cars (Practical Classics 2006, 13).

The nostalgia implied in answer 3 in Table 1 ties in with McCracken’s (1988: 104ff) notion of ‘displaced meaning’. Given the mismatch between reality and cultural ideals, “…a community may displace these ideals. It will remove them from daily life and transport them to another cultural universe, there to be kept within reach but out of danger...”. The past is one possible ‘safe haven’ for these displaced ideals (Jackson 2004: 16). Objects associated with this idealised past – such as classic cars – can then be used to carry this meaning in our daily lives and with the ability to take us in an instant to this idealised past; and back again. It preserves the idealised past at a distance and thus protects it. This is where the reasons behind answer 3 in Table 1 become clear.

3.2 Classic cars as a PSS

Although classic cars are actively traded, they essentially form the central element of a product-service system. Classic cars are not normally expected to be scrapped. Hence a large part of the value of the EU classic car business involves buying and selling cars - €2.5bn – while around €1.4bn involves maintenance and repair (Frost et al. 2006, 8). Normally the only time classic cars are scrapped is after a crash when they would be used as a source of parts for other examples of the same model – re-use. The same is true for classics that are really beyond economical repair but which are more valuable as a source of parts for cars in better condition. Although new product is not added as such, there is a regular supply of ‘new’ classic cars in that any car that manages to last more than 20 years or so is recognised as an historic vehicle, although this is an issue widely debated in the historic vehicle movement. New resources are not used in the process of creating these classics, which makes it quite different from the new car system, and presumably more sustainable. The historic vehicle system is essentially an aftermarket, service-based system and thus already essentially a de facto PSS.

The Morris Minor Centre follows the PSS model and Neil Morrick, who bought British Motor Heritage (BMH) in 2001, is a known promoter of the PSS model for the car industry more generally (Morrick and Wattam, 2000).
BMH supplies and makes parts including replacement body shells for obsolete British Leyland cars such as the Mini and MGB. He argues, for example (Morrick and Wattam 2000, 104) that in future cars will become too technologically complex for the conventional dealership to handle repair. This forces car manufacturers themselves to handle more of this, which provides part of his logic for predicting PSS as the future for the car industry. Existing garages and dealers would increasingly be forced to deal with older, simpler vehicles.

4 Conclusions

Clearly it is technically possible to extend the useful life of a car far beyond the current norm. The classic car or historic vehicle phenomenon shows how this can also be achieved in practice. The lessons from this market are that, provided an emotional relationship between product and user can be retained or re-established, durability of the car is virtually guaranteed. The essential elements needed to achieve this emotional relationship involve the following:

- Rarity value to make the user feel special.
- An appeal to nostalgia – a bridge to displaced ideals of the past.
- A level of control achieved through mechanical simplicity which allows the owner the ability to carry out his or her own maintenance and repair and personalise if and when the need is felt.

The question remains to what extent these elements can be transferred to mainstream, modern mass produced cars. A modular approach to car construction which would allow a higher degree of personalisation and regular cosmetic changes than is readily achievable today is one option. This would allow the car to grow and evolve with the user, including updating to the latest environmental and safety standards. Easy exchange of modules by the owner would also address the control and simplicity of maintenance issue, while greater reliability could render repair unnecessary. Whether the ‘displaced ideal’ feature of classic cars could be addressed is more doubtful, although with modularity there may always be modules or options that are possible but somehow out of reach either through cost or, perhaps even obsolescence, thus imbuing such modules themselves with collector status.

Thus, we have some of the elements that may make cars more emotionally durable well within our grasp. In fact the MCC Smart ForTwo was conceived with some of these ideas in mind; its coloured thermoplastic body panels can be exchanged relatively easily with panels of different colour or pattern. In practice, few owners have used this option. The process and the panels are still relatively expensive and exchanging the Smart for another, newer model is often easier. If car replacement became more costly or discouraged in some other way, such systems might well work. Also, if the Smart were to be offered as part of a PSS and the change in colour was taken care of by the service provider at nominal cost, the take-up may well be much greater. It is noteworthy, however, that the Smart has already
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achieved a degree of cult status and that values of used Smarts are holding up well.

Clearly, then, the classic car phenomenon as both an example of building the essential product-user relationship and as an example of an automotive product-service system is a promising area for further research. It provides some hints at how the automobility system could become more sustainable both from the production and from the consumption viewpoint.

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How to Achieve Factor X Improvements in Transport?

Lessons learned from the FIN-MIPS Transport project

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1 Introduction

Transport plays an essential role in modern life. We can hardly imagine any product or activity that would not require transport to make it readily available. The amount of transport has been steadily growing for decades, almost without even a temporary decline. In Finland, for instance, passenger traffic increased more than 5-fold and goods transport nearly 4-fold from 1960 to 2005 (Finnish Road Administration, 2006).

If sustainability is to become a reality, a tremendous increase in resource efficiency is required. 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. This would make possible a worldwide cut in material flows by half, while doubling worldwide prosperity, i.e. an increase in worldwide resource productivity by a factor of four (Schmidt-Bleek, 1993; Schmidt-Bleek, 1998; von Weizsäcker, Lovins & Lovins, 1997). Meadows et al. (2003) propose, amongst other means, an increase in eco-efficiency by 4% p.a. in order to achieve sustainability. This corresponds to a factor 8 increase in resource productivity.

The purpose of this paper is to discuss the potential for factor X improvements in the resource efficiency of transport. The basis for the discussion are the results of the FIN-MIPS Transport research project. The discussion includes activities by different actors on the micro level as well as the transport system on the macro level.
2 MIPS values as an indicator for the resource efficiency of transport

2.1 Background and methodology of the FIN-MIPS Transport research

2.1.1 Motivation and objective of the research project

The promotion of sustainability requires appropriate indicators. Changes in technology and consumption patterns must be measurable, e.g. in relation to the Factor 10 target. In 1992, the Wuppertal Institute for Climate, Energy and Environment proposed the amount of natural resources used to provide a certain benefit (Material Input per Unit Service, MIPS or MI/S) as a basic measure for assessing and comparing the ecological pressure caused by products and services. MIPS constitutes a tool for assessing and systematically reducing the resource consumption of products or activities. The bases of MIPS values are the ecological rucksacks calculated for different goods or commodities. The ecological rucksack is the sum of natural resources moved away from their original place in the ecosphere during the entire life cycle of a certain raw material, product or activity, including indirect resource use as well. (Ritthoff et al., 2002.)

The MIPS approach concentrates on the material input of products and activities. It differs from a life cycle assessment (LCA) in that it does not provide detailed results on certain emissions and other output factors. However, the use of the MIPS concept is less time and cost intensive than the use of, for instance, LCA based methods. In addition, the MIPS concept is easily communicated to a non-expert. Kilograms and tonnes of resources are understandable concepts for guiding consumer decisions, as well as product development and macro-economic considerations. The wide potential for the application of the MIPS-concept (product, service, household, company, municipality, region, national and global economy) promotes the understanding of the links between local activities and global sustainability.

As transport services are part of the life cycle of any product or activity, data on the material intensity of transport services are useful for the MIPS calculation of products and activities. The FIN-MIPS Transport research project was established in order to provide material input data for MIPS calculations made by Finnish companies and other institutions. Other objectives were to study the contribution of transport to the overall natural resource use in Finland and to consider potentials for increasing eco-efficiency and decreasing resource use.

2.1.2 Scope and methodology

The research project covered the Finnish transport system, including road, rail, bicycle, air, and maritime transport. Transport on inland waterways was excluded as it represents only a small part of the transport volume. Private navigation, private aviation and walking were also excluded. MIPS values were calculated for the consumption of abiotic resources, water and air. Biotic resources and earth movement in agriculture and forestry were excluded from the final calculations as transport turned out to cause only a minimal consumption of these resource categories.
In the first stage, the material intensity of the different transport modes was investigated based on case studies for typical parts of the infrastructure (see Vihermaa et al., 2006; Saari et al., 2006; Nieminen et al., 2005; Lindqvist et al., 2005; Hänninen et al., 2005).

In co-operation with the infrastructure authorities and transport companies involved, the data obtained from the case studies was then generalised to average Finnish conditions by assumptions made on, e.g., the average service life of infrastructure and vehicles, the average amounts of traffic on different infrastructures, and the average ridership.

The MIPS values for transport include the life cycle wide material input of infrastructure and means of transport. This material input is divided by the service obtained, i.e. the amount of transport, expressed in passenger kilometres and tonne kilometres. The calculation of MIPS values for transport requires the allocation of the material input of the infrastructure between passenger and goods traffic, both using the same infrastructure.

2.2 Material intensity of the Finnish transport system

2.2.1 Passenger transport

The average material intensity of passenger transport within Finland is shown in Table 1. Travel by metro, bus and bicycle consumes the least abiotic resources, travel by van most. Water is consumed least by bus travel and most by using the tramway. Air consumption is the lowest for bicycle travel and the highest for domestic aircraft travel.

Table 1. Average MIPS values for domestic passenger transport in Finland (km / passenger kilometre).

<table>
<thead>
<tr>
<th>Means of transport</th>
<th>Abiotic</th>
<th>Water</th>
<th>Air</th>
</tr>
</thead>
<tbody>
<tr>
<td>Private car</td>
<td>1.44</td>
<td>12.4</td>
<td>0.14</td>
</tr>
<tr>
<td>Van</td>
<td>2.16</td>
<td>20.0</td>
<td>0.28</td>
</tr>
<tr>
<td>Bicycle</td>
<td>0.38</td>
<td>12.1</td>
<td>0.02</td>
</tr>
<tr>
<td>Bus</td>
<td>0.32</td>
<td>2.8</td>
<td>0.06</td>
</tr>
<tr>
<td>Train</td>
<td>1.37</td>
<td>29.3</td>
<td>0.04</td>
</tr>
<tr>
<td>Metro</td>
<td>0.29</td>
<td>29.4</td>
<td>0.04</td>
</tr>
<tr>
<td>Tramway</td>
<td>0.66</td>
<td>48.1</td>
<td>0.07</td>
</tr>
<tr>
<td>Aircraft</td>
<td>0.56</td>
<td>26.6</td>
<td>0.28</td>
</tr>
</tbody>
</table>

Table 2 shows the average material intensity of passenger transport between Finland and abroad. The material intensity decreases with growing distance because the contribution of infrastructure to the material input decreases. Maritime travel consumes fewer resources than air travel mainly because of the lower fuel consumption per passenger kilometre. However, growing distance decreases the difference.

Table 2. MIPS values for international passenger transport from or to Finland (kg / passenger kilometre).

<table>
<thead>
<tr>
<th>Means of transport</th>
<th>Destination</th>
<th>Abiotic</th>
<th>Water</th>
<th>Air</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ship</td>
<td>Nearby areas</td>
<td>0.26</td>
<td>2.42</td>
<td>0.31</td>
</tr>
</tbody>
</table>
Table 3. Average MIPS values for domestic freight transport in Finland (kg / tonne kilometre).

<table>
<thead>
<tr>
<th>Means of transport</th>
<th>Abiotic</th>
<th>Water</th>
<th>Air</th>
</tr>
</thead>
<tbody>
<tr>
<td>Van</td>
<td>10.78</td>
<td>100.2</td>
<td>1.39</td>
</tr>
<tr>
<td>Light lorry</td>
<td>0.58</td>
<td>5.0</td>
<td>0.07</td>
</tr>
<tr>
<td>Semi trailer lorry</td>
<td>0.44</td>
<td>3.8</td>
<td>0.07</td>
</tr>
<tr>
<td>Full trailer lorry</td>
<td>0.23</td>
<td>1.7</td>
<td>0.04</td>
</tr>
<tr>
<td>Average road transport</td>
<td>0.52</td>
<td>4.4</td>
<td>0.09</td>
</tr>
<tr>
<td>Avg road transport without van</td>
<td>0.37</td>
<td>3.1</td>
<td>0.07</td>
</tr>
<tr>
<td>Train</td>
<td>0.54</td>
<td>15.3</td>
<td>0.02</td>
</tr>
<tr>
<td>Aircraft</td>
<td>5.60</td>
<td>266.5</td>
<td>2.80</td>
</tr>
</tbody>
</table>

Table 4 shows the average MIPS values for cargo transport between Finland and abroad. Air transport consumes more resources than maritime transport. Growing distances decrease the material input per tonne kilometre because less infrastructure is needed per service unit, in air transport also less fuel.

Table 4. Average MIPS values for international cargo transport from or to Finland (kg / tonne kilometre).

<table>
<thead>
<tr>
<th>Means of transport</th>
<th>Destination</th>
<th>Abiotic</th>
<th>Water</th>
<th>Air</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aircraft</td>
<td>Nearby areas</td>
<td>4.70</td>
<td>189.0</td>
<td>3.4</td>
</tr>
<tr>
<td>Aircraft</td>
<td>Europe</td>
<td>1.10</td>
<td>33.6</td>
<td>1.4</td>
</tr>
<tr>
<td>Aircraft</td>
<td>Overseas</td>
<td>0.60</td>
<td>9.1</td>
<td>1.3</td>
</tr>
<tr>
<td>Ship</td>
<td>Nearby areas</td>
<td>0.75</td>
<td>3.1</td>
<td>0.1</td>
</tr>
<tr>
<td>Ship</td>
<td>Europe</td>
<td>0.12</td>
<td>0.7</td>
<td>0.1</td>
</tr>
<tr>
<td>Ship</td>
<td>Overseas</td>
<td>0.08</td>
<td>0.6</td>
<td>0.1</td>
</tr>
</tbody>
</table>

2.2.3 Resource use on the national level

According to the methodology and assumptions of this study, the Finnish transport system consumes a total of approximately 130 million tonnes of abiotic natural resources, 1.46 billion tonnes of water, and 16.3 million tonnes of air, per year. Per capita this amounts to 25 tonnes of abiotic natural resources.
resources, 280 tonnes of water, and 3 tonnes of air, per year (Tables 5, 6 and 7). Based on the methods used, 72% of the abiotic natural resource consumption by the transport system is attributable to passenger traffic and 28% to goods traffic.

Table 5. Average amount and division of the abiotic natural resource consumption by the Finnish transport system in one year.

<table>
<thead>
<tr>
<th>Mode of transport</th>
<th>Infra (mill. t)</th>
<th>Traffic (mill. t)</th>
<th>Total (mill. t)</th>
<th>Per capita (t)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public roads</td>
<td>84.52</td>
<td>5.70</td>
<td>90.22</td>
<td>17.3</td>
</tr>
<tr>
<td>Private roads</td>
<td>10.93</td>
<td>0.16</td>
<td>11.09</td>
<td>2.1</td>
</tr>
<tr>
<td>Municipal streets</td>
<td>9.18</td>
<td>2.78</td>
<td>11.96</td>
<td>2.3</td>
</tr>
<tr>
<td>Cycling</td>
<td>0.43</td>
<td>0.06</td>
<td>0.49</td>
<td>0.1</td>
</tr>
<tr>
<td>Rail</td>
<td>4.62</td>
<td>0.67</td>
<td>5.29</td>
<td>1.0</td>
</tr>
<tr>
<td>Air</td>
<td>0.91</td>
<td>0.34</td>
<td>1.24</td>
<td>0.2</td>
</tr>
<tr>
<td>Maritime</td>
<td>8.56</td>
<td>1.56</td>
<td>10.11</td>
<td>1.9</td>
</tr>
<tr>
<td>Total</td>
<td>119</td>
<td>11</td>
<td>130</td>
<td>25.0</td>
</tr>
</tbody>
</table>

Table 6. Average amount and division of the water consumption by the Finnish transport system in one year.

<table>
<thead>
<tr>
<th>Mode of transport</th>
<th>Infra (mill. t)</th>
<th>Traffic (mill. t)</th>
<th>Total (mill. t)</th>
<th>Per capita (t)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public roads</td>
<td>462.85</td>
<td>77.12</td>
<td>540.0</td>
<td>103.4</td>
</tr>
<tr>
<td>Private roads</td>
<td>244.38</td>
<td>2.18</td>
<td>246.6</td>
<td>47.2</td>
</tr>
<tr>
<td>Municipal streets</td>
<td>139.53</td>
<td>27.93</td>
<td>167.5</td>
<td>32.1</td>
</tr>
<tr>
<td>Cycling</td>
<td>10.10</td>
<td>5.59</td>
<td>15.7</td>
<td>3.0</td>
</tr>
<tr>
<td>Rail</td>
<td>51.43</td>
<td>234.37</td>
<td>285.8</td>
<td>54.8</td>
</tr>
<tr>
<td>Air</td>
<td>67.60</td>
<td>2.43</td>
<td>70.0</td>
<td>13.4</td>
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<tr>
<td>Maritime</td>
<td>28.85</td>
<td>11.97</td>
<td>40.8</td>
<td>7.8</td>
</tr>
<tr>
<td>Total</td>
<td>1,005</td>
<td>362</td>
<td>1,366</td>
<td>261.7</td>
</tr>
</tbody>
</table>

Table 7. Average amount and division of the air consumption by the Finnish transport system in one year.

<table>
<thead>
<tr>
<th>Mode of transport</th>
<th>Infra (mill. t)</th>
<th>Traffic (mill. t)</th>
<th>Total (mill. t)</th>
<th>Per capita (t)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public roads</td>
<td>0.71</td>
<td>7.50</td>
<td>8.21</td>
<td>1.6</td>
</tr>
<tr>
<td>Private roads</td>
<td>0.11</td>
<td>0.21</td>
<td>0.32</td>
<td>0.1</td>
</tr>
<tr>
<td>Municipal streets</td>
<td>0.26</td>
<td>3.33</td>
<td>3.59</td>
<td>0.7</td>
</tr>
<tr>
<td>Cycling</td>
<td>0.002</td>
<td>0.02</td>
<td>0.02</td>
<td>0.0</td>
</tr>
<tr>
<td>Rail</td>
<td>0.08</td>
<td>0.27</td>
<td>0.35</td>
<td>0.1</td>
</tr>
<tr>
<td>Air</td>
<td>0.07</td>
<td>0.80</td>
<td>0.87</td>
<td>0.2</td>
</tr>
<tr>
<td>Maritime</td>
<td>0.30</td>
<td>2.66</td>
<td>2.97</td>
<td>0.6</td>
</tr>
<tr>
<td>Total</td>
<td>1.5</td>
<td>15</td>
<td>16.3</td>
<td>3.1</td>
</tr>
</tbody>
</table>

A significant percentage of abiotic natural resource consumption by the transport system comes from infrastructure provision. The contribution of the infrastructure to the traffic’s abiotic MIPS values varied between 73% in the case of domestic air traffic and 99% in the case of private roads. The
abiotic natural resource consumption primarily reveals the amount of earthworks and construction undertaken on behalf of the traffic.

The abiotic natural resource consumption is equivalent to around 25% of Finland’s Total Material Requirement (TMR). In the study by Mäenpää et al. (2005) the calculated contribution of traffic to the total consumption of natural resources is appreciably smaller. The high figure obtained in this study is influenced by the fact that the previously constructed infrastructure is evenly applied across all the years of use. The amount of traffic infrastructure construction nowadays is, however, less than one might think from the average figures calculated in this study.

The most important factors regarding water consumption are rainwater diverted from its normal route, and electricity consumption. With air consumption, approximately 90% was due (with the exception of bicycle traffic) to energy consumption.

2.3 Analysis of the MIPS values

In order to assess the potential for a factor X reduction in resource use, it is necessary to analyse the values given in section 2.2.

One aspect affecting the final range of the values presented in Tables 1-4 is the allocation of the material inputs for the infrastructure to the different users. For instance, the abiotic resource consumption per passenger kilometre can be slightly smaller for car traffic than for bus traffic when allocating the infrastructure input according to the gross weight of the traffic, or 8.7 times higher for car traffic than for bus traffic when allocating on the basis of the number of vehicles using the roads (Saari et al., 2006). However, as the total material consumption of the transport system is not dependent on allocation methods and as the values of Tables 1-4 are based on very profound discussions and decisions with Finnish infrastructure experts, the allocation of the material input for infrastructure is not discussed any further in this paper.

2.3.1 Factors influencing the material input

The factors influencing the material input values for transport differ for the different resource categories. The material input from infrastructure dominates abiotic resource consumption of domestic transport. The share of infrastructure varies between 73% for air transport and 99% for private roads (see Table 5). Air transport has a limited need for infrastructure and a relatively high resource consumption during the period of use of aircraft whereas private roads form a widely spread and relatively heavy infrastructure with only small amounts of vehicles using them. Most of the material input for infrastructure is attributable to the construction of infrastructure, which causes huge direct shifts of material.

The abiotic material input of the traffic (without infrastructure) is dominated by the use phase, i.e. mostly energy consumption, in the case of rail, air and maritime transport. For road and street traffic, the material input for the production of the vehicles is roughly equal to that of the use of vehicles. In the case of bicycle traffic, the production of the bicycle is dominant.
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Figure 1. Division of natural resource consumption between traffic and infrastructure.

Infrastructure is also the dominant factor for water consumption as 75% of the water consumption of the transport system is due to infrastructure. The water consumption is mainly caused by two factors, (i) the rainwater diverted from sealed surfaces and (ii) the water input for electricity consumption. In Finland, the latter is highly affected by the proportion of waterpower in the electricity production. Whereas diverted rainwater accounts for a lot of the water consumption for vehicle, maritime and short distance air transport, the water consumption of rail transport is dominated by the water input for the electricity consumed.

With air consumption, approximately 90% was due (with the exception of bicycle traffic) to energy consumption.
2.3.2  Factors influencing the service unit

In addition to the material input (MI), MIPS values are influenced by the amount of service (S) provided as a result of consuming natural resources. In the case of transport, the service provided to the final consumer are the person-kilometres travelled and the tonne-kilometres transported, because the service in question is the transportation of people and goods.

Also, the calculation of the service unit for transport includes the two aspects of infrastructure use on the one hand (means of transport/people/freight tonnage using the infrastructure during its service life) and the use of the means of transport on the other (service life of the means of transport and the passenger and freight tonnage transported in them). The service unit calculation required an analysis of the average person and freight amount transported based on the average traffic volumes for different infrastructures.

The major assumptions for the use of infrastructure and means of transport are shown in Table 8.

Table 8. Major assumptions concerning the use of infrastructure and means of transport.

<table>
<thead>
<tr>
<th>Means of transport</th>
<th>Service life of infrastructure years</th>
<th>Capacity use of infrastructure</th>
<th>Service life of means of transport</th>
<th>Capacity use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Car</td>
<td>60</td>
<td>Average daily traffic (ADT) of different road and street categories, 26 … 38,600 vehicles/day</td>
<td>270 000 km</td>
<td>1.4 persons</td>
</tr>
<tr>
<td>Bus</td>
<td>60</td>
<td>1 000 000 km</td>
<td>13 persons</td>
<td></td>
</tr>
<tr>
<td>Van</td>
<td>60</td>
<td>400 000 km</td>
<td>1 person or 200 kg</td>
<td></td>
</tr>
<tr>
<td>Lorry</td>
<td>60</td>
<td>1 000 000 km</td>
<td>7, 14 or 21 tonnes (app. 50%)</td>
<td></td>
</tr>
<tr>
<td>Bicycle</td>
<td>60</td>
<td>ADT 300 bikes/day</td>
<td>20 a</td>
<td>1 person</td>
</tr>
<tr>
<td>Cargo train</td>
<td>100</td>
<td>0.5 - 3 M. tonnes/a</td>
<td>14 000 000 km</td>
<td>50%</td>
</tr>
<tr>
<td>Long distance train</td>
<td>100</td>
<td>0.05 - 5 M. pass. trips/a</td>
<td>14 000 000 km</td>
<td>20 – 60%, depending on rail traffic</td>
</tr>
<tr>
<td>Local train</td>
<td>100</td>
<td>ADT 11,000 pass./km</td>
<td>Based on long distance trains</td>
<td>Based on yearly passenger amounts</td>
</tr>
<tr>
<td>Metro</td>
<td>100</td>
<td>ADT 52,500 pass./km</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tramway</td>
<td>60</td>
<td>ADT 3,800 pass./km</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aircraft</td>
<td>100</td>
<td>Based on the real amount of operations</td>
<td>30 a (depending on aircraft type, 20 – 110 M. km)</td>
<td>53 – 89%, depending on the route</td>
</tr>
<tr>
<td>Passenger ferry</td>
<td>50</td>
<td>30 a, express boats 15 a</td>
<td>2000 persons (pass.ferry)</td>
<td></td>
</tr>
<tr>
<td>Freight ship</td>
<td>50</td>
<td>30 a</td>
<td>2100 – 2200 t. (Roro-ship)</td>
<td>8300 t. (oil tanker)</td>
</tr>
</tbody>
</table>

The assumptions for the use of infrastructure and means of transport have a noticeable impact on the resulting MIPS values. The lowest impact was observed for the lifespan of the means of transport as the material input of the means of transport has only a slight influence on the final MIPS results (cf. 2.3.1). Only with bicycles (Hakkarainen et al., 2005) and express boats (Lindqvist et al., 2005) does a change in the service life have a visible influence on the MIPS values.

The capacity use of the means of transport plays a relevant role. Despite its shorter distance, a transeuropean charter flight consumes less abiotic resources and air per passenger kilometre than an intercontinental flight.
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because its capacity use (76% instead of 57%) is higher (Nieminen et al., 2005). Travelling in a van causes a high resource consumption per passenger kilometre (Table 1) because there is usually only 1 person travelling in a van instead of an average of 1.4 persons in a car. With goods transportation, an average of only 200 kg is transported in a van whereas lorries carry an average of 7 tonnes at least, which leads to deliberately higher MIPS values (Table 3). Transporting by full trailer lorries consumes fewer resources than transporting by lighter lorries (Table 3) because full trailer lorries transport on average 2 or 3 times more freight than lighter lorries, while their difference in material input remains lower.

Also the presumed service life of the infrastructure influences MIPS values appreciably. There is no generally agreed life for infrastructure. Roads even hardly ever cease to exist. If a larger road is built alongside an existing one, the original road is usually left in place and used as a lower category facility. In the FIN-MIPS Transport research, the service life of the infrastructure (see Table 8) was estimated in close co-operation with the responsible authorities. On short distance flights, for instance, the reduction of the presumed service life of the airside infrastructure of airports from 100 to 50 years, would increase the abiotic MIPS values of short distance flights 38 – 65% whereas the values for water and air consumption remain nearly constant (Nieminen et al., 2005). Similar observations were made when varying the service life for harbours (Lindqvist et al., 2005) and bicycle lanes (Hakkarainen et al., 2005).

The capacity use of infrastructure has the greatest service-unit related influence on the MIPS values. The abiotic MIPS value for travelling by car on a motorway is lower by a factor of 3 than on a lower class connecting road, although the abiotic material input per kilometre of road exceeds the MI of the connecting road by a factor of 20. This is due to the fact that the average daily amount on motorways is 63 times higher than on connecting roads. For water consumption, the differences between the road categories are even bigger, but for air consumption they are considerably smaller.

Similar observations can be made for other modes of transport. For bicycle travel, there is a factor 2.1 difference in abiotic MIPS and a factor 1.6 difference in water consumption between an average bicycle lane in Finland and in Helsinki, the latter having smaller values because of higher traffic density (Talja et al., 2006). Travelling on a single-tracked railway used by 50,000 passengers per year exceeds the MIPS values for a similar track used by 5 million passengers per year by factors of 64, 10, and 9 for abiotic resource consumption, water, and air, respectively. MIPS values for air travel from Helsinki to low frequency airports at a similar distance can be even 4 times higher than for travelling to similar but higher frequency airports.

2.3.3 Variation of average MIPS values due to different circumstances

In addition to the differences between average values, attention has to be drawn to the fact that average values cover noteworthy variations between different circumstances.

The material input of infrastructure is strongly determined by the ground and local topography the infrastructure has been built on. Vihermaa et al. (2005) observed differences of up to a factor of 17, 10, and 4 in abiotic
resources, water, and air consumption, respectively, in the material input values for the construction of one metre of modern, double-tracked railway, depending on the bearing capacity of the soil and the local topography. Hänninen et al. (2005) have stated potential differences by a factor of 40 in the abiotic resource consumption for the construction of one square metre of municipal street, depending on the bearing capacity of the soil, the soil stabilisation method and the amount of traffic expected.

The amount of traffic using a certain infrastructure has a strong influence on the MIPS values obtained for using this infrastructure. Talja et al. (2006) report a factor 3 difference in abiotic MIPS values for car traffic on private roads due to variations in average daily traffic.

The origin of the electricity used by rail traffic has a noticeable influence on the MIPS values. For instance, the use of electricity produced by Helsinki Energy instead of the average national electricity mix increases the material input per passenger kilometre in metro transport by 10% (factor 1.1) for abiotic resources and a factor of 1.75 for air, but decreases the MIPS value for water consumption by a factor of 6 (Talja et al., 2006). Wind power as an electricity source for railway transport has a considerably reducing effect on water and air consumption, but is visible also on the abiotic resource side (Vihermaa et al., 2005).

2.3.4 Factors influencing the national material consumption

Figure 2 shows the distribution of the total consumption of natural resources between the different modes of transport in Finland.

When the division of natural resource consumption is compared to the amounts of passenger and goods traffic, the results can be considered logical. 94% of passenger traffic and 68% of goods traffic comprise road and street traffic, through which 87% of the abiotic natural resources, 71% of the water and 75% of the air are consumed. Vehicular traffic is thus the transport mode mostly affecting natural resource consumption by transport.

In order to draw conclusions about reduction in resource use, it is worth analysing the factors behind the consumption of resources in transport.

The consumption of abiotic natural resources first and foremost reveals the infrastructure mass demanded by the particular mode of transport, this mass being determined by surface area and thickness. Thus, for instance harbours, which are of massive construction, consume more abiotic natural resources than private roads, despite the latter having a larger surface area. Similarly, while airports have larger surface areas than harbours, their abiotic natural resource consumption is markedly less than that of harbours.

The distribution of water consumption is primarily correlated with the surface area required by the mode of transport, since an appreciable fraction of water consumption is due to rainwater diverging from its original route. The contribution of private roads to water consumption is greater than the contribution of maritime traffic. The use of water by rail traffic, on the other hand, is linked to the utilisation of water for electricity generation. Consequently, the contribution of rail traffic towards water consumption by the traffic system is greater than its surface area contribution.
Figure 2: Distribution of natural resource consumption between different modes of transport in Finland.

Air consumption is in almost direct relationship to the amount of traffic, since it is primarily based on the use of fuel. Here rail traffic forms an exception, too. The contribution of rail traffic to the amount of traffic is greater than the contribution of rail traffic to air consumption. This is influenced by, firstly, the energy efficiency of rail traffic and, secondly, the proportion of electricity generated by means other than combustion in relation to the overall electricity consumed.

The MIPS values presented in sections 2.2.1 and 2.2.2 do not tell us anything about the amount of traffic as the material input is set against the amount of service output. As an example, bicycle traffic, the MIPS value for which may be surprising in the case of abiotic resources (Table 1) and water (Table 2), constitutes only 0.4% of the abiotic material input and 1.1% of the water consumption of the whole transport system.
2.3.5 Application of the MIPS values in different transport cases

The MIPS values calculated can be applied to distinct examples for travelling or transporting goods. In this section, three different examples for passenger traffic and two examples for goods transport are shown:

(i) a trip from Helsinki to St. Petersburg,
(ii) a commuting trip to work in the Helsinki region,
(iii) a trip to school in the countryside,
(iv) an average letter sent in Finland, and
(v) a comparison of express consignments.

When travelling from Helsinki to St. Petersburg, five different modes of transport can be used (Table 9). The calculations do not include journeys between the harbour, airport or railway station and the city centre. There are differences between the least and the most consuming travel of factors of 8, 9, and 18 for the consumption of abiotic resources, water, and air, respectively. However, the results differ in the different categories of resources. From the standpoint of the consumption of abiotic natural resources and water on this journey the best alternative is the passenger car ferry. The coach consumes almost as little, but in terms of air consumption the coach is an appreciably better option than the passenger car ferry. The train uses the least amount of air, but from the water consumption standpoint the train is the worst alternative. From the overall point of view, the best option would appear, based on this calculation, to be the coach.

Table 9. Natural resource consumption per person on the Helsinki to St. Petersburg route, kg/journey

<table>
<thead>
<tr>
<th>Modes of transport</th>
<th>Abiotic</th>
<th>Water</th>
<th>Air</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passenger car</td>
<td>794</td>
<td>7990</td>
<td>75</td>
</tr>
<tr>
<td>Coach</td>
<td>128</td>
<td>1116</td>
<td>24</td>
</tr>
<tr>
<td>Train</td>
<td>568</td>
<td>8089</td>
<td>10</td>
</tr>
<tr>
<td>Passenger car ferry</td>
<td>96</td>
<td>895</td>
<td>115</td>
</tr>
<tr>
<td>Jet</td>
<td>111</td>
<td>895</td>
<td>177</td>
</tr>
</tbody>
</table>

A commuter’s work trip within the Helsinki Metropolitan Area, with a length of approximately 15-19 km, depending on the mode of transport, was examined for six modes of travel. The different means of travel are named according to the most common form of transport on the journey (Table 10). Between the different options, there are differences by a factor of 9, 43, and 18 in the consumption of abiotic resources, water, and air, respectively. On this trip the bicycle is the best option in terms of abiotic resource and air consumption. From the water consumption perspective, the best alternative is the bus. Water consumption is affected mainly by diverted rainwater and by the use of electricity. Electricity for the metro, as also the tram, has been calculated according to the average national electricity mix, thereby emphasising the contribution of hydropower. From the standpoint of abiotic resource and air consumption the passenger car is far and away the worst alternative.
Table 10. Natural resource consumption of a work trip (Espoo-Helsinki) per person using different modes of transport (kg/journey).

<table>
<thead>
<tr>
<th>Modes of transport</th>
<th>Abiotic</th>
<th>Water</th>
<th>Air</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passenger car</td>
<td>25.5</td>
<td>228</td>
<td>5.6</td>
</tr>
<tr>
<td>Bus</td>
<td>3.2</td>
<td>13</td>
<td>1.1</td>
</tr>
<tr>
<td>Bicycle</td>
<td>2.7</td>
<td>111</td>
<td>0.2</td>
</tr>
<tr>
<td>Metro</td>
<td>5.6</td>
<td>560</td>
<td>0.9</td>
</tr>
<tr>
<td>Bus + tram</td>
<td>5.4</td>
<td>346</td>
<td>1.2</td>
</tr>
<tr>
<td>Bus + metro</td>
<td>4.2</td>
<td>128</td>
<td>1.0</td>
</tr>
</tbody>
</table>

The natural resource consumption of a child’s 4-km school trip one way in a sparsely populated part of the countryside is considered using four different travel variations. For car travel, the length of the journey in both directions has been calculated. In this case the service applies to the passengers, i.e. the driver has not been taken into account in the total number of people being transported. Thus, the consumption due to transporting one child has been calculated on the basis of the passenger car’s vehicle kilometres. With three children on board 1.5 kilometres of extra driving at the start of the trip has been calculated and the vehicle kilometres have then been divided by three. The biggest differences between the options are as high as factor 41, 63, and 17 for abiotic resource, water, and air consumption, respectively (Table 11). The bicycle and coach/bus are appreciably more eco-efficient alternatives than the passenger car, even with several children on board.

Table 11. Natural resource consumption per passenger of children's school journeys using different modes of transport in a rural area (kg/person/trip).

<table>
<thead>
<tr>
<th>Modes of transport</th>
<th>Abiotic</th>
<th>Water</th>
<th>Air</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cycle</td>
<td>0.9</td>
<td>37</td>
<td>0.1</td>
</tr>
<tr>
<td>Taken by car, one child aboard</td>
<td>37</td>
<td>564</td>
<td>1.7</td>
</tr>
<tr>
<td>Taken by car, 3 children aboard</td>
<td>19</td>
<td>286</td>
<td>0.8</td>
</tr>
<tr>
<td>Coach</td>
<td>1.3</td>
<td>9</td>
<td>0.2</td>
</tr>
</tbody>
</table>

Based on the results of this study it was calculated how much transporting a letter in Finland on average consumes natural resources. The basic data were supplied by the Finnish Post Corporation (Suomen Posti Oyj). Most of Finland’s ‘letter kilometres’ take place by passenger car. Journeys between sorting offices are made by lorry. The most urgent long distance mail goes by air, while vans are used mainly for deliveries to companies and for emptying public mailboxes, so that the contribution of these to the overall transportation is minimal. For calculating the material input of transporting a letter, the average MIPS values for the vehicles were used. The calculations adopted the material intensity values of Sinivuori and Saari (2006) for university buildings to the buildings used by the post corporation.

On average, transporting a letter consumes 190 g of abiotic natural resources, 7.8 kg of water, and 34 g of air. Around 77% of the consumption of abiotic natural resources, 29% of the water consumption, and 74% of the air consumption was attributable to vehicles. Most of the water consumption
was due to the hydropower needed for the electricity supply to the buildings. From the standpoint of its abiotic natural resource consumption, sending a letter in Finland is equivalent to a journey of well over 100 metres by passenger car. Transporting a letter to a letterbox by passenger car over a one-way distance of 1 kilometre multiples the consumption of abiotic resources, water, and air by a factor of 21, 5, and 11, respectively.

The results of the study were also applied to the calculation of natural resource consumption by TNT’s transport operations with the aid of a few examples. TNT Finland Ltd. assisted in making the calculations. To compare the natural resource consumption of different routes and consignments of varying sizes, the results for the different consignments were converted to consumption per tonne kilometre. In the case of transportation within Finland, the actual number of kilometres driven was divided by the total load for each section of the route. The case consignments transported abroad both went from Finland to Germany, one being sent by air, the other by road. Information on the distribution contribution was not as precise as with deliveries in Finland, so that distribution was calculated only as a one-way direct journey to the recipient. In natural resource consumption for foreign route sections in Sweden the MIPS values from this study were used, and in Denmark and Germany, the German values (Schmidt-Bleek, 1998). For the purpose of the calculations only transportation was taken into account and not, for example, buildings as in the previous example.

Table 12. Natural resource consumption of case consignments (kg/tonne km)

<table>
<thead>
<tr>
<th>Route</th>
<th>Collection and distribution, km</th>
<th>Main route, km</th>
<th>Means of transport</th>
<th>Abiotic</th>
<th>Water</th>
<th>Air</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turku-Rauma</td>
<td>190</td>
<td>---</td>
<td>Van + Lorry</td>
<td>9</td>
<td>54</td>
<td>1.3</td>
</tr>
<tr>
<td>Tuusula-Nurmes</td>
<td>196</td>
<td>617</td>
<td>Van + Lorry</td>
<td>0.7</td>
<td>6.5</td>
<td>0.09</td>
</tr>
<tr>
<td>Järvenpää-Mannheim</td>
<td>42</td>
<td>2020</td>
<td>Van + Aircraft</td>
<td>1.1</td>
<td>49</td>
<td>0.5</td>
</tr>
<tr>
<td>Kotka-Bremen</td>
<td>172</td>
<td>1642</td>
<td>Lorry + Ferry</td>
<td>0.2</td>
<td>0.84</td>
<td>0.02</td>
</tr>
</tbody>
</table>

The natural resource consumption of a 4.4 kg consignment from Turku to Rauma was compared to a delivery made from Tuusula to Nurmes and weighed 80 kg. Taking the consignment from Tuusula to Nurmes consumed in terms of tonne kilometres less abiotic resources, water, and air by a factor of 13, 8, and 14, respectively. An express delivery taken from Järvenpää to Mannheim by air in one night consumed more resources per tonne kilometre than a consignment from Kotka to Bremen taken by road, mainly using a semi-trailer lorry. The difference was a factor of 5.5, 58, and 25, for the consumption of abiotic natural resources, water, and air, respectively.

When the results were examined, it was found that the degree to which vehicles are filled vastly affects the consumption of natural resources. In main route point to point transportation, large amounts of goods are transported from depot to depot in full vehicles, thus not markedly raising the material input in the overall transportation, but reducing the material input of the delivery in relation to the tonne kilometres. The case calculations differ radically from each other in regard to what component of the delivery consumed the most natural resources. The results calculated per tonne kilometre in the examples supported the results of the study regarding the size category of the average MIPS values, even though the fluctuating
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goods volumes at the same time indicated that there may be appreciable differences in the eco-efficiency of natural resource consumption between individual cases. Among the domestic consignments the difference is primarily due to the fact that the Turku-Rauma route does not include any main point to point transportation, but comprises solely collection and distribution journeys in vehicles which are not as full as those used for main route transportation.

When comparing the material inputs per tonne kilometre of the two case consignments sent to Germany, it was observed that in regard to the consumption of abiotic natural resources, water, and air, transportation by land is much more eco-efficient than air transport (factor 5.5, 58, and 25, respectively). In addition, on the Kotka-Bremen route almost 90% of the consignment’s abiotic natural resource consumption was due to transportation from Kotka to Vantaa. By making the Kotka-Vantaa route section more efficient the consignment’s eco-efficiency could, however, be considerably increased, the difference between air and land transportation then even increasing.

3 Reflection concerning factor X improvements in transport

3.1 Comparison of the MIPS values for transport

When comparing MIPS values for domestic passenger traffic in Finland it can be seen that from the standpoint of the consumption of abiotic natural resources the bus, bicycle and metro are the most eco-efficient modes of transport (Table 1). From the water consumption standpoint travelling by bus/coach is clearly the most eco-efficient option. In regard to air consumption cycling is the best alternative. Maximum differences between the different modes of travel are factor 5, 17, and 14 for abiotic resource, water, and air consumption, respectively. When travelling to areas close to Finland the ship is more eco-efficient than the aeroplane (Table 2). On longer haul flights, the MIPS values decrease.

In goods traffic the most eco-efficient form of transport per tonne kilometre from the abiotic resource and water consumption perspective is the full trailer truck (Table 3). In regard to air consumption the best alternative is the train. The differences between the different modes of transports are greater than in the case of passenger travel, varying by a factor of 47, 157, and 140 for abiotic resource, water, and air consumption, respectively. Calculated per tonne kilometre the van is the least eco-efficient mode owing to its average load being so small. In international goods traffic the ship is a markedly more eco-efficient form of transport than the aircraft because of its low fuel consumption (Table 4). Maximum differences range between factor 9 in abiotic resource consumption over European distances and factor 34 in air consumption over short distances.

The modes of transport shown in Tables 1 – 4 are not totally comparable with each other. For instance, bicycles and aircrafts cannot be considered as modes of travel competing with each other but they can both compete with cars in certain circumstances. Despite this, obvious errors in the MIPS values for different modes of transport can be pointed out. Thus, in principle there is considerable potential for increasing the resource efficiency of transport.
There is a difference in the potential reduction of resource consumption in the different categories for material input. The contribution of infrastructure to the MIPS values for abiotic resources and water consumption was significant. Thus, improvements in these areas require new approaches in the planning and use of infrastructure. Regarding the material input for air consumption (mainly combusted oxygen), a reduction in the fuel consumption is most relevant.

3.2 Options for decreasing MIPS values

Within the constraints of this study, it was not possible to comprehensively estimate the relationships with material intensity of measures commonly proposed for reducing the environmental loading due to traffic. However, a few methods which have emerged in the public discussion are reflected below from the natural resource consumption perspective.

3.2.1 The material input of infrastructure

The share of the infrastructure in abiotic natural resource consumption by different modes of transport is appreciable (see Figure 1). The use of material from quarrying or excavating at the construction site reduces the need for importing soil and stone materials. Another way of enhancing the eco-efficiency of infrastructure construction is to replace new building materials by waste raw materials or by surplus materials imported from elsewhere. Also imported recycled materials or by-products, for example stones from the mining industry, coal and peat ash, metallurgical crushed slag, blast furnace sand and crushed concrete, can decrease the material input. So far, there has been little utilisation of waste for making road foundations (Hänninen et al., 2005).

Straight road and rail lines demanded by fast transport connections do not leave much chance of avoiding terrain that is unfavourable from the construction standpoint. This increases the demand for cuttings and soil stabilisation, so that abiotic resource consumption per route kilometre rises. Infrastructure planning can appreciably influence the material intensity of the infrastructure built.

Most of the natural resource consumption by roads and railways is due to their construction, with just a small contribution coming from their maintenance (e.g. Hänninen et al. 2005: 55-56; Vihermaa et al. 2005: 29). On this basis the construction of new infrastructure increases the overall consumption of natural resources far more than does the maintenance of existing roads and railways. New roads also tend to increase, rather than decrease, the amount of traffic (e.g. Tapio 2002), which again raises the total use of natural resources. Rather than building new roads, the capacity of existing ones should be uprated by, for example, ways of improvement having lower materials intensity. These ways could include, for instance, developing traffic arrangements at road junctions, constructing or designating overtaking lanes, diverting traffic to a parallel road, or by investing in traffic control systems.

The need for including infrastructure already built into MIPS calculations can also be reflected on a general level. If someone walks a distance of one kilometre along a private road to a bus stop instead of being taken there, how much natural resources in actual fact are spared? At least the fuel
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consumption of the passenger car; but what about the infrastructure? It is easy to maintain that the road is in any case there, having once been built, so that the natural resource consumption due to the road does not need to be calculated in addition to the car’s consumption. However, there is no such thing as free infrastructure, as resources have been used for it at least at some point in the past. In addition, this kind of thinking could also be applied to public transport: since the bus is going to pass that way anyway, then a single passenger will not increase the consumption by travelling on it. However, from a holistic point of view thinking along these lines is unsustainable as in the long term the bus will not run at all, if the single passengers do not make use of it. Consequently, the material input of infrastructure should be allocated to all types of users and cannot be omitted.

3.2.2 The material input of the means of transport

The contributions of car manufacturing and car fuel consumption to vehicle abiotic natural resource consumption are both around five percent, while fuel consumption is the governing factor in terms of air consumption (Figure 1). Shortening the service life of vehicles, e.g. by a shift in taxation from vehicle purchase to vehicle use, would thus enlarge the relative and absolute contribution of vehicle manufacturing and reduce the proportion of the natural resource consumption due to the use of the vehicles. Reducing fuel consumption would decrease air consumption directly. On the other hand, shortening the lifespan of individual vehicles by e.g. 20% would call for a fuel consumption reduction in the equivalent size class to prevent the consumption of abiotic natural resources from increasing.

According to a study by the Wuppertal Institute for Climate, Energy and Environment, replacing a passenger car with a steel chassis by a car with an aluminium (alloy) chassis and consequently lower fuel consumption would require the vehicle to be driven over 500,000 km, for the increased manufacturing materials’ abiotic natural resource consumption to compensate for the lowered fuel consumption (Schmidt-Bleek 1998). The service life of a bus or coach is appreciably longer than 500,000 km, so that in this instance the increased use of aluminium can more easily be defended.

Various development trends are apparent in existing cars and on the car markets. A Smart-type small 2-person car in terms of its capacity answers an appreciable proportion of peoples’ travel needs (the average ridership in Finland is 1.4 persons; see Table 8). Thanks to its compact size, this type of car requires a somewhat smaller infrastructure and less parking space, at least in urban areas.

However, the trend appears to be precisely the opposite: an increase in large vehicles (space wagons or people carriers, city 4X4s) is raising natural resource consumption in the form of higher fuel consumption. Moreover, the space requirement of this kind of vehicle, both in traffic and when parked, is higher than average, thereby increasing the infrastructure requirement.

The hybrid car (a combination of internal combustion engine and electric motor) saves fuel but requires fitting with an electric motor containing a lot of copper (which has a high abiotic material intensity). While it is fair to assume a decline in air consumption by this kind of engine, owing to the increased use of copper the overall abiotic natural resource consumption is unlikely to decrease.
The contribution of fuel consumption to abiotic natural resource consumption of vehicle transport as a whole is of the order of five percent (see Figure 1). By using biofuels, this proportion could be lowered. However, if the biomass for biofuels had to be cultivated for fuel use, it would also become necessary to examine this form of biotic natural resource use (which is beyond the range of this study). The abiotic material inputs in biomass cultivation would also have to be considered. Using biogas generated from wastes as a fuel would not have to include natural resource consumption due to cultivation. With the use of biofuel, however, air consumption would remain at the same level, since oxygen is also used up when biofuel is burned. In the MIPS concept, air consumption does not change based on the use of renewable resources. Thus, this method is not equivalent to the general practice of carbon dioxide emission calculation, in which the carbon dioxide bound up in growth is taken into account (carbon cycle).

3.2.3 Service unit: capacity use and service life

By making the use of a means of transport more effective, eco-efficiency can be improved. Even in long haul goods transportation, a significant proportion of natural resources are consumed at the start and end of journeys in conjunction with goods collection and delivery (cf. Table 12). Therefore, special attention should be devoted to improving the efficiency of goods collection and delivery journeys.

If two people travel to work in the same car instead of both using their own, in principle the consumption of natural resources by the journey is halved. If travelling together leads to extra driving, the savings are reduced, although they will most likely not entirely disappear altogether (see Table 11).

The running of public transport vehicles is not eco-efficient if they are empty because the MIPS values rise as the ridership falls. However, when public transport is examined in the network, maintaining schedules on some little-used runs, e.g. through state funding, can promote the use of the entire network. If public transport support reduces private car use, it promotes dematerialisation, because passenger car transport is the most highly consumptive form of passenger traffic (see Table 1).

Shared trips reduce the consumption of natural resources in direct proportion to the number of people sharing. They can lessen the amount of both fuel and vehicles, as well as the infrastructure requirement and thus provide one means of lowering the MIPS values in all the sub-areas. Car sharing not only reduces use of the infrastructure but also the number of cars and private car performances (Meijkamp 1998).

In addition to an increase in the capacity use of infrastructure, an increase in the service life of the infrastructure could be seen as a major contributor to decreasing the material input per unit service in transport. Especially with abiotic resource use, an increase in the service life of the infrastructure would be necessary for cutting down the high share of the infrastructure in the MIPS values for transport.
3.3 Relevance of the consumer’s choice

As shown in section 3.1, a potential for a factor \( X \) increase in the resource efficiency of transport can be found when comparing and analysing average MIPS values for transport. Despite general recommendations concerning the material intensity of different transport modes, the consumer of transport services can make decisions about how to travel or how to transport in a certain case. As section 2.3.5 shows, the results for distinct cases are not necessarily equal to the average figures. Thus, reflection on a case basis can be useful.

Case studies also show that the consumer’s choice is relevant, but limited. Through his or her daily choices everybody can promote a reduction in natural resource consumption by opting for the most eco-efficient alternative among the available means of travel and by keeping the travel performance as small as possible. However, the consumer cannot choose a non-existent service. Again, with existing services, there are usually factors other than material intensity influencing the consumers’ choice, e.g. prices, speed and service availability. Thus, the responsibility for the dematerialisation of transport cannot be laid solely on the consumer, but one has to consider the circumstances and structures shaping and influencing the transport system, within which the consumer has to make choices.

3.3.1 Passenger transport

The natural resource consumption per person on the Helsinki to St. Petersburg route was calculated for five modes of transport (Table 9). The train uses the least amount of air, but has high values for abiotic resources and water consumption. Abiotic natural resources and water on this journey are consumed least when using the passenger car ferry. The coach consumes almost as little, but in terms of air consumption the coach is an appreciably better option than the passenger car ferry. However, at present the consumer cannot choose the car ferry, as this service is not offered. The coach is a resource-efficient, but time-consuming option so that the consumer might make a choice based on other criteria.

The resource consumption of one work trip may appear small (Table 10), but since the trip is made twice a day, 220 days a year, the values and their differences have to be taken seriously. Work trips made by the passenger car in the example consume 11.2 tonnes of abiotic natural resources a year. Travelling by bus uses up 1,400 kg of abiotic natural resources a year, which is a factor of 8 less. According to Mäenpää et al. (2005) the overall consumption of natural resources by households in 1995 came to well over 15 tonnes per capita (without the infrastructure contribution). Thus, a work trip of sufficient length, especially one made by passenger car, may well double a citizen’s total natural resource consumption.

As with the journey to work, so also with the journey to school: the values may look small but when the trip is made twice a day, 180 days a year, the values and their differences begin to acquire more significance. For instance, transporting one child to school, as in this example, by passenger car in a rural area consumes 13.3 tonnes of abiotic natural resources a year. By contrast, the coach consumes 470 kg of such resources over the same period of time (factor 28 less). The distance of services such as schools is one important factor influencing the possibilities and the need for the choice
of transport mode. If e.g. schools in rural areas are closed down, the
distances grow even and this may affect additional transportation if walking
or cycling becomes impossible.

3.3.2 Goods transport

The distance of the service available is also relevant in terms of goods
transport. The case calculation indicated that sending a letter in Finland is
equivalent from the standpoint of its abiotic natural resource consumption to
a journey of well over 100 m by passenger car. Transporting a letter to a
letterbox by passenger car multiplies the consumption of natural resources
severalfold. Thus, the consumption of natural resources by the sending of
letters remains the smaller, the fewer the letters taken for posting use
different forms of motorised transport. Thus, the decision of the consumer
not to use the car for delivering his or her letter is relevant. However, the
consumer cannot directly influence the letterbox network. Keeping the
collection network for letters sufficiently dense conserves natural resources.
Equivalent phenomena have also been observed in the energy consumption
of infrastructure changes in the retail trade (Kasanen & Savolainen, 1992):
drivers’ journeys by passenger car are a more significant factor than trade
logistics lorries, so that the increased passenger car journeys by consumers
when a shop closes down clearly exceed the energy savings made by the
cooperative business by closing the shop. Consequently, ways of shopping
and distribution (e.g. e-commerce and home delivery) that reduce the
customers’ need to drive elsewhere promote dematerialisation.

The use of products produced locally in principle lowers the product
transportation intensity and in that respect also the materials intensity.
However, there are various kinds of preconditions associated with this. The
transport chain’s eco-efficiency is radically affected by the collection and
delivery journeys at the start and end of each transportation (Table 12). If,
for example, procuring or consuming locally grown food increases the
passenger car or van journeys, with their high materials intensity (see Table
1), the extra performances may increase the material intensity of the
products.

When comparing the material inputs per tonne kilometre of the two case
consignments (Table 12), it was observed that in regard to the consumption
of abiotic natural resources, transportation by land is over 5 times more eco-
efficient than air transport (factor 5). In terms of water consumption the
difference between the two examples is factor 58 and in the case of air
consumption almost factor 17. Thus, speed also costs in terms of natural
resources, and resource use can be reduced by avoiding air transport and
preferring slower delivery.

3.3.3 Choosing the least consuming means of transport

Replacing road and air transport by rail and water transport has been put
forward as a means of, for example, reducing greenhouse gas emissions. The
effect of replacing modes of transport is here considered from the natural
resource consumption angle.

In passenger transport the vehicle consumes more abiotic natural
resources and air than rail transport (Tables 1, 9, 10), even though exceptions
do turn up when specific road categories and routes are examined. In
Finland, rail transport uses more water than vehicular traffic because regulated hydropower plays an important part in the Finnish electricity mix. A change in the method of generating electricity may radically affect the MIPS values for rail traffic, especially in terms of water consumption.

Travelling by bus uses up natural resources and water to a far less extent than rail traffic. Air consumption is, however, higher (Tables 1 and 9). When there are several passengers in a car, the latter’s eco-efficiency improves. If increasing rail traffic calls for additional construction of rail infrastructure, the abiotic natural resource consumption may not necessarily decrease, because modern two-track lines are material intensive. If, however, road investments of equivalent capacity are avoided, lower amounts of natural resources will be consumed by the rail investment.

A domestic flight consumes on average less abiotic natural resources and more air than a train journey (Table 1). The differences between travelling by train and by passenger car are less pronounced. When travelling to nearby areas (from Finland to Stockholm, St. Petersburg and Estonia) the ship is slightly more eco-efficient than the aeroplane (Table 2). On the Helsinki-Tallinn route the aeroplane consumes, however, less abiotic natural resources and air than the express boat.

The relationships between the MIPS values of different modes of transport are different in goods traffic. Lorry transport consumes on average slightly less abiotic natural resources and appreciably less water than goods train transport, but goods train deliveries consume less air (Table 3). In goods traffic air transport is generally a less eco-efficient option (Tables 3 and 4).

Domestic maritime cargo deliveries were not studied in the FIN-MIPS Traffic project due to their low level of significance (Lindqvist et al., 2005). If Finland’s coastal traffic is compared to cargo ship traffic going to areas close to Finland, the MIPS values for its abiotic natural resource and air consumption are higher than in road and rail transport, while the value for water is of the same order of magnitude as in road transport, but lower than in rail transport. Hence, transferring domestic goods transport to the sea within the current system framework would not conserve much natural resources.

The aforementioned comparisons indicate that there are differences between modes of transport and it is thus possible to achieve savings in natural resource consumption by choosing the best means available. However, there are no fundamental bases from the natural resource consumption standpoint for replacing vehicle and air transport by rail and maritime transport in any case.

### 3.3.4 The paradox of speed

Increasing speed is usually considered desirable and useful. However, numerous results of the FIN-MIPS Transport research indicate that speeding up traffic increases natural resource consumption in the form of energy consumption and/or infrastructure material inputs. Thus, decisions by consumers and planners to prefer lower speed transport modes would save resources.

For example, the straight road and rail lines demanded by fast transport connections, with their cuttings, do not leave any chance of avoiding terrain
that is unfavourable from the construction standpoint, so that natural resource consumption per route kilometre rises. Additionally, speed easily increases travelling and/or the length of journeys and thus the traffic and its natural resource consumption as a whole.

In Finland, for instance, it is not possible to leave for weekend shopping visits to Central Europe by car, but it is possible by air and this is becoming increasingly popular. Air transport increases natural resource consumption in the form of increasing performances, despite being relatively eco-efficient per person kilometre in mode of transport comparisons (see Tables 1 and 2).

In maritime transport the express boat consumes considerably more natural resources than the slower passenger car ferry, this being a result of the higher fuel consumption due to the increase in speed, among other factors (Lindqvist et al., 2005).

In goods transport fast transportation by air is much more consumptive than other modes of transport (Tables 3, 4, 12).

3.4 Transport system level

A significant percentage of abiotic natural resource consumption by the traffic system comes from infrastructure provision. The abiotic natural resource consumption primarily reveals the amount of earthworks and construction undertaken on behalf of the traffic. The abiotic natural resource consumption is equivalent to around 25% of Finland’s Total Material Requirement (TMR). In the study by Maenpää (2005) the calculated contribution of traffic to the total consumption of natural resources is appreciably smaller. This is influenced by the fact that the previously constructed infrastructure is evenly applied across all the years of use, while the amount of traffic infrastructure construction nowadays is less than one might think from the average values calculated in this study.

The maintenance of old roads consumes appreciably lower amounts of natural resources than the construction of whole new roads, so that the amount of further construction is fundamental to natural resource consumption by the transport system. A substantial decrease in abiotic resources used by transport can only be achieved if the growing need for infrastructure is re-thought and turned into a more efficient use and an extension of the service life of the existing infrastructure.

The most important factors regarding water consumption are rainwater transferred from its normal route, and electricity consumption. With air consumption approximately 90% was due (with the exception of bicycle traffic) to energy consumption. Air consumption by traffic reflects carbon dioxide emissions quite well.

From the relatively low MIPS values for busy routes, one may gain the impression that by increasing the amount of traffic, i.e. the service unit, on existing routes we could decrease the MIPS values and increase eco-efficiency. This does not, however, mean a reduction in natural resource consumption as a whole. From the environmental aspect, it is the total consumption and not the size of the relative MIPS values that is of relevance. Higher eco-efficiency, in other words a lower MIPS value, is not the same as less consumption of natural resources. This reinforces the viewpoint that in addition to eco-efficiency we must also aim for sufficiency.
Eco-efficiency is increased by e.g. the choice of vehicle based on the MIPS values, and an increase in the use of the vehicle or the infrastructure. In both cases, the natural resource consumption in relation to the performance falls. Sufficiency is promoted by endeavours to reduce the transport performance, when the consequence is a reduction in the overall consumption as well.

Travelling by public transport in general consumes smaller amounts of natural resources per person kilometre than travelling by private car (Tables 1, 9, 10, 11). Hence, the eco-efficiency of traffic improves when the public transport contribution to the overall traffic performance grows. In public transport as well, the ridership of vehicles is important, because the MIPS values rise as the ridership falls.

The contribution of roads to the consumption of abiotic natural resources and water by the transport system is considerable (Tables 5 - 7). Most of the natural resource consumption by roads is due to their construction, with just a small contribution coming from their maintenance. On this basis the construction of new roads increases the overall consumption of natural resources far more than does the maintenance of existing roads. Rather than building new roads, the capacity of existing ones should be uprated.

It is generally assumed that by concentrating the human community traffic can be reduced compared to a situation where an equivalent amount of construction takes place outside the existing community structure. If concentrating the community structure increases the use of the existing traffic routes without the need for constructing new ones, it reduces the MIPS values for transport. Concentrating the community structure can also reduce the overall natural resource consumption if it can be used to decrease traffic performances, and if it promotes the use and profitability of more eco-efficient modes of transport. If, however, the community structure is intensified by constructing on weak foundations, the materials intensity of the infrastructure increases. In particular the consumption of abiotic natural resources may rise compared to a situation where construction takes place on sturdy, but more distantly located, ground. The “profitability” limit, especially from the abiotic natural resource consumption perspective, needs to be calculated in each case.

A carfree quarter can reduce infrastructure materials input in two ways. The number of streets is less than normal, since the number of roads leading to properties decreases. Roads leading directly to residential properties are lighter in construction and materials intensity, but they are numerically greater thus consuming big amount of resources (Talja et al., 2006). Secondly, devehicularisation makes the construction of narrower and lighter traffic routes than normal possible, for example within residential areas based on apartment buildings. In addition, devehicularisation may promote the use of other forms of transport to the passenger car, which consumes the most natural resources. For example, in Austria the arrangement of parking outside apartment block areas has been found to improve the profitability of public transport and to reduce traffic performance, i.e. journey length and quantity (Knoflacher 2004).

One purpose of telecommuting is the reduction of journeys between home and work place. Cutting down the number of journeys directly reduces natural resource consumption. Lessening the amount of journeys during the rush hour also reduces the pressure for bolstering up the infrastructure.
However, if telecommuting increases the readiness to move to places a long way away and/or requiring the use of a passenger car, then the increased travel cancels out at least part of the savings in natural resource consumption achieved by the telecommuting.

4 Overall conclusions – how to achieve factor X?

Applying the MIPS methodology to the traffic system brings a new perspective to the discussion on the environmental impact and eco-efficiency of traffic. The most important new aspect concerns taking abiotic natural resource consumption into account. Another strongpoint of the MIPS method is its simplicity: products and services differing from each other can be made comparable on the basis of kilograms of resources.

Reducing the total consumption of natural resources by transport is only possible if the growth in traffic performances ceases. Predictions on traffic performance growth increase the pressure to construct new roads, which increases abiotic natural resource and water consumption, as well as the traffic performance when new and better roads are introduced. According to Tapio (2002), there is a self-perpetuating connection between traffic predictions and performances, which is difficult to break without effective intervention measures.

Within the framework of the FIN-MIPS Transport research, the traffic system and different modes of transport have been studied in an exhaustive fashion. Natural resource consumption by transport can be considered high from the standpoint of both the national economy and, for instance, the overall consumption of natural resources by households. If comprehensive materials flow data from other sectors of consumption were available, a wider view on the role of transport in dematerialising consumption and the intervention measures required for dematerialisation would become possible.

In the light of the results of the study, natural resource consumption by traffic is appreciable, for example in relation to Finland’s Total Material Requirement. Reducing the overall consumption would require a reduction in the amount of traffic performance. This can, despite the potentials observed in this study, in the present situation be regarded as a challenge, since the number of transport performances have almost constantly risen over the last few decades (Finnish Road Administration, 2006).

A material intensive traffic system can be considered one cause of a way of life and a society headed in an unsustainable direction, or at least as an underlying factor. On the other hand, material intensive traffic can also be considered a consequence of an unsustainable way of life and society, since traffic is not a purpose in itself, rather it is one kind of community “support activity”.

Even if a material intensive traffic system is regarded as merely the result of a way of life and society, the situation can be considered disturbing. Since the abiotic natural resource consumption of the community’s “support activity” is responsible for one quarter of the total consumption of natural resources, it may be that our society is on the way towards “The tower of Babel” (Van Dieren 2005), at which the society will suffocate and collapse in the constantly escalating need for resources called for by growth maintenance.
Still, if a large dematerialisation of society (factor 10) is a prerequisite for achieving a sustainable society and way of life, the traffic system must also be vastly dematerialised from its present level. According to Gudmundsson and Nielsen (1999), the consumption of solid (equivalent to abiotic) materials during the life cycle of passenger car transport in Denmark could at best be reduced by 71% (factor 3.6) by 2050 and the carbon dioxide emissions (equivalent in principle to air consumption) by 88% (factor 8.3).

The FIN-MIPS Transport study shows that similar reductions in resource use are in principle possible also in Finland although requiring remarkable efforts. Efforts have to be done on different levels and by different actors viz. consumers, infrastructure and municipal planners, infrastructure administration, producers of equipment, providers of services, and last but not least local and national political decision-makers.

References


MOB Docking sharing, a new advanced mobility strategy solution

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1 The jam of urban mobility

1.1 State of the art

"Transport is one of the Community's earliest common policies, focused on removing obstacles at the borders between Member States so as to facilitate the free movement of persons and goods. Its prime objectives are the completion of the internal market, ensuring sustainable development, the deployment of major networks, spatial management, improving safety and the development of international cooperation.

(...) the common transport policy make it possible to keep pace with the growth in demand and tackle problems of congestion and saturation." (by the White Paper "European transport policy for 2010" EU Commission, 2001)

The lack of attention to the transport issues is one of the reasons of the decadence of our daily living conditions. The waste of time due to traffic congestion, to the inadequate use of new IT and communications systems, the damages caused to the environment, are partly responsible for the present urban uneasiness and the ensuing social breaking.

The attention to living quality conditions, more than ever focus of the new urban social surveys, have by now for years highlighted the closer link existing between the degree of satisfaction of urban life and the issues related to the mobility.

The phenomenon of the divulged knowledge (Amendola, 2000) that now characterizes the “city” as a whole, as a shared desire of questions and reflexions by people, advance new goals and new management problems of the space development, so that the traditional demands for a functional, efficient and productive city, have been flanked by the new demands for beauty, significance, usability, conviviality, variety, sustainability, etc.
In spite of that, the transport sector seems still to be ruled by the old culture of functional matrix that attempts to read all the problems breaking them up in units and functional sub-units, offering solutions internal to the “optimality typology”, so loosing sight of the process framework being at the base of the problem. Traffic and congestion are solved with new infrastructures public works, zero-emitting engine projects, policies of territorial closing of fluxes (as the Marxist “development poles” policy), and monitoring systems end in themselves.

The difficulties that designers meet with in order to understand individual territorial maps, together with the requests for “value” that imply a complex management of the problem to face and to develop as multidisciplinary issue (think of the social request for sustainability), could be extended to transport matters. The awe of the project, and/or project as a credibility risk for this new visibility and process shared management, seems to lead to a sort of a wait and see policy or to emergency management only, without a real project of the future scenario toward which drive the territory’s political-design strategies.

Ever more important is the active involvement of the political subject which, promoting the emerging values of individual choices, takes upon himself the responsibility of leading and driving the industrial choices of product. Research and policy joined within the goal of social risk assumption, with the aim of ensuring to the EU industries an horizon of medium/long term industrial project, to develop new products on the basis of an optimized combination of the current transport systems to the end of improving their results and reduce their impact on the environment.

The lack of such a driving -product’s norms and/or territorial plans- couldn’t lead to reach those goals of sustainability required by many, and indispensable premise for development of the next future. Transport planning actions, driven by strategies of opposition to mobility technical innovation –as the incremental approach- paradoxically end to direct activities expulsion dynamics and increase of demand on one hand, and to develops new closure and/or utopian urban experiences, on the other.

From the point of view of the development of the individual mobility on automobile, in a way we’re living a sort of paradox. On one hand the unbelievable explosion of the cities and mega cities all over the world, on the other, the increasing development of individual mobility by means of automobiles. A paradox just because the increase in individual mobility trends does not match urban concentration which, in theory, should reduce the distances among people hence their mobility needs. Our daily experience and the industry’s numbers refuse this hypothesis.

As Viale rightly pointed out (Viale 1996), automobile system is having an unremitting success even while facing today, in occidental countries, its most important mobility crisis: “there isn’t a true city mobility plight, but a level of immobility different from one town to town, one area to the other, one daily period of time to another (...). The time taken to move doubles and the velocity halves, nearing, in many cases, that of a journey on foot !”
1.2 Social changes

This point of view is rightly referable to the “mutation on the general framework of individual and common behaviours” that, in the current mutation of socio-economical aspects, aims to exalt the behaviours based on individual relations modes, able to develop the values of freedom in living space experiences. This system’s mutation, made by the changing from functional to complexity paradigm (from the imitative to the generative/interactive system), refers to mutation of the framework of mobility and its development patterns. Together with the mutations on productive/settlement models, technological models and of people living stiles, it is common the image of a fluid and changeable reality, with an increase importance for borders and micro-realities, where the breaking of roles and categories fosters a more dynamic view of people that live their territory according to no pre-determined frameworks.

Accepting the risks of design process (building a bridge to the future) means avoiding the simplest historical and reduction hypothesis for “back to country living” and/or “self-sufficient community” fostered by the avant-garde environmentalists. Avoiding the closures made by Marxist/physical political hypothesis, design have to promote projects with a mix of tradition and innovation, avoiding top-down processes, promoting the most interaction between systems. The creative sustainable development is made by a partnership of people’s individual behaviours as actors of a shared project toward the “territory of the sustainable complexity”.

The general system becomes the basis for the planning hypothesis of mobility system’s development. Research’s general systems of alternative mobility strategies for the Lombardy territory, as highlighted by Newman and Kenworthy, is made by three macro-ensembles: political, social and economical. (Newman and Kenworthy, 1999)

![Diagram](image)

Figure 1: The diagrams by Newman and Kenworthy made by three macro-ensemble: political, social and economical.

The first one and most important actor of the planning choices of the activities on the territory (rather than functions made by rationalism) drives mobility trends looking to a short term (local legislative bodies) and a long-
term (general legislative bodies) planning political perspectives. General and central legislative bodies lead the planning process with a wide point of view: infrastructures and grid’s projects. Local bodies –as recently pointed by the reform of the road code- drive policies, plans and tools with a closer time of intervention with the aim to “limit and restrain” the out-of-control individual mobility development, fostering actions of restriction and unequal use of the space.

This system, for economical reasons, is drawn as a widespread and multi-functional territory but, on the other side, works for an individual mobility restriction. Development policies foster at high level, wide dynamics of relations made by individual mobility.

Without an alternative transport system, these trends are related to the second ensemble of the general system: social system. Nowadays is possible to read some of the most important transformations in mobility demands at this level of observation. Trends that need a redesign of the general framework of the structures and ways of action of mobility on the territory with the aims of common and socially responsible project process.

The last wide-ensemble, economy, refers to vehicle (automobile in our interpretation of individual mobility) that can be read as one of the least innovative design product on the market: vehicle’s structure, construction processes and mobility strategies at the basis of the product, aren’t changed since the advent of mass production until now.

The change from local economical systems to industrial urban structures made by zoning process, have created the basis for a public and/or individual mobility defined as O/D mobility (origin/destination mobility, made by given trips and times strategy). This model has drawn our urban space and still now drives the research on mobility planning.

Today, in the above-mentioned transformation of territorial dynamics, due to the transition to a society ever more based on communication, information and multi-loci relationship, the premises for a new kind of dynamic mobility defined by Blasi and Padovano, as aimed/wandering mobility could be seen. (Blasi, Padovano, 1998)

Based on the O/D strategies, the aimed mobility is mainly a commuting strategy, as the mobility demand typical of the urban systems is characterized by living and productive settlements organized as polar systems. The best accessibility offer is given by common public or private transport strategies.

The Plan is the framework system for this hypothesis, even thought probably the worst tool for describe a dynamic process (of mobility demands, socio-economical and territorial changes, etc). This kind of instrument is important to avoid the mere qualitative approach -without dates and forecasts-, but shows a weakness where the plan configure itself as a total forecast instrument with a top-down strategy, and a simplification of the decision-making process.

This modelling system don’t include the scenarios developed outward vehicle mobility – as cycling and pedestrian trips into inner-zones mobility- with the related loss of quantity and quality relationships, as most of the links in the inner urban fabric are.
Wandering mobility, on the other hand, is carried out within high activity, congested areas and within the territorial fabric where the advanced and specialized service sectors are common. Private mobility is often a necessity without solution within public transport systems. Related to this approach are all the occasional movements (called un-orderly), that characterize our metropolitan wide-spread territory which are the most important portion of individual mobility.

Figure 2: The diagrams show the transformations in mobility trends: within post-industrial society, mobility demands are mainly based on O/D strategies able to develop only internal relationships (in favour of destination area). This approach tends to dissolve for a more complex relationships on a wider territory. Commuting/wandering mobility becomes wandering/wandering, with an increase in unconventional trips between the less important towns, crossing the main poles. (Nuvolati, 2000)

2 Alternative hypothesis, project strategy

Three are the shared approaches shared by civil engineering and urban planning with the aim of overcoming automobile dependence and for a more sustainable use of the territory (from a social and environmental point of view): a) interventions and actions of technology innovation; b) economy tools and policies; c) urban planning systems.

The first approach aims mainly to technological efficiency and performance of the vehicle, and to traditional and/or innovative energy sources. On the other hand the approach aims also to develop public interventions of management on monitoring, programming and enhancement of the fluxes: intelligent transport systems, IT systems, navigation systems, auto-drive systems for people and goods, etc.

The framework of the second approach are the urban policies. The aim of this approach is for restriction and regulation policies of traffic and parking. They are the so called road and park pricing policies. Politically hard to introduce, this kind of interventions without more structural measures on alternatives to privately-owned mobility of people and goods, tend to produce only restriction measures and policies, mainly felt by the poorest people, and restraints to economic enterprises start up.

With the phrasing “get the poor people off our roads” economist Elmrе Johnson had been the first to underline the risk of social exclusion and the
increase of social gap within a mainly privately owned mobility context, when a hard pricing policy is coming (estimable in 3000-4000 US$ per vehicle, per Year).

This is the main reason for the application of the famous London pricing policy on the urban core only.

Finally the third approach: planning systems. More structured, they are defined as planning strategies (medium-long term perspectives), and monitoring actions and emergencies management as programming strategies (short term perspectives). Instruments and methodology of analysis and evaluation of the interventions are common in both perspectives.

A mixed approach between urban and territorial planning, management, innovation and policy, is the premise for an “urban system” approach (Newmann and Kenworthy, 1999), rather than individual actions made by incremental approach.

Research in the mobility field, as a sum of product design, space design research, socio-environmental policy, needs to assess itself within a multidisciplinary approach, thinking within a multi-modality point of view rather than mere technology and energy efficiency. This is the key to read the future mobility trends. It is the focal point of the general system where the three contexts -political, social and economical- give the terms of the problems into multidisciplinary approach.

As Shostack pointed, product and services can operate simultaneously to create a wider body that overcomes the single specificities. The combination between the two terms, runs to detect a range of relationships that, starting from the simple product, reaches through mixed passages the mere service. Within the diagrams on the European journal of marketing, we’ll find in order, pure service, service with product, service plus product, product/service, product plus service, product with service, pure product. (Shostack, 1982)

Mobility, now, shows itself either as pure product –individual mobility by automobile- or as service with product –every kind of public transport-, notwithstanding the growing complexity of the matter and the tangible lack of experimentations within mid-term strategies.

Looking for an alternative sustainable mobility solution for the metropolitan Milanese area, our choice was pointed to strategies that, moving from the “virtuous” experiences of car sharing, car pooling, smart car projects, and Milan Polytechnic Dual Modules Unit project of modular breakdown, draw a method-project of a new infrastructure as a product/service device: that is the central level of the Shostack’s diagram where product and service have the same weight, with neither prevailing.

Product is the key element to foster more sustainable mobility strategies within wide-territory, to design a mixed solution among car-sharing, car-pooling, public mobility, private mobility, dial a ride services, etc.
3 DOCKING SHARING, toward an innovative strategy for the territorial mobility

The current crisis of the mobility system, mainly emerging in vehicular congestion, take origin from the individual behaviours changes regarding the ways of living. The main international scenarios of territory sustainable development, converge to detect the next future of our urban development within the follows key-points:

1. local dimension of the widespread territory will not depend on patterns of local public transport but upon privately-owned vehicles and with off-centred dial-a-ride social services.
2. the highest weight will be taken by the good’s transport, with an increase of restriction policies
3. a restriction of public space available for binding policies and an increase of the number of circulating vehicles will be observed
4. the most important congestion problems will concern the peri-urban areas (outskirts of the cities) and the short-beam mobility - 50 to 70 km- in respect to metropolitan area.
5. an increasing development of inter-modal areas, equipped for collective use activities.

It seems therefore a priority to focus our attention on the development of a new strategy for extra-urban mobility, considering that such territory will face the most important mobility mutation both in qualitative and quantitative terms.

From the scenario observation emerges a fracture within mobility ways between urban/metropolitan level and extra-urban level: collective transport strategies and restricted access modalities for the first level, no alternative strategy regarding privately-owned mobility on wheels, except a generic enhancement and valorisation of the rail grid within multi-centred territory and a generic dial-a-ride social service devices.

The project of alternative hypotheses will tend to overcome the current crisis and foster, on the basis of similar urban experiences, a mix of product/service devices -vehicle with its innovative supply network- able to answer the specific mobility needs of a wide-spread/extra-urban territory.

Special attention will be given to the aspects of emerging socio-economic mutations that tend to exalt individuality and freedom of movement of the people, without top-down and/or pre-given structures.

The alternative proposed strategy, the DOCKING SHARING, is made on:

1. a mobile person -a driver
2. an innovative micro-car
3. a supply network
4. a shared set of modules (to combine with the main module).

The main module seems a small micro-car, with small dimensions and limited weight. This innovative vehicle respond to the needs of aimed/wandering territorial mobility, characterized by low-density and weak-demand. Thanks to this suitable vehicle –near to the vehicle average occupancy rate- will be hold the door-to-door connections.

Between the various project’s alternatives born by the research, the most bright is base on the partnership with automobile supply system that for their
–commonly- wide sizes and capillary territorial distribution, will be configure as the supplier of a rent system of modules of the DOCKING SHARING system itself. Therefore, will be possible configure a partially transformation, from manufacturer sector (automobile producer) to administrator of a service (the DOCKING SHARING). This configuration is true both for urban level and territorial level, characterized by a great unconventional mobility and wide-spared activities.

At the base of the configuration there are:
1. average vehicle cost reduction made by the reduction of the mass, engine, weight, and internal equipment; reduction of the fuel consumption by the reduction of the engine power and total weight and the resulting reduction of the pollutant emissions;
2. transformation of the automobile sector from product oriented patterns to new production/management/provision patterns of service, with steady market level and position incomes;
3. development of a new kind of car-sharing, with its capillary distribution and territorially nature;
4. economic consumer’s advantages by the use-cost relationship.

Figure 3: General space organisation: public-private-inn/between

3.1 Configuration

The modularity of the two vectors have to be based on a “tractor” vehicle and a “trailer” vehicle that for people transport will be designed as “truck” vehicle, able to unload and lean on the tractor vehicle. Briefly the significant parts of the strategy are:
1. a privately-owned component (the tractor vehicle),
2. a public and/or shared component (the truck vehicle),
3. an inn-between component (the space between the two modules within all the hook-up systems and the space of relation).

The tractor units is made by a vehicle that seems a compact city-car but very different on the matter due to its flexible configuration –far from the unity of the traditional small second car- that permits an every possible patterns related to mobility needs transformations.

The truck module could be configured/equipped as “people” or “goods” vector.
Docking sharing, a new mobility strategy solution

Figure 4: Configuration diagrams of the DOCKING SHARING strategy: from the left, the tractor vehicle – the two vehicle tractor+truck and the two “people” and “goods” possible vectors – components: public space (blue), privately-owned (red), inn-between (yellow).

3.2 Indicators and evaluation of the results

“Occupancy rate”, “pollution reduction”, “costs”, “enhancement of the public space” and “traffic fluidity”, are the five evaluation indicators of the design alternatives. Seems better focus the attention on the last one for its emerged goals related to problem. The fixed border conditions, referred to the Lombardy situation at 2005, are:

1. occupancy vehicle rate: 1,2 pax
2. CO2 emissions / litre of fuel: 2,35 kg (gasoline), 2,60 kg (diesel)
3. average time dedicated to mobility by each mobile person: 1 hour and 12 minutes
4. average distance reached by each mobile person: 27,1 km/day
5. average number of movements: 2,65

3.2.1 Evaluation indicator: traffic fluidity

Civil engineering fixed the fluidity of the traffic as:

1. stopped queue: distance between vehicle < 3 meters
2. queue: distance between vehicle between 3 / 6 meters
3. fluid queue: distance between vehicle between 6 / 12 meters
4. free of flux: distance between vehicle > 12 meters

The evaluation of the proposed strategy is due by the percentage analysis of the vehicle’s flow both at the traffic light cross section and at the common road flow, comparing the proposed DOCKING SHARING mobility strategy with an OPEL ZAFIRA as a kind of ordinary vehicle.

Therefore will be take constant the speed and the distance between vehicle, regardless the acceleration phase.

The distance between vehicles at time of crossing will be assumed at 3 meters (stopped queue), 6 meters (queue), 12 meters (fluid queue), 24 meters (free of flux). The opening time of the traffic light will be assumed at 30 seconds. The average speed will be assumed at 10km/h (stopped queue), 20 km/h (queue), 35 km/h (fluid queue), 50 km/h (free of flux). The outputs are:
stopped queue
traffic light time: 30”, speed 10 km/h, distance 83,5 meters
DOCKING SHARING: 2 + 3 = 5 m - 83,5 m / 5 m = 16,7 vehicles
OPEL ZAFIRA: 4,5 + 3 = 7,5 m - 83,5 m / 7,5 m = 11,13 vehicles
Outcome: + 50,04%

queue
traffic light time: 30”, speed 20 km/h, distance 167 meters
DOCKING SHARING: 2 + 6 = 8 m - 167 m / 8 m = 20,87 vehicles
OPEL ZAFIRA: 4,5 + 6 = 10,5 m - 167 m / 10,5 m = 15,90 vehicles
Outcome: + 31,26%

fluid queue
traffic light time: 30”, speed 35 km/h, distance 300 meters
DOCKING SHARING: 2 + 12 = 14 m - 300 m / 14 m = 21,43 vehicles
OPEL ZAFIRA: 4,5 + 12 = 16,5 m - 300 m / 16,5 m = 18,18 vehicles
Outcome: + 17,88%

free of flux
traffic light time: 30”, speed 50 km/h, distance 417 meters
DOCKING SHARING: 2 + 24 = 26 m - 417 m / 26 m = 16,04 vehicles
OPEL ZAFIRA: 4,5 + 24 = 28,5 m - 417 m / 28,5 m = 14,63 vehicles
Outcome: + 6,64%

and the same for the common road flow as shown at the follow tabel 1.

Table 1: The outcomes made by the common road flows evaluation.

<table>
<thead>
<tr>
<th>stopped queue</th>
<th>queue</th>
<th>fluid queue</th>
<th>free of flux</th>
</tr>
</thead>
<tbody>
<tr>
<td>DOCKING SHARING: 2 + 2,5 = 4,5 meters</td>
<td>DOCKING SHARING: 2 + 6 = 8 meters</td>
<td>DOCKING SHARING: 2 + 12 = 14 meters</td>
<td>DOCKING SHARING: 2 + 24 = 26 meters</td>
</tr>
<tr>
<td>ZAFIRA: 4,5 + 2,5 = 7 meters</td>
<td>ZAFIRA: 4,5 + 6 = 10,5 meters</td>
<td>ZAFIRA: 4,5 + 12 = 16,5 meters</td>
<td>ZAFIRA: 4,5 + 24 = 28,5 meters</td>
</tr>
<tr>
<td>Outcome: + 35,71%</td>
<td>Outcome: + 23,80%</td>
<td>Outcome: + 15,15%</td>
<td>Outcome: + 8,77%</td>
</tr>
</tbody>
</table>

4 Evaluation: conclusion

The mainly outputs of the DOCKING SHARING strategy evaluation are a general enhancement of the traffic flow (between 6,64% and 50,04%), an important restoration amount of the public space for socialization and/or transit policies, the reduction of pollution (every implemented), the reduction of the consumer’s fixed cost, a constant flux of incomes for the new product/supply enterprises.

With an average occupancy rate of 1,2 pax/vehicle, the DOCKING SHARING strategy, is able to attend with the only “tractor” vehicle more than 94% of the movement for the 1+1 configuration hypothesis, and more
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than 98% of the movements for the 1+2 configuration hypothesis. Referring to the Lombardy framework (10,430,566 movements by automobile at 2005) it seems a rate of movements changeable between 625.834 (1+1 configuration) and 208.611 (1+2 configuration).

Dividing these dates by the average number of movements in Lombardy made by each mobile person (2.65) we could obtain an amount of DOCKING SHARING vehicle between 236.164 (1+1 configuration) and 78.721 (1+2) (elaboration by “Indagine O/D Regionale”, Lombardy Region 2002).

On the basis of the car-sharing daily prices (about 40,00€ for an Opel Zafira or similar, for the Milan car-sharing service) we could presuppose a convenient daily price of 20,00€ for each truck rent module, with the following outputs: from 4.729.280€ to 1.574.420€ daily income for the new supply network enterprises.

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ENER Barriers, bottlenecks and potentials for energy savings in households

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1 Point of departure and objectives of the study

The theme of this paper is potentials and barriers for energy saving within households. In Norway electricity is produced by hydropower. That this is a “clean” and cheap production method is well-known “fact” among Norwegian consumers. During the winter of 2003/2004 there was an “energy price crisis” in Norway in the winter of 2003/2004, where the price of electricity spiked due to severe cold, combined with low water levels in the water dams. This leads to a doubling of electricity prices over a relative short time period. This event turned attention to the potential of heat pumps in Norwegian households. Even though it has become something of a truth that you save money on these devices, Norwegian consumers appear reluctant to borrow money to install them. This is the background for a Norwegian study on barriers among consumers to solutions for energy saving that is considered sensible and rational. How can these barriers be understood, explained and finally overcome?

We are inspired by the work of Shove (1998) and Crossley (1983) who both have studied barriers for energy conservation policies. Especially Crossley seems relevant because he addresses the energy barriers on the same level as we do, mainly among individuals and households. Based upon empirical studies, Crossley distinguish between six barriers: 1) Personal predisposition, 2) Living situation, 3) Economic costs, 4) Social costs, 5) Inadequate information and 6) Barriers arising out of structural factors.(Crossley, 1982: 540).

We want to reorganise these barriers from macro- to micro-oriented perspectives; rename some of them; and include the political level as one significant barrier to change. Consumption never took place in an vacuum both within framework create but businesses and political authorities (Stø et al 2004). We propose that there are six types of barriers to energy saving solutions, ranking from macro to micro perspectives:
1. **Physical and structural barriers**: Households are a part of society’s greater general physical structure. The overwhelming majority are connected to electrical, telecom, water and wastewater networks. The degree and character of freedom of actions for individual households are largely dependent on basic historical traditions.

2. **Political barriers**: Politicians create frameworks for household behaviour. They give laws, directives and develop regulations on national and European level. These laws and regulations are set into practice by political authorities. Thus, political authorities determine the potential for change, and freedom of actions for households.

3. **Cultural-normative barriers**: Not all ways of saving energy may comply with the culture you live in. Norway for instance has the world’s highest per capita energy use for lighting; a major contributing factor to this is related to the cultural aesthetics, which relates interior lighting and pools of light and shadow with a cosy atmosphere.

4. **Economic barriers**: Some measures to reduce your household’s energy use will include economic investments. These may give a payback over time, but still they presuppose available economic funds in the household to be set aside for such investments.

5. **Knowledge based barriers**: To overcome barriers individuals need relevant information, or they need information about how to search for such information. In many cases this is not enough, they also have to understand that measures are relevant for their situation and that they may belong to special target groups for energy savings.

6. **Individual-psychological barriers**: Finally we all have our own limits to what we would do to achieve a goal like saving energy, which can have their origin in individual taboos, having their roots in own experiences or upbringing. How information is understood or misunderstood can also a part of this barrier.

The main elements in these barriers will be identified and discussed in an empirical analysis based upon focus groups among various group of households. Especially we will distinguish between ordinary, stable households and households who are in a transition process where they build, rebuild and repair houses and flats, or move from one residence to another. We will identify their windows of opportunities. Thus, the main questions put forward in this paper are:

*What are the strength and relevance for various barriers for change in consumer energy behaviour? Is it possible to identify situations of opportunities and arenas for change among ordinary households? Which degree of freedom has individuals to develop their own strategies to reduce energy consumption?*

2 **Theoretical background of the study**

Within the natural sciences, progress has been made the last decade to measure and model the environmental impact of consumption in general, and related to energy more specifically. Indicators have been developed at the macro level, and a number of LCA studies have been carried out at the micro level for specific products (Frankl and Rubik, 2000; Sonnemann et al. 2000; Heiskanen et al., 2002). There is work remaining in this research field; to
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develop more flexible indicators and to update LCA studies in line with product developments and innovations. LCA studies have so far mainly been relevant for business. A challenge for further development is LCA approaches to sustainable consumption (Loerincik et al., 2005).

The Dutch HOMES project probably represented a breakthrough in the measuring of the environmental impacts of households’ consumption (Noorman and Uiterkamp, 1998). This was done within a household metabolism approach, and the main focus was on direct and indirect energy use. For our project, household energy requirements (Wilting and Biesiot, 1998) and the spatial aspects of housing (van Diepen, 1998) seem relevant.

In the DEEP project the main focus was put on the Environmental Product Information Schemes (Rubik and Frankl, 2005). The future of eco-labelling in Europe was discussed with inputs from LCA studies on the one hand, and consumer behaviour on the other. The main focus in the TOOLSUST project was the potentials of short and long-term changes in consumer behaviour in European cities (Stø et al., 2004). On the one hand the project discussed the degree of freedom for consumer choices within the framework created by local public authorities and businesses; on the other hand substantial contributions were made to model direct and indirect consumption in the cities (Moll et al., 2005, Throne-Holst et al., 2002). This modelling was used as guidelines for the discussion of long-term changes in a back-casting perspective (Throne-Holst et al., 2003).

The contemporary discourse on consumption occurs in a tension between opposing explanatory frameworks of human behaviour and opposing theories about the course of action required in response to environmental problems (Throne-Holst et al., 2007). Regarding human behaviour, the role of the individual and individual rationality is contested. The point of departure might be observations by Giddens (1991, 1994) and Beck (1992) of “modern” consumers or citizens that to a greater extent than before seem to act based on individual choice. The individuality perspective has given rise to a number of attempts to change consumer behaviour through providing information about ecological behaviour (Hobson 2002). Most of these attempts, however, have shown little success. Apparently contradicting the theory of planned behaviour by Ajzen and Fishbein (1977), these studies show that behaviour usually cannot be predicted from individual intentions. Some try to rescue the attitude-behaviour connection by suggesting experimental flaws, and by pointing to the importance of personal norms (Kaiser et al. 1999), while others point to processes of culturalization and socialization (Wilk, 2002) the persistence of habit (Biel; 2003), or to the conditioning of behaviour through technology and infrastructure.

A rather more sophisticated perspective on consumer behaviour is to study consumption practices in the context of everyday life (Gronow and Warde, 2001) with contributions from disciplines like anthropology and sociology. Whereas the rational and reflexive perspective on consumer behaviour requires a strong relation between conscious reasoning and individual action, the daily life perspective emphasise that action and practices are results of routines and habits more than individual active choices. Halkier, building on Giddens and Beck, modifies this and states that in daily life you will find a mixture of rational, intended behaviour and more routine practices, so that “a sharp distinction between reflexive and
routinised consumption practices is impossible to sustain in empirical analysis” (Halkier, 2001, p. 27).

The potential for change will also be discussed in relation to the situations of opportunities. (Svane, 2002) use this theory related to environmental questions, in his work about sustainable housing in the Nordic countries. The main idea behind this theory is that in everyday life it is difficult for consumers to change habits, even if they are well informed and are motivated. However, when people make certain fundamental changes in their life, they are susceptible for changes on other aspects as well. Potential situations of opportunities (or “windows” of opportunities) could be when persons change dwelling, change workplace or occupation, get married or divorced, have children etc. We will study to what degree households actually use such situations to improve the eco-efficiency in their household related to energy use.

Recent Norwegian studies show that consumers to a large degree reduce temperature in rooms that is not in use (75%), and turn off lights when they leave rooms (89%), but only 1/3 of the respondents say that they buy energy saving products and save hot water (TNS-Gallup 2005). Comparative studies show that Norwegian consumers to a smaller degree than consumers in the UK, Italy and The Netherlands save energy in households (Methi et al. 2002) One potential explanation for this is that electricity traditionally has been relatively cheap in Norway so consumers lack economic motivations for savings.

3 Empirical design and methods of the study

The main concepts in the empirical analysis are barriers, potentials and freedom of action for individuals and households. To what degree have households developed strategies to reduce energy consumption from appliances, and how is the relation between real and perceived freedom of action for households?

There are reasons to believe that the real freedom of action for households concerning energy use is at least different from what most of them perceive. We suspect that the real freedom is larger than the perceived. We have carried out four focus groups among households, two of them in Oslo and two in Trondheim, where the situations of opportunities plays an important part. In both places we distinguished between households who plan to move or rebuild their houses or apartments, on the one hand; and more passive households with limited situation of opportunities, on the other. However, the two “passive” focus groups consisted of environmental conscious consumers.

These four focus groups were taken place in Oslo and Trondheim in June 2006, by TNS Gallup. The focus groups had 24 participants, 14 men and 8 women, and had from 4 to 7 members. The data is saved on DVDs and the analysis is based upon these DVDs and observation behind the screen when the focus groups took place.
4 The strength and relevance of the six barriers

Based upon former studies we have identified six potential barriers for radical consumer changes:

- Physical and structural barriers
- Political barriers
- Cultural-normative barriers
- Economic barriers
- Knowledge based barriers
- Individual-psychological barriers

We will first discuss these barriers separately, within the concept of windows of opportunities, before we move to the question of the strength and relevance of each barrier. In the materiel from the focus groups we will also search for other possible barriers or a specification of the existing barriers.

4.1 Physical and structural barriers

“The energy solutions are often fixed when you rent a flat” (Man, 19 years old, environmentalist)

Event though most of the Norwegians own their own flat or house, they very often belong to a collective housing structure. It is difficult to choose individual solutions; you are dependent on collective or cooperative decisions. This can take time, and very often a minority is able to stop or postpone radical energy alternative or solutions. When you rent a flat from an estate company, energy decisions belong to the owners and you have minimal influence. This was confirmed by the focus groups.

However, if it could be possible to move housing cooperative or estate companies to make energy saving decisions, the effect on all flats within the collective would be significant. This means that what seems to be a structural barrier, could turn into a substantial structural advantage, - when the eco-efficient decisions are made.

When you live on the countryside, in your own house, you have more degrees of freedom. But in areas with low density in population, distant heating systems may not be a realistic alternative, the physical barriers seems to be difficult to climb.

One interesting question was raised in the focus group concerning the different between buying new flats and houses on the one hand, and second hand homes on the other. It is worth noting that the windows of opportunities for households seem to be much larger for new houses than for old. Consumers very often limit their possible improvement of old houses and flats to cheque the electrical system and the standard of the windows:

“Not if you are going to buy second hand. You can check if the electricity is according to standards and that the windows are not too old, not more”. (Man, 31 years)

This is a surprising result because the situations of opportunities are multi-dimensional even when you buy old flats and houses. In our focus groups consumers are not aware of, or not willing to use these opportunities.

4.2 Political barriers

“You have to think big. In a way you have to decide politically that what we need is a massive development of alternative wind-power” (Man, 34 years old, environmentalist).
Among the environmentalists in our focus groups the responsibility was clearly placed upon the political authorities. The political system was not really considered as a barrier, but especially the environmentalist were waiting for initiatives, standards and economic stimulations from the political authorities. It is easier to act individually when it is a part of a collective active program. This program has to address both the supply side, - development of green energy - , and the consumption side; - increase the energy efficiency in households.

“It is a concern for the (political) power to decide that it must be cheaper, you know, to build eco-friendly” (Woman, 37 years old, environmentalist)

Nearly all participants in the four focus groups would welcome new initiatives from public institution concerning information and labelling systems. This could be done by governmental authorities or by third party institutions.

4.3 Cultural-normative barriers

“(My dream house) is white, with a minimum of 300 m2, large windows, the view is important, I want to watch the sea. Minimum three sleeping rooms, separate washing room, large living room with open plan kitchen, quite common…. Want a garage around 100 m2 with space for tools and some cars, and I want an office in the second floor” (Man 31 years old)

You will, of course, find various cultural norms among Norwegian households, but one strong tendency is that our home is our castle. There is a large share of homeowners in Norway, and this is culturally rooted. The house creates the framework around family life, hobbies, workplace and the social life. The main norm is that it should be comfortable and large. This is also linked to conspicuous consumption and economic investment, but the strongest norm is that our house creates the possibilities for a living a good life.

The size of the house is one of the strongest cultural barriers against eco-friendly energy solutions. In addition to comfortable and large houses, the focus groups also stress two other aspects that draw our conclusion in the same direction. The dream house is also a single-family house, situated nearly alone in the nature with an excellent sea view. Very few of the participants in the focus group preferred a flat in the city centre.

It is also a surprise that even among the environmentalists the focus upon energy saving systems was nearly totally missing. They were very much concerned about chemicals, gas and the origin of materials.

“I am very much concerned about materials, that they are nor transported around the world to get to me. Avoid varnish of floors, as an example, rather linseed oil, there is a lot of dangerous varnish (Man, 19 years, environmentalist)

However, this does not mean that that is was impossible to trace interests for new eco-friendly technology in the four focus groups. Especially distant heating was wanted by several people, but also heat exchangers and heating control systems was mentioned unasked.

One last question is the relationship between choices and routines. While installation of heat exchangers and control systems are conscious choices, a large number of behaviours within households are more unconscious.
Barriers for energy savings

routines, such as the level of indoor temperature, keeping the light on when you leave a room and not reduce temperature in rooms that you don’t use very often. In Norway this is definitely an important part of the cultural and normative barriers among consumers.

4.4 Economic barriers

“I think that I have to be honest and say that it is a matter of money. If I could save 10 000 NOK to heat our house in one way or another, I think it is a matter of money. If the most environmental friendly alternative is cheaper, I will take that. But if something else is cheaper, I must say that I will choose that.” (Woman, 55 years)

The economic barriers are a multidimensional phenomenon. One obvious economic barrier is the idea that “it costs to act environmentally friendly”. When you choose eco-friendly alternatives it is often more expensive than conventional products. This is the case for organic food and eco-labelled products, - and in some countries: green energy. On the other hand, it is a quite different barrier that you have to invest in eco-friendly technology to earn money in the long run. The focus groups show that consumers have a tendency to mix these two barriers.

However, the main result from this part of the focus groups is that consumers will prefer eco-friendly solutions, - if it doesn’t cost anything. This is confirmed by other studies where the price difference has to be limited in order to make eco-friendly products available for large consumer groups. When the price difference is substantial, it will only attract the small segment of eco-consumers. This seems also to be case for the choice of energy systems.

The other barrier is more complicated, how much is household willing to - or able to - invest in order to save money in the long-term perspective? And what do the mean by long-term perspective?

“But then we have to save money in a 3 –5 years perspective if it should be interesting” (Woman, 31 years old)

The claim to earn money on the investment within 3 –5 years seems not very realistic. It shows that many consumers have a relative short-term perspective on investment in the housing sector. They probably also forget that investment in eco-friendly energy systems will increase the value of the house.

Our main conclusion is that there exists strong economic barriers for investment in new energy systems, and this is also confirmed by the recent public debate on this matter.

4.5 Information barriers

“But I am also a little sceptic to the effort to insulate houses too much, if we are talking about this, because I think it is unhealthy. I think it is an advantage with some cracks or splits and that the wind draws a little some places. (Woman 55 years old)

One element in the individual barriers is knowledge and information, and we have decided to treat this as a special barrier. Consumers need updated and relevant information, and especially they must understand that the information is relevant for their own situation. What seems to be an important lesson is that consumers not only need information on what to do
and how to do it when it comes to energy saving. They also need to learn when investments and modifications of dwelling can or should be done.

We are talking about a relative complicated technological message that can confuse consumers. In addition the message are talking about different aspects on the same time: insulation, heat exchangers, ventilation and temperature level. The public discourse on energy saving also makes the tools and goals complex.

On the other hand, many of the campaigns don’t reach the receiver because of stress and timing of the message. However, we have experienced that a surprisingly large number of household did react on the offer for economic support to buy heat exchanger in 2003. But at the same time, the message did not reach many potential households. They either didn’t know about the opportunities at all, or they didn’t realise that it was relevant for them.

One way to overcome the information barriers is to continue the work with labelling systems. Both the mandatory European energy label system, The Blue Angel in Germany and the Nordic eco-label, The White Swan have experienced reasonable successes in the market of consumer goods (Rubik and Frankly 2005).

4.6 Individual-psychological barriers

With this barrier we mean that in addition to the more economic and sociological perspectives described in the four other barriers, it is also possible to trace individual and psychological barriers to energy saving among consumers. This it not a very strong tendency in our material, and it is linked to personal hang-ups, often beyond rational argumentations. This also means that traditional information will have problems to change attitudes and behaviour among these consumers.

One example is attitudes towards eco-labelling. Two of the participants in the focus groups where convinced that the Nordic Swan was a fake. The consumer were cheated by the labelling scheme because the industry could only buy the label, it meant nothing for the environment.

One other participant would never in his life live in houses with a cellar, because of “the characteristic, unpleasant smell from basements”. Some participants preferred houses build on bricks instead of wooden material, while others were of the opposite opinion. There will always be personal hang-ups, but they play no substantial part in the focus groups.

5 Concluding remarks

The main objective in this article is the relevance and strengths of various barriers for change and the situations of opportunities for households. The study is based upon four focus groups; two among household who have just moved or are planning to move in the near future and two among households without such active plans.

The situation of opportunities for radical change in energy consumption is much stronger among the active households in the first group than among households in the more “passive” group. When people move, or plan to move, they rethink their economic situation and their energy consumption; households without such plans seem to lack incentives to question their own use of energy. It is also worth noting that the windows of opportunities
Barriers for energy savings

seemed to be larger when you move to a new house than when you move to an old house or flat.

We identified six barriers for energy change: Physical and structural barriers, Political barriers, Cultural-normative barriers, Economic barriers, Knowledge based barriers and Individual-psychological barriers. The two first and the last of these barriers seemed not relevant among the participations in the focus groups or they were not very strongly articulated. However, in addition to the cultural and economic barriers we also found strong elements of an information barrier in our material. Of the barriers sensible to energy solutions, we find the following three to be the most important:

- **Cultural**: When our participants were asked to describe their ideal house, size was a dominant feature. The visions of the good life are closely connected to big, flexible and well-equipped homes. It is viewed positively to realise optimal adjustments between work- and family lives, hobbies and interest, and in addition an extensive social life. The degree of freedom is limited by strong cultural norms.

- **Economic**: Our main conclusion is that there exists strong economic barriers for investment in new energy systems, and this is also confirmed by the recent public debate on this matter. The consumers who participated in our study wanted a short payback time on their investments, typically 3 to 5 years. The increased wealth of the Norwegian population is manifested in ever increasing area of houses and flats. This is also a part of an international trend, for instance “the Mac Mansions” discussed in the US. Households have probably greater degree of economic freedom then they are aware of.

- **Information**: The consumers not only need information on what and how to save energy, but also help in identifying when they should do their investments. This is a real challenge for political authorities and NGOs concerned about energy savings.
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Barriers for energy savings


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ENER Understanding strategic choices for sustainable consumption: the case of residential energy supply

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1 Introduction

Increasing evidence of climate change, high levels of energy import dependence, rising oil and gas prices, and concerns about the depletion of resources have created a renewed sense of urgency with regard to energy issues. There are many reasons to believe that the world will see radical changes in the energy sector in this century. Eighty percent of today’s energy supply is based on fossil fuels. There are two basic pillars of a sustainable development in the global energy sector: Energy efficiency and substitution of fossil fuels. While there is wide agreement that significant increases in energy efficiency are necessary, there is also reason to believe that it will probably not be sufficient. Increasing substitution of fossil fuels by renewable energy sources will be an indispensable element of a sustainable energy future.

Heating and electricity supply for households accounts for about 25 percents of the total (direct and indirect) non-renewable primary energy consumption of an inhabitant of Switzerland (cf. Kaenzig and Jolliet, 2006). One vision of future energy systems is based on an increasingly decentralized supply of heat and electricity in small-scale systems that are installed on the individual building level, which we refer to as micropower. Micropower includes systems that provide electricity (such as photovoltaics), heat (such as wood pellet stoves, heat pumps, or solar thermal collectors) or both heat and electricity (micro-CHP, either based on natural gas or biomass). The focus of this paper is on micropower systems that have a lower environmental impact than conventional technology, which tends to be oil heating and the electricity mix from the grid in most European countries. While the technological potential of micropower has been widely acknowledged and some policies are explicitly trying to support this market, the market adoption of micropower systems ultimately depends on a large number of customer decisions to buy them. Compared to other aspects of
micropower, research on customer preferences and acceptance is a relatively underdeveloped stream of research (Wüstenhagen, Wolsink, Bürer, 2007). This paper reports on results of a qualitative empirical survey of customer preferences for micropower systems in Switzerland. It aims at answering the following research questions:

1. What are the attitudes of Swiss residential customers towards various micropower alternatives and which attributes of the micropower systems are most relevant for buying decisions?
2. Who else plays an important role in the decision process for or against micropower systems, and what are the most relevant sources of information for preparing buying decisions?
3. What are important motivating and hindering factors for the adoption of environmentally favourable micropower by house owners?

2 Account of the state of research in the field

2.1 Scope

The first objective of this paper is to determine how consumers choose a new micropower system. There is an important body of literature on behavioural change related to environmental and sustainability issues, energy investment decisions, energy efficiency measures, diffusion of eco-innovation and micropower. Various disciplines present models of decision-making such as environmental psychology, behavioural economics and sociological approaches. They can all provide insights for the present research on consumer preferences of micropower alternatives. It is not the aim of this article to provide a comprehensive overview on all theoretical fields. The literature following review section attempts to integrate different theoretical backgrounds by reviewing publications which provide insights that are of direct relevance for the research presented in this article.

2.2 Sustainable consumption and behavioural change

Jackson (2005) undertook a review of research on drivers and barriers for sustainable consumption in order to improve the use of existing research and evidence in policymaking. He highlights important lessons on modern consumption: the huge variety of different social and psychological roles that consumer goods can play in modern society. Consumption satisfies needs but material artefacts also play important symbolic roles in our lives (e.g. a new sports car, teddy bear etc.). Another important lesson from the literature according to Jackson (2005) is that consumers are far from being able to exercise free choice about what to consume and what not to consume. Reasons are economic constraints, institutional barriers, or inequalities in access that actively encourage unsustainable behaviours. Habits can also constitute barriers for sustainable consumption patterns. It is important to understand that individual choice is continually tempered by social constraints and sometimes consumers act through instinct, emotion or habit rather than reason. Theses are some reasons to search for a model that overcomes the limitations of the "rational choice" model, which assumes consumers close to homo oeconomicus calculating individual costs and benefits to choose between options and in order to maximize utility. It is also
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the challenge of this article to identify heuristics that consumers employ to make decisions and to identify barriers. According to Jackson (2005) it is important to take into account that different behaviours carry varying degrees of moral sanction, that pro-environmental behaviours are not always motivated by altruistic concerns, and that awareness in itself is not enough to foster pro-environmental behaviour. Jackson sees behaviour in any particular situation as a function partly of attitudes and intentions, partly of habitual responses, and partly of the situational constraints and conditions under which people operate.

McKenzie-Mohr (2000) also claims that a variety of studies have established that enhancing knowledge and creating supportive attitudes often has little or no impact upon behaviour. Policies assuming a "rational consumer choice" and providing information and price signals proved to have only limited success in changing unsustainable behaviours. McKenzie (2000) presents community-based social marketing as an attractive alternative to information-intensive campaigns. Community-based social marketing is composed of four steps: (1) uncovering barriers to behaviours and then, based upon this information, (2) selecting which behaviour to promote; (3) designing a program to overcome the barriers to the selected behaviour, piloting the program; and then (4) evaluating it once it is broadly implemented (McKenzie-Mohr and Smith, 1999). To identify barriers, social marketers often identify differences between individuals who engage in the activity and those who do not. To uncover these differences, several research methods can be utilized including focus groups, observational studies, and survey research (McKenzie-Mohr, 2000). The research presented in this article follows these recommendations to a large extent.

2.3 Energy investment decisions and barriers to energy innovation

Long-term energy investment decisions, such as buying a new heating system for a residential building, occur very few times in a person’s life and imply important initial investments as well as costs during use. Kempton et al. (1992) found that in general it is easier to achieve one-time changes in behaviour than to alter and maintain repetitive behaviour changes.

There are few investment decisions that can be compared to micropower purchases but building-related energy efficiency measures represent an interesting case for comparison because both imply important investments, rather low involvement, a time horizon of several decades and they concern target groups within the residential sector. Ott et al. (2005) analyzed the potential of energy efficiency measures in residential buildings in Switzerland. Decisions about energy efficiency are often taken in the context of a renewal or refurbishment of a building. In the case of rental apartments, they are often associated with a rise of the rent in contrast to status quo maintenance. Ott et al. (2005) characterizes building owners and their behaviour with regard to renewal, refurbishment and status quo maintenance of houses. As far as decisions about measures related to the building envelope are concerned, 50% of house owners choose the measures on their own and then hire a contractor, 30% of house owners ask a company to suggest measures and few house owners hire an architect or energy consulting company. Similarly to the findings of the research presented in
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this article, Ott et al. (2005) state that house owners normally consider companies that already worked on the house before (60%). In 30% of all cases, building owners consider companies recommended by relatives or friends and in 13% trade fairs are determining the choice of the company. Ott et al. (2005) do not consider the professional background to be relevant as far as the amount and nature of renewal and refurbishment are concerned. Pehnt et al. (2005) as well as focus groups and the survey conducted for this study indicate that the professional background does play a role as far as the choice of specific micropower products is concerned.

Wittmann et al. (2006) describe a bounded rationality model of private energy investment decisions which aims to explain and uncover how best to overcome apparent barriers to energy efficiency investment. They explain the existence of barriers by applying three different frameworks (cf. Table 1): neoclassical, behavioural economics and institutional economics (Sorell et al., 2000). As pointed out by Weber (1997) each barrier implies economic, behavioural and institutional aspects, however taking the three perspectives enables to highlight particular aspects of the complex energy investment context.

Table 1: Theoretical perspectives on barriers to energy efficiency investment
(source: Wittmann et al., 2006).

<table>
<thead>
<tr>
<th>Perspective</th>
<th>Issue</th>
<th>Actors</th>
</tr>
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<tbody>
<tr>
<td>Neoclassical</td>
<td>Imperfect information,</td>
<td>Individuals and organizations</td>
</tr>
<tr>
<td></td>
<td>asymmetric information hidden</td>
<td>conceived as rational and utility</td>
</tr>
<tr>
<td></td>
<td>cost and risk. heterogeneity</td>
<td>maximizing</td>
</tr>
<tr>
<td>Behavioural</td>
<td>Inability to gather and process information, format of</td>
<td>Individuals conceived as boundedly rational, who apply identifiable rules</td>
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<tr>
<td></td>
<td>information, trust, status quo bias</td>
<td>and heuristics to decision making</td>
</tr>
<tr>
<td>Institutional</td>
<td>Organizational culture,</td>
<td>Organizations conceived of as social systems influenced by goals, routines,</td>
</tr>
<tr>
<td></td>
<td>management time and attention</td>
<td>internal culture, power structures, etc.</td>
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Wittmann et al. (2006) state that more work is needed to validate the assumed actor and consumer types used in their analysis. They suggest that this may comprise computer assisted telephone interviews, focus group discussions and/or questionnaire surveys in order to better understand how house owners and managers make energy investment decisions. That is exactly one of the research gaps this article addresses.

Diffusion of innovation theory, another interesting conceptual perspective for this research (cf. Figure 1), has been applied by Faiers and Neame (2006) to identify attitudes towards attributes of domestic solar energy systems.
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They surveyed a group of 100 "early adopters" and a group of 1000 previous adopters of other types of energy efficiency measures who were classified as "early majority" with regard to solar energy. They found that although the group "early majority" demonstrates a positive perception of the environmental characteristics of solar energy, its financial, economic and aesthetic characteristics are limiting adoption. They state that if consumers cannot identify the relative advantage of solar energy over their current sources of energy, which is supplied readily and cheaply, it is unlikely that adoption will follow. Laroche et al. (2001) provide examples where Rogers' adopter categories do not fit and Pedersen (2000) and Bilharz (2005) point out inconsistencies between "green" consumption areas, showing that individuals' purchasing behaviour is not predictable between "eco-products". Bilharz (2005) for instance depicts that "power has no vitamins" when comparing marketing for green power products and marketing for organic food. The conclusion for the present study is that products with very different characteristics such as various micropower systems have to be considered separately and that findings for one system can not be transferred without careful checking for differences.

Combined heat and power (CHP) units were studied and compared to other micropower options by Pehnt et al. (2006). They addressed consumer preferences using focus groups. Participants were recruited among early adopters taking part in a field test of CHP-units based on fuel cell technology. The project titled "Transformation and Innovation in Power Systems" (TIPS) provides an extensive literature review on micropower customers (Pehnt, 2006, chapter 6). Several studies were identified which dealt with consumer aspects (Haas et al., 1999, Karsten, 1998, Rohracher et al, 1997, Genennig and Hoffmann, 1996, Hackstock et al., 1992). The technologies investigated on the heat side are small biomass plants and solar thermal collectors which tend to attract “Do-It-Yourself” customers with technical know-how. On the electricity side, most studies focus on photovoltaic, whose high-tech image attracts persons with higher education and income. The geographical focus of the studies is Germany and Austria.
3 Research methods

This paper reports on the preliminary results of a Swiss three-year research project on micropower in residential buildings. The consumer research part of this project uses focus group research, personal interviews and a survey. It aims at identifying barriers and motivating factors for micropower products and services and establishing a model of decision-making.

At this point nine focus groups (with a total of 48 participants) and 12 individual interviews have been conducted and analyzed. Seven focus groups were conducted between November 2005 and October 2006 with residential building owners and a few tenants, one of which included only female participants to explore gender differences. Two focus groups were conducted with professionals, such as architects and installers. While our empirical focus is on Switzerland (particularly the cities of St. Gallen and Lausanne), one of the focus groups with professionals was conducted in Germany for comparison. In addition to the group discussion, focus group participants were asked to fill in a short questionnaire on residential energy systems at the beginning of the session, and to fill in a lifestyle segmentation questionnaire at the end of the session. These two survey elements were also extended to a sample of owners of solar thermal collectors (34 homeowners). The questionnaire was also applied to a sample of 20 students. In sum, our database includes more than 100 responses (for both the residential energy system and lifestyle segmentation questionnaires).

Focus groups, moderated group discussions around a given topic, have been widely used in marketing for various consumer goods (Morgan, 1996, Krueger, 2000, and Fern, 2002). Research in the area of sustainable energy has only recently discovered this method, e.g. focus groups are found in research by social psychologists or scholars in science and technology studies on consumer preferences for green electricity (Wortmann, 1996, Truffer, Bruppacher, Behringer, 2001) or in the design of electricity disclosure labels (Tutt and Davis, 1998, Markard and Holt, 2003). An advantage of focus groups is that they provide information about emerging customer preferences for micropower systems, and also on the interactions between various consumers as they form their attitudes and opinions towards new innovative micropower technologies. When using attitudes for the elaboration of recommendations the attitude-behaviour consistency needs to be checked. Consumers often do not behave consistently with their attitudes for several reasons (Perner, 2004): Ability (he or she may be unable to do so), competing demands for resources, social influence, and measurement problems. Another difficulty for measuring attitudes is that consumers tend to give socially desired answers when asked about their preferences by a market researcher. Thus, one of the challenges is to distinguish stated and true attitudes and to uncover true attitudes by careful investigation. This is why we complemented the focus group discussions by a questionnaire with open and structured questions related to the topics of the focus group. On the one hand the complementary questionnaire allows for analysis of individual preferences and might be less biased by socially desired answers. On the other hand the questionnaire provides an opportunity to ask similar questions in a slightly different way and to check for consistency between answers. This two-folded approach – considering the group and also the individual level – allows for a consistency check between written and oral statements.
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Normally focus group results do not provide for representativeness, but by determining the lifestyle segment for every respondent, we have a robust indicator for possible biases. Using the Sinus lifestyle segmentation typology\(^1\) has been a pragmatic choice. While the theoretical foundation of lifestyle segmentation typologies leaves room for improvement, Sinus lifestyle segments have proven their relevance in several domains such as TV-advertisement, marketing for consumer products and financial services, etc. In future work, we intend to complement our qualitative research with a more quantitative investigation to uncover e.g. price elasticities and willingness to pay for certain micropower attributes (e.g. fuel type, guarantee, brand, eco-label).

4 Empirical results: understanding the micropower customer

4.1 Research context

The analysis of consumer attitudes reveals a wide variety of preferences among customers and important differences between countries. Results are compared to those of similar focus group research carried out in Germany (Pehnt et al., 2006). Cultural and policy context, barriers and incentives are country specific. This partly explains for instance huge differences in market penetration of heat pumps in Switzerland and Germany. In Switzerland heat pumps achieved 20 per cent market share in existing buildings and were being built into 72 per cent of all new single family houses in 2005 (FWS, 2006), but only 3.4 per cent in Germany (BDH, 2006).

4.2 Barriers for micropower purchases

Knowledge on micropower systems is limited. Presuming that there has probably been some self-selection bias during the recruitment of the focus groups, we must assume that participants were more interested than the overall population, and average knowledge might even be lower. Customer unawareness about renewable energy systems is one of the most important hindering factors. Most of our focus group participants knew only oil and gas based heating systems and heat pumps. Some mention solar, but cannot distinguish between solar thermal and photovoltaics. Wood pellets are not widely known. Very few mention micro-CHP, and almost nobody can explain how combined heat and power works. Therefore we concur with similar market research that has been done in the US (Keane, 2006) that there is a major lack of knowledge when it comes to understanding clean energy, and that this may constitute a serious barrier to market penetration of micropower. Another hindering factor for micro-CHP and photovoltaics in Switzerland is the considerable administrative effort in order to get the permission to sell and feed electricity into the grid. An important conclusion for power supply is that people do not really think about electricity. For most of our focus group participants, the electricity supply appeared to be convenient as it is today.

\(^{1}\) cf. www.sinus-sociovision.de
4.3 Attitudes: beliefs, affects and behavioural intentions

In this chapter insight into focus groups research is provided by looking at different statements of participants. Focus groups started with open questions such as: What do you associate with heating and power production systems in residential buildings? Participants were asked to write down and answer quickly in order to capture the most familiar and the most deeply rooted associations. An example of a cumulated association chain is the following:

Dependence from foreign countries, pollution, greenhouse effect, basic need, failure, comfort, price, wood, electricity, nuclear (a lot), hydropower (less), gas (even less) ... solar (nothing), heating oil (business as usual), wood (old fashioned and modern furnaces, local), electricity grid, hydropower in the mountains, service, network, local production, cogeneration etc..

Some citations for illustration:

L5 (engineer, 30): My father didn't want solar thermal panels; he said that would waste the aesthetics of the building. L3 (researcher, 35): But this is very subjective, it is a question of fashion.

L3 (researcher, 35): I am a tenant; I can't influence the heating system at all.

Many statements suggested that oil is no longer a socially accepted energy source for heating in Switzerland. Many focus group participants using heating oil almost apologized for it. However architects did not experience this in their daily business. By contrast, natural gas has a surprisingly positive image as an efficient and clean energy source.

Many participants said they could imagine to use district heating or to share a heating system with neighbours. In terms of who would be an appropriate supplier for heat, most home owners expressed more trust in a governmental organization (such as the municipal utility) than in private companies. Sharing the heating system with neighbours is perceived as risky and potentially problematic, especially when the initial partner moves out and contracts need to be renewed with new neighbours.

Asked about their preferences for green electricity, many participants were quite critical, pointing to the importance of eco-labelling and independent verification (Truffer, Markard and Wüstenhagen, 2001).

L16: Why should I pay more for green electricity from hydropower for instance and basically get the same as everyone else? I mean who guarantees that the surplus I pay is really used to promote renewable energy production?

4.4 Decision-making process – Information and buying habits

In the Northern hemisphere heating and electricity is used for almost all human activities at home, from nutrition to hot water for personal hygiene. In Switzerland consumers spend about 360 Euro for heating supply and 250 Euro for electricity per capita every year (Swiss Federal Statistical Office, 2003). Together this makes up for about 2.5 per cent of the average budget per capita; in other European countries this share is higher (Eurostat, 2001).

Consumer research studies how people make choices regarding a variety of products. Typically consumer research uncovers decision schemes that
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consumers routinely use to make choices and tends to generalize the populations relevant to the specific applications. In this paper we are interested in how house owners make choices among different micropower products and services. The focus is on house owners and on buying decisions concerning heating and electricity. To analyze individual decision-making various disciplines present models. For this article the general model of consumer behaviour from Hawkins et al. (2006) was taken as a starting point and then specified and adapted to the case of micropower purchases. Important actors and factors for the decision-making process were identified (cf. Figure 2).

![Specific model of consumer behaviour with regard to micropower](image)

Figure 2: Specific model of consumer behaviour with regard to micropower

According to the model, needs and desires drive an individual’s purchase behaviour. Needs and desires are influenced by each person’s self-concept, which in turn, is formed by internal and external influences in that person’s life, i.e., attitudes, values and emotions. They are determined by numerous actors such as friends, neighbours, family, marketing campaigns, etc. As we gain life experiences our self-concept and lifestyle change based on what we have learned. Acquaintance, friends with experience in the field, family members and neighbours seem to have an important influence on the self-concept of the persons that participated in the focus groups or have been interviewed. The determination of social milieus aims at capturing a part of the self-concept of respondents.

Needs and desires in regards to micropower systems could be a convenient room temperature, hot water. They can be partly determined by looking at attributes of micropower systems relevant for consumers presented in the following section. As far as the purchase behaviour is concerned, several steps can be differentiated. The first step is the problem recognition. As stated by many installers and energy consultants participating in the focus groups and interviews, it must be distinguished
between new buildings and owners of existing houses. In the planning phase of new buildings, almost all kinds of micropower system can be considered while refurbishing of existing buildings implies some constraints and is more complicated. For instance a replacement of an existing radiator heating system by a heating system using heater mat entails heavy reconstruction activities. The availability of gas supply or not is also an important aspect. In Swiss cities gas is widely present and most architects even don’t consider other systems and fuels when gas is available. The thermal quality of existing buildings determines the amount of heat required and therefore the size of the heating system. Additional system components such as solar thermal systems for hot water and photovoltaic panels are less complicated to install on existing buildings than central heating and combined heat and power units.

For the analysis of information and buying decisions the available time for the second step towards the purchase, the information search, is of relevance. Information sources mentioned in focus groups and interviews range from neighbours, friends, family, colleague from work, fairs, and independent energy consultants to commercial companies (cf. Figure 3)

![Figure 3: Information sources influencing the buying decision for micropower (numbers in brackets indicate frequency of consideration of the specific source, N=23).](image)

The analysis of statements of 23 Swiss house owners and 4 tenants shows that the most frequently considered sources of information for preparing buying decisions are trade fairs, companies and installers, friends, colleagues, and neighbours, municipal utilities and public energy information centres. Internet sources are commonly used by younger persons. Asking for the perceived reliability of information sources, it is striking that municipal utilities and public energy information centres appear to be by far the most trusted sources. On the other hand, architects and professional journals are also seen as relatively important sources of information, but people perceive information provided by them as less reliable. Several participants around 30 years old stated that they tried to
influence the choices of their parents as far as micropower systems are concerned. The majority did not succeed and parents bought the same system as they already had before.

Analysis of information habits of house owners for the purchase of a solar thermal installation reveals different behavioural patterns. Trade fairs are less frequently considered and public energy centres as well as private energy consultants more frequently. As solar thermal panels are visible for all neighbours one could assume that neighbours are information sources. However only 5 out of 32 owners of a domestic solar thermal installation attributes the neighbour a certain influence on his purchasing decision. Furthermore they consider the reliability of the information provided by neighbours as lower than the information from any other source. It can also be stated that owners of a solar thermal installation have a higher knowledge as far as energy issues are concerned; they can name more types of micropower systems and options for electricity production than house owners without solar thermal installation.

In the case of a failure of the heating system in cold days when heating is a constant need, the available time for the information search is very short and customers will tend to buy the new version of the product they had before and they know. Another reason for the replacement of a central heating system and a combined heat and power unit is the non-compliance with regulation and norms as they get older. In this situation there is no immediate constraint to change the system rapidly as in the case of the failure where people need a new system in order to get warm. If the reason for a replacement is a desire for a new technology with certain attributes, the available time for the decision making process increases. But even in these cases the decision process is rather short.

Summarizing it can be stated that many focus group participants expressed a clear wish for an independent energy information centre (such as a regional energy agency). Fairs did not really satisfy consumers.

L4 (former caretaker, 75): If you go to Living&Gardening (fair) you get a dozen of offers and it's a fight, you don't know what to do, how to do it. There are thermal solar panels, different heating system, you check gas - it's a jungle and I don't know what to choose, what to do and in which direction to start.

As a third step of purchase behaviour, customers evaluate a smaller set of alternatives. According to participants in our focus groups with energy professionals, customers rarely look for more than two offers from micropower system vendors. An important finding is that the evaluation process at this stage typically does not only involve different heating (and possibly power) systems, but that these investments compete with other, more visible, building-related investments:

S29 (architect, 35): And then they look at their budget and suddenly it's not just a matter of "oil heating or heat pump?", but a matter of "shouldn't I rather stick to the cheaper heating and spend the extra money on these fancy kitchen features"?

According to installers, vendors and architects that were interviewed or participated in focus groups, the consultation process often coincides with the selection process, the fourth step of purchase behaviour. This implies that selection normally does not take more than one to three hours and that customers easily accept the propositions of the vendor or the architect. This
is a major difference to the long selection process in the case of buying a new car for instance, a product with a shorter lifetime than micropower systems and a somewhat higher price. Heating systems evoke mainly functional expectations and their potential for emotional marketing has only been marginally explored in comparison to cars. Therefore micropower products and services should not be considered high involvement products although the initial investment and the operating costs are high. Our focus groups provided evidence for a low level of awareness of energy-related costs. For example, participants were typically unable to give accurate estimates of their heating and electricity cost per annum.

Experiences during the fifth and the sixth step of purchasing behaviour, use and post purchase evaluation have a high influence on the next micropower system buying decision. Several participants reported their experiences and outlined the consequences for their next purchase. Positive experiences are a strong predictor that customers will consider the same vendor and/or brand next time, whilst negative experiences increase the chances of competitors to sell their product.

4.5 Attributes of micropower systems relevant to customers

In this section relevant product attributes of micropower systems with regard to consumers’ buying decisions are listed and ranked.

We tested different procedures to identify the most relevant attributes of micropower systems in the focus groups conducted with home owners. In seven focus groups a questionnaire was distributed and filled out at two points of time during the session. To capture the uninfluenced attributes in the beginning, participants had to list their expectation towards a micropower system when they arrived even before the start of the discussion. Towards the end of the discussion, they were asked to name the system they would buy, if they had to buy a system within the next week. Immediately thereafter, they were asked to list advantages and disadvantages of the chosen system. This procedure aims to avoid bias due to higher or lower social acceptance of certain attitudes. It is assumed that their could be a inconsistency between stated preferences for single attributes and real preferences when choosing and counterbalancing all the different attributes of a micropower system, analogous to the inconsistency between environmental awareness and environmental behaviour.

In all focus groups, cost was the attribute that was mentioned by most of the participants. Additionally it has been chosen the most important attribute by many participants. Installers believe that private customers do not calculate lifecycle cost, taking into account operating costs, but that instead they are very much focussed on upfront cost of the micropower system. While several of the residential customers argued that environmental aspects are an important attribute for their buying decision, the four installers in the German focus group perceived the opposite, namely that environmental aspects do not play an important role when it comes to taking actual buying decisions. Swiss installers and architects believe that environmental considerations matter for some customers. According to installers, the choice of the company or the installer by customers is based on recommendations by other persons. Additionally customers may prefer local installers, because
they assume that in case of problems with the micropower system, it might be fixed more rapidly.

When comparing the presented attributes to findings of Pehnt et al. (2006), who surveyed pioneering customers participating in a fuel cell field test in Germany, we find that there are both similarities and differences. In Pehnt et al.'s sample of pioneers, reliability was mentioned as the most important attribute of micropower systems, which was less explicitly stated in our focus groups. However, several respondents alluded to the inconveniences that a failure of their heating system on a cold winter day would cause, therefore indirectly pointing to the importance of reliability. Environmental aspects such as energy efficiency, low pollution and climate protection were ranked highly in the fuel cell survey as well as in our sample. A remarkable difference is that the German pioneer customers surveyed by Pehnt et al. explicitly stated that low operation costs were very important for them, while low capital costs was considered significantly less important. This might indicate an interesting difference between the innovators, who actually consider costs more comprehensively over the lifecycle of the micropower system, and the mainstream consumers in our sample, who are primarily concerned with upfront cost. The same tendency can be observed with owners of solar thermal installations. However most of them do not seem to be able to discount upfront and operating costs. They more or less assume that their system is economically viable as operating costs are lower; others believe that full costs of solar thermal installations are higher and it does not pay back at the moment. For this reason the discount rate was not considered to have a significant influence on the buying decision of private house owners. If these preliminary results hold true, then full cost computations should show in future quantitative analysis as an interesting differentiating element between early and later target segments. It would also indicate that new financing solutions that would lower upfront cost might be effective for mainstream consumers, but less so for pioneers.

Findings from focus groups and interviews about most important attributes of micropower can be categorized into four general goals that consumers are willing to achieve when buying micropower products and services: Minimizing costs, maximizing comfort and maximizing prestige or social credit. In contrast to other studies (e.g. Wittmann et al., 2006), achieving environmental improvements or doing good for the environment is not considered as a goal itself but rather as a mean to achieve social credit.

5 Preliminary conclusions and outlook

In this final chapter we summarize findings of focus groups, interviews and the survey about consumer behaviour and preferences for micropower products and services. It also contains an outlook on potential target groups and segmentation approaches that could help to pave the way of

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2 In contrast Wittmann et al. (2006) consider investment, pay-back period, discount factors and the net present value in their bounded rationality model of private energy investment decisions.

3 Bettman et al. (1998) suggest a general framework for decision making contexts. They describe four meta-goals: maximizing accuracy, minimizing effort, maximizing ease of justification, and minimizing negative emotions.
environmentally favourable micropower from niche to mass market. Understanding the decision-making process for new micropower systems might allow for more effective intervention for the promotion of environmentally favourable micropower.

Focus groups showed that average Swiss customers are relatively uninformed about aspects of heating supply of their homes, and are even less informed about aspects of electricity supply. The connection between heating and electricity is rarely made, which may constitute a strong barrier to diffusion of micro CHP systems. Among different micropower systems, heat pumps and solar thermal collectors are relatively popular in Switzerland, while micro-CHP technologies are less present in customers' minds and their value proposition is not immediately clear to many of them. Pioneers such as owners of a solar thermal installation are better informed about energy related issues than house owners with conventional heating systems. Technical professions are significantly overrepresented among owners of solar thermal installations.

Buying decision processes and criteria for heating systems differ between two typical situations, namely an emergency replacement of the existing boiler, and a more planned search for a new system (mainly in the case of new buildings, but to some extent also in the refurbishment market). In emergency replacements customers tend to be conservative and often choose the same system as before. The new building market is a more promising route for innovative micropower systems. However environmentally conscious consumers are very interesting also within the much larger refurbishment market. Concerning the influence of the available time for the decision-making process it can be taken as a working hypothesis: the more time available for the search of a new system the higher the chances that an environmentally favourable micropower option is chosen.

Fairs, installers, and architects are the most frequently solicited sources of information before a purchase of a new micropower system. Interestingly this ranking does not correspond to the list of the most reliable sources of information for micropower where public information centres figure on top, followed by municipal utilities, and installers only on the third position. Architects and installers play a key role in influencing buying decisions, and many homeowners expressed their preference for getting independent advice in their decision process (e.g. by regional energy agencies). However architects that are not interested in sustainable development don't seem to be willing to invest additional time in the evaluation of alternative micropower systems. For example they reported not being interested in a tool that would help them to rapidly calculate total costs.

Enablers for environmentally favourable micropower systems are environmentally active or "green" consumers, architects and installers or sometimes painters and plumbers. Consumers as well as architects and installers whose latent willingness to consider environmental aspects can be evoked could be targeted to move further on the way from niche to mass market.

The present research confirms that segmentation based on professions might be an interesting approach as it offers potential for direct marketing also for small companies. Combining focus group research with questionnaires and lifestyle segmentation is interesting for several reasons. On the one hand it allows for checking the representativeness of the sample
Understanding strategic choices for sustainable consumption: the case of residential energy supply

and on the other hand there is a lot of general information about consumers available for each milieu. For instance the distribution of households possessing a mortgage as well as the distribution of the population watching all the different broadcasts is publicly available. Although the sample at the basis of this research is small it seems to uncover different relative attractiveness of solar thermal installations for specific lifestyle milieus (Post-materialistic and status oriented milieus are clearly overrepresented).

This article is based on a three years SCP-research project titled “Micropower in residential buildings - an integrated analysis of consumer preferences, marketing strategies and emerging business models”. The authors are grateful for funding of the Swiss National Research Programme "Sustainable Development of the Built Environment" (NRP 54).

6 References


ENER Informative ambiance: a design process

With a case on the application and communication of this project in Bologna, Italy

James Ennis

Light¹ noun: 1° the energy that stimulates the sense of sight and makes things visible.
Light² adjective: 1° having little weight.
(Oxford paperback, 1995)

1 Introduction

Light as media! A lighter sense.
A territorial service for citizens, that acts as a guide to use and to save energy knowingly and reduce emissions.

Light as a medium to communicate, is absolutely no way new. From smoke signals of the Native Americans, Morse code, warning flairs, traffic lights; however, light has a great advantage over a product, that it can be shared, providing visibility for one or many at the same instant.

This paper refers to other meanings/informations that light can carry and how it can disperse information on a territory or community. In detail we report the way we have carried out this research in a practical process with the region of Emilia Romagna, the city of Bologna, Italy.

Using design as a process we explored:
the possible information we can disperse using light and illumination;
the zones/locations where to get maximum visibility;
the timing of the service;
how the information can be understood and translated;
the various media that can support this service;

The purpose of that first step was to identify existing artefacts that can be developed to expand the relationships between citizens and their utilities’
service provider in the urban environment. This led us to the question of how we can define light in a contextual level, attaching it to information and embedding it in a service. Seeing light:

as an integral element in applying a digital layer (that can be controlled) onto the urban space, which both provides information for dwellers and creates an interesting and fun way to do so;

as a provider of location-based information service that can be perceived from multiple locations creating possibilities of ubiquitousness;

as an effective way of raising public awareness on green issues within the city that is ubiquitous;

2 Concept

Specific buildings, landmarks, through different projected colours, can act as a communal interface to share local knowledge and information. The illumination as a medium of communication gives a value as well as nocturnal beauty to the public spaces. This extension of visibility and meaning is a transparent, clear system to deliver data (not needing another tool) that promotes community awareness and sustainable lifestyles.

The objective of this project is to use design as a tool that conceptualises and communicates the concept to various institutions and diverse actors involved.

3 Design

3.1 Introduction – design relations

“There are professions more harmful than industrial design, but only very few of them. And possibly only one profession is phonier. Advertising design, in persuading people to buy things they don’t need, with money they don’t have, in order to impress others who don’t care, is probably the phoniest field in existence today....”

(Papanek, 1971)

Looking at the consumer market today, it does not seem to have changed and ‘design’ (in the traditional sense) has been used very successfully on a global scale. At the same time the contemporary society is increasingly becoming energy dependent, to the massive introduction of electrically powered objects and appliances and in relation to the social behaviours based on communication and information technologies, we can note from massive change, today,

“for most of us, design is invisible. Until it fails.”

(Mau, 2004)
Informatic ambiance

From a design perspective this situation requires the necessity to start from the re-interpretation of the relationships between everyday life practices and the creation, manipulation and consumption of energy. We need to develop concepts and scenarios aimed at increasing awareness, on and around, the energy issue and their innovative and responsible behaviours.

In design, by designing energy related services and products, the aim is to explore another vision of energy that is more responsive, active and in a sense more alive amongst their environment and audience/users. In this way we highlight levels of thinking that can be embodied through design (brand design, sustainable design, and service design).

The diagram (figure 1) subjects an existing panorama of the relationship between the consumer, our energy source and our distribution companies… It mainly highlights that our relationship with our energy consumption is merely a bi monthly transaction.

![Diagram showing relationships between consumer, energy source, and distribution companies.]

Figure 1: highlighting our relationships as passive or almost completely diluted by our everyday environment and activity.

The diagram shows also how pure (electrical) energy is. It pinpoints its way to us, through light, sound comfort and pain, it is the most transversal material used through the mechanical/technological/information revolutions. Energy is Mac and windows, Linux, light sound and motion, washing our clothes and brushing our teeth. Absolutely no other material shares this magnitude of presence.
James Ennis

Figure 2: the energy used to work products today, if given presence, is demoted to a miniature icon, if even.

The fact that the costs to supply energy are constantly fluctuating is in no way apparent to us when we wish to use an energy-consuming appliance. In this sense we have no relationship with our energy supply, we just know, if we know, how much this energy will cost to us, one month later! –Alas what do we pay for?

"Estimates of the cost to consumers and businesses for all the electricity lost to vampire power in the US range from $1 billion to $3.5 billion annually."
(Jeantheau, 2004)

Today we have a number of buying services with our providing companies, giving options to entice the use of major energy consuming products during off peak hours. This does evoke awareness, and is evident when paying a bill, but these options still do not involve consumer participation and does not render the consumer more conscious of their consumption patterns.

In conclusion, design apart from ergonomics, materials, markets... we can step back four years, quoting from doors of perception.

"Design research should involve the innovative re-combination of actors among the worlds of science, government, business, and education."
(Thackara, 2002)

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1 Vampire power, a phrase describing a product that consumes energy while in stand-by mode.
3.2 Tools + partners

3.2.1 Concept and outcomes

In terms of design from the outset, rendered storyboards were used as a tool to communicate the concept to a broad variety of actors, institutional, private, of diverse roles and interests. The concept scenarios we developed were easily understood across all participating disciplines and planning authorities. They proved to be a key tool in generating interest to further develop the project.

Figure 3: examples of concept scenarios that can be used to communicate quickly and easily the elements of a system concept.

Every town has their form of street lighting system, controlled daily, providing public light. The territorial infrastructure and technology are in place to carry out these activities scenarios. We have already talked about public lighting – and light with information. However, the function of a traffic light has to capture the attention, as a flare, a warning light! They are a defined language to be understood by someone while performing another task, i.e. driving a car, crossing a road, entering a port. They have strict guidelines and are, in general, designed to capture attention for the well-being and safety of the operators in these situations.

In our case, embedding information on the urban environment some different social issues occur; the general public cannot be ordered in the same manner to that of a driver in rush hour traffic. Light is a powerful medium of communication, creates security, it gives greater awareness of the immediate environment. We cannot induce surprise or paranoia. Certain findings can generate panic.
Light and territory become our variables. How the information can be translated and embedded on the territory, in a way that can be understood passively and positively by the public, without invoking paranoia the project becomes an equation of cultural elements?

Figure 4: colour combinations and context can create immediate alert. Found in nature and in most signalling languages.

Unlike traffic signals and warning signals, we have the opportunity immerse the information - for example, in one of our original concept scenarios (fig 3b), changing the illumination of the park, but the effect would have been overwhelming and maybe somewhat suffocating for public space, the scenario explains a concept well on paper, but could not be implied by a social domain.

Figure 5: illustrates simply levels of intensity we can apply with the use of light.
3.2.2 Key players and cultural elements.

In fact when we explained our project to use the light as an information media in Bologna, the region, the city and utility providers took great interest from the outset, but were concerned about the public reaction/insecurity/paranoia, and the appropriate time to launch this service.

After many meetings with the public authorities for the ambient, energy, city heritage, tourism, we concluded that art can be the most appropriate vehicle to carry the project through its first stage because the cultural content has a massive impact on the public, but yet, it is an artistic impression, it does not create fear or panic, even if it does, however, give basic information.

So with the authorities we planned to use public space, during an art calendar occasion, to launch the project. Arte Fiera Bologna looked then to be the perfect event and we chose to light, during the art fiera days, four of Bologna’s landmarks in collaboration with ArteFiera and Comune of Bologna.

4 Communication Strategy

‘Does your design research exist? ... If nobody 'gets it', when you present your results, has anything been achieved?’
(Thackara, 2002)

This pilot project – the lighting of the four landmarks of Bologna - introduces the concept of an informative environment to the public and press.

However, in order to explain fully what exactly the mission of this project is, apart from the lighting installations, art is not alone enough. Our strategy has to break into a number of different channels. Other levels of communication are required to give more tangible support to the public who are invited to take part in the project.

The publics’ participation in parallel with local authorities is needed to create a bottom up scenario. This dialog ultimately helps in maintaining a goal of a more harmonious supply/demand balance for the service scenario.

4.1 Art as an interface to a design project

4.1.1 Existing work.

Large scale public instilllations, both temporary or permanent have a large communication value to the public, and there are many beautiful projects throughout the world using light, creating magical atmospheres. One we take note of is Alberto Garutti’s, “Ai nati oggi, Gent, Belgium 2000” that has been installed in a number of cities to date.
The project links public lighting to a local maternity hospital. When a baby is born, either parent presses a button at the maternity ward that triggers the light in the selected location for thirty seconds. "Life is energy", explains Garutti, however, he stresses, the most important part of the project is to communicate the meaning of the light to the public, in Gent for example, there is a large stone inscription explaining the meaning of the light plus in four languages. The same project lit the bridge in Istanbul during the bi-annual 2001; here posters were posted all over the city explaining the meaning of the project. Alas without previously knowing the meaning of the pulsing light – one could only assume some sort of strange power surge!

As illustrated by Garutti the light can pass beautiful information across a space.

4.1.2 Enlightening, bologna, Illumina.

In this sense we sought to involve other artists in the project, briefing them on “Bologna illumina” (Bologna enlightens) stressing key words as balance, transparency, real time information.

Figure 6: the two towers and gasometer can communicate energy balance ratios of supply and demand.

These structures have a very strong image in the urban environment but do give basic information to the people, showing a fluctuation, and introducing new colours associated to these levels.
Figure 7: Porta Marcarella, used as a traffic round-about, has a maximum visibility for road commuters.

Porta Marcarella light installation indicates pollution levels in the air. Suitably located does not submerge the information, as in the scenario concept (fig 3b), and give to the meaning a more playful element in its physical design. The light reflects the levels of PM 10 – in a fun and friendly way…

4.1.3 Exhibition participation/communication.

How can we explain to the citizens the light installations project? How can we get feedback from the public? Furthermore, how can you tell somebody to save energy if he does not know what it is, does not know what it costs, does not know how much they really use?

To answer those questions we initiated an exhibition concept, broken into three parts (analyse, inform and participate) with an introduction:

Figure 8: scheme of exhibition layout. Both onsite and with virtual platform to allow for home participation.
The most important and fundamental part of this stage is to explain the meaning of the project to the public, to capture their involvement, and create a bottom up exchange.

1- Analyse
Is to explain how to measure one’s personal level of energy consumption (we use the metaphor of weight [fig 9] to communicate the different levels of consumption). Here the people measure their energy consumption patterns. The interactive exhibit allows them to do this and receive a ticket – the ticket acts as a key to be involved at a more practical level, and a key to access online community.

![Figure 9: the simple metaphor of weight can be very strong in communication](image)

2 - Inform
Moving to the next phase, the public can understand that energy during different times has different values. The exhibit lets them see how they can improve their consuming patterns – and how they can save energy by using certain goods during the more appropriate moments following the indication of the light installation. As illustrated in fig 9, one wash while light is red, is equal to two washes when the light is green.

3 - Feedback
Involvement in the project! The people have a possibility to give their own opinion and can choose a good location for the future service project by choosing their ideal location. This section allows the users to input this information to accommodate the service phase of the lighting project.

4 – Participation
When returning home they can access the web portal, logging in with their previously collected ticket. The extension allows the participants to update their information and participate more in the project. They can give their
opinion on what the local meanings for the light could transmit, and again on
the locations with greatest visibility or beauty in their locality.

4.1.4 Local and cultural research.

During the exhibition phase of the project, from the participation of the
public and data inputted, we can expand on the local possibilities of the
project development and application. A further study should be carried out
and evolved on more sensitive topics to the specific locality, and on their
local, respected colour/illumination translations.

Figure 10: an extremely general colour scheme and how we can use colour
with scale.

As colour and there many cultural meanings are so diverse, we can use this
grid as a general example of how the colour can be used. In terms of scale
and intensity we can use a daily mean – based on the daily market. From this we can fluctuate up and down, giving subtle indications to the cost variables throughout a day. In this way there should be no ALERT signals that can evoke the modern day fear.

Local research will look to promote community and schools participation, collecting local data and feedback during the pilot project phase. The main tools for this will be the exhibition centre and web portal, both designed to gather information but not invade privacy.

5 Overall conclusion

The mix of entities and actors from the outset of this project gave a large contribution to understand how to make it possible and how the use of design can be implemented among the different entities:

- to channel information and actors together;
- to open dialog and relations between the public and local authorities in a rational way;
- to help achieve more transparency between the public and our traditional service providers.

During the first phase, integrating the application, we can learn from the participation of the public, getting their feedback through an online platform. Design in this sense can build a more bottom up approach in the exchange of local information and allowing the public to act or not act knowingly.

With this ability to use light as a ubiquitous urban information platform, that can harmoniously communicate between public and utilities providers, design can give energy a more bodied identity and would endeavour to adapt with intelligence the use of greener technologies.

Future areas of studies could target adaptive billing systems, co-branding of energy producing/consuming services.

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ENER EcoTopTen – Innovations for Sustainable Consumption

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1 Abstract

One of the objectives of the research project and consumer information campaign “EcoTopTen” is to trace existing products that are innovative, of high quality and of course more environmental friendly than other products in the according field. Most of the analysed product groups deal with energy using products (EuP): refrigerators, freezers, washing machines, tumble-driers, cookers, televisions, flat panel displays, printers, boilers and lighting. For each product group, Öko-Institut sets minimum criteria relating to environment, quality and costs. They are based, as far as possible, on existing labels and product tests, like the European energy label, EU or German Eco-label, labels for green electricity or product tests published in the journal of the German “Stiftung Warentest”. In product groups where no labelling exists, Öko-Institut develops own criteria. For example, this is the case for the energy consumption of televisions.

Today, the EcoTopTen-campaign gives a market survey of the most energy efficient products for private households in Germany. For each of the recommended “EcoTopTen-products”, consumers get information on environmentally relevant aspects, the results of product quality tests and the annual life cycle costs. These comprise the acquisition costs (on an annual basis, calculated with the purchase price and the assumed life span of the product), as well as the annual costs for the usage (i.e. costs for energy or water consumption, taxes, repairs or insurances etc.).

EcoTopTen goes far beyond existing labels and consumer information schemes. Thus, Öko-Institut promotes the further development of environmental towards sustainability labels. At the same time, EcoTopTen already works similar to the requirements of the EuP directive and delivers valuable experiences in this field. Additionally, Öko-Institut promotes sustainable product development: Sustainable innovation goals are communicated to manufacturers showing advanced criteria relating to environment, quality and costs that products should meet in a few years.
2 Introduction

Most consumers are not willing to wade through many sales brochures, test reports or consumer advice manuals to find the ‘right’ product. Since March 2005, the EcoTopTen campaign provides German consumers with comprehensive overviews of those products that are recommendable in every respect. Such products not only have a low environmental impact, but also meet customers’ quality expectations and are affordable at the same time.

EcoTopTen delivers information on the purchase prices and on further annual costs, such as for electricity or water needed for using the products. In view of comparison possibility, typical products failing to meet the EcoTopTen criteria are also presented. These market overviews should put consumers in a position to take quick decisions in favour of sustainable products. The campaign also provides tips on how to use these products in a way that saves money and is less environmentally harmful.

EcoTopTen is a major initiative for sustainable consumption and product innovations in mass markets initiated by Öko-Institut in Freiburg, Germany. The EcoTopTen research project [1] is sponsored by the Federal Ministry of Education and Research. The consumer information campaign [2] is sponsored by the German Ministry of Food, Agriculture and Consumer Protection and the Legacy for the Future Foundation. At regular intervals, the scientists produce recommendations of high-quality ‘EcoTopTen products’ – all of which offer good value for money and top environmental performance. A series of product recommendations is published on www.ecotopten.de at regular intervals.

Table 1 gives a review of ten product fields and associated product groups analysed within EcoTopTen. Taken together, the products in these fields currently generate 64 percent of Germany’s total carbon dioxide emissions and 58 percent of its energy consumption, and account for about two-thirds of all consumer expenditure.

Table 1: Analysed product fields and associated product groups within EcoTopTen

<table>
<thead>
<tr>
<th>EcoTopTen Product fields</th>
<th>Associated product groups</th>
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<tbody>
<tr>
<td>Building &amp; Housing</td>
<td>Condensing boilers (gas)</td>
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<td></td>
<td>Wood-pellet heating systems</td>
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<td></td>
<td>Energy-saving lamps</td>
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<td></td>
<td>Low energy houses (prefabricated construction)</td>
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<tr>
<td>Mobility</td>
<td>High-mileage car fleet. Best-in-class schemes for:</td>
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<td></td>
<td>Small cars / Mid-range cars / Family cars / Mini-vans</td>
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<td></td>
<td>Car sharing</td>
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<td></td>
<td>Bicycles (safe and low-maintenance)</td>
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<td>Eating &amp; drinking</td>
<td>Full range of organic groceries with umbrella label</td>
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<td>Refrigerating, Cooking, Dishwashing</td>
<td>Refrigerators &amp; Freezers</td>
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<td>Gas &amp; Electrical cookers</td>
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<td>Dishwashers</td>
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<td>Clothing</td>
<td>Full range of textiles (organic &amp; fair-trade standards)</td>
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<tr>
<td>Laundry washing &amp; drying</td>
<td>5-kg washing machines</td>
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<td></td>
<td>Tumble driers (heat pump driers, gas driers)</td>
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<td>Information &amp; Communication</td>
<td>Virtual answering machines</td>
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<td></td>
<td>PCs / notebooks</td>
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<td></td>
<td>Flat panel displays</td>
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<td>Printers</td>
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<tr>
<td>TV &amp; Co.</td>
<td>CRT and flat panel TV sets</td>
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<tr>
<td>Electricity</td>
<td>Certified green electricity</td>
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<tr>
<td>Investment</td>
<td>Sustainable funds / Old-age-provision products</td>
</tr>
</tbody>
</table>
3 What is new about EcoTopTen? The methodological approach

The EcoTopTen product ratings give equal weight to the criteria of low environmental impact and acceptable annual overall cost, while at the same time taking high quality into account. Integrating these three dimensions as well as systematically considering the annual follow-on costs – instead of comparing merely the purchase price – is an entirely novel approach.

The EcoTopTen criteria are, to the extent possible, based on existing criteria such as those of eco-labelling schemes – EcoTopTen is thus not a new label. There are minimum environmental criteria that must be met for products to get an EcoTopTen listing, but there are also price ceilings that must not be exceeded. Where permitted by data availability, EcoTopTen also provides information on existing quality tests or social aspects.

3.1 Ecological approach of EcoTopTen

Depending on the product group, (German) consumers find a great number of different labels signalling good environmental performance – which means that on the other hand they also have the difficulty of choice. Consumers have to know and understand the meaning of each of these labels in order to make a good and above all sustainable choice. On the other hand there are product groups where consumers find no ecolabel at all, e.g. virtual answering machines or investment funds. EcoTopTen wants to reduce the complexity for consumers by providing precise recommendations for sustainable products without the need for consumers to know every detail – comparable to an umbrella brand name. Table 2 gives an impression on the variety of different eco-labelling schemes that form the basis of the environmental assessment of product groups in EcoTopTen.

Table 2: Underlying eco-labelling schemes for EcoTopTen product groups

<table>
<thead>
<tr>
<th>EcoTopTen product groups</th>
<th>Underlying eco-labelling schemes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Condensing boilers (gas)</td>
<td>German Blue Angel</td>
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<tr>
<td>Wood-pellet heating systems</td>
<td>German Blue Angel</td>
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<tr>
<td>Energy-saving lamps</td>
<td>European energy efficiency label</td>
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<tr>
<td>Low energy houses</td>
<td>German energy pass</td>
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<td>High-mileage car fleet</td>
<td>Annual list of ecological cars by Verkehrsclub VCD</td>
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<tr>
<td>Car sharing</td>
<td>German Blue Angel</td>
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<tr>
<td>Bicycles</td>
<td>...</td>
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<tr>
<td>Full range of organic groceries</td>
<td>“Bio-Siegel” (Organic food label), Transfair label</td>
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<tr>
<td>Refrigerators &amp; Freezers</td>
<td>European energy efficiency label</td>
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<tr>
<td>Gas &amp; Electrical cookers</td>
<td>European energy efficiency label (electrical cookers)</td>
</tr>
<tr>
<td>Dishwashers</td>
<td>European energy efficiency label</td>
</tr>
<tr>
<td>Full range of textiles (organic &amp; fair-trade standards)</td>
<td>European flower, Öko-Tex 100/1000, Ecoproof, Toxproof, IVN Better / Best, Purewear, ...</td>
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<tr>
<td>Washing machines</td>
<td>Energy Efficiency Label, European flower</td>
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<td>Tumble-driers (heat pump and gas)</td>
<td>Energy Efficiency Label (for electrical driers only)</td>
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<td>Virtual answering machines</td>
<td>...</td>
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<td>PCs / notebooks</td>
<td>German Blue Angel</td>
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<td>Printers</td>
<td>German Blue Angel</td>
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<td>TVs</td>
<td>European flower</td>
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<td>Certified green electricity</td>
<td>German ok-power label / green electricity label</td>
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<tr>
<td>Sustainable funds</td>
<td>Austrian Ecolabel for green funds</td>
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<tr>
<td>Old-age-provision products</td>
<td>...</td>
</tr>
</tbody>
</table>
In its criteria, the German ecolabel ‘Blue Angel’ mostly goes beyond the European Energy Efficiency Label. For example, there are requirements in terms of materials used (e.g. excluding materials classified as carcinogenic), construction (e.g. being suitable for recycling), noise, packaging of the product or manual and consumer information. Therefore, EcoTopTen primarily seeks to take the Blue Angel as basis for the environmental assessment. At the same time, this was quite a challenge in two terms: On the one hand, the possibility for awarding the Blue Angel exists for only five out of 22 EcoTopTen product groups.

During the last few years, the Blue Angel was mainly withdrawn from most of the large household appliances, like washing machines, freezers or ovens. For these product categories, EcoTopTen rather applies the European Energy Efficiency Label as minimum requirement for the environmental assessment – setting additional criteria if necessary, e.g. noise level or protection systems for damage by water concerning dishwashers.

On the other hand, application for the Blue Angel is voluntarily. Therefore, it happens that manufacturers whose products fulfil the criteria do not apply for the ecolabel due to procedural, cost or other reasons. For example, looking at wood-pellet heating systems, the main market leaders did not apply for the Blue Angel. In those cases, EcoTopTen bridges a gap by recommending also those products to consumers that fulfil the ecological criteria without being awarded the Blue Angel.

3.2 Economic approach of EcoTopTen

EcoTopTen has supplied a market report on the most efficient fridges, fridge-freezers and freezers [3]. The EcoTopTen market survey contains information on energy consumption, purchase price and overall annual cost, as well as details of special functions such as energy-saving holiday programmes, automatic defrosting and temperature warning systems.

The new EcoTopTen market survey recommends that consumers only go for models with A++ energy efficiency. These are the ones that are best buys in terms of environmental and energy performance. What only few consumers know: the top models within the A class consume up to 45 per cent less electricity than the worst performers in the same category. This is why in 2004 the range was extended with a view to include sub-classes A+ and A++.

It certainly pays off to look at the energy consumption of fridges and freezers: they are constant consumers since they stay switched on all the time. Products in energy efficiency classes A or B, which use much more electricity than the ones of higher categories, can end up costing more in the long run. Their smaller purchase price can be outweighed by high annual electricity bills.

Table 3: Overall annual costs of an A-classified fridge compared to an A++-EcoTopTen fridge

<table>
<thead>
<tr>
<th>Model</th>
<th>EcoTopTen – fridge</th>
<th>Typical fridge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy efficiency class</td>
<td>A++</td>
<td>A</td>
</tr>
<tr>
<td>Volume fridge/icebox [litre]</td>
<td>121/19</td>
<td>121/19</td>
</tr>
<tr>
<td>Energy consumption [kWh/a]</td>
<td>131 kWh</td>
<td>230 kWh</td>
</tr>
<tr>
<td>Purchase Price [Euro]</td>
<td>329,95 €</td>
<td>309,00 €</td>
</tr>
<tr>
<td>Overall annual cost [Euro/year]</td>
<td>49 €</td>
<td>66 €</td>
</tr>
</tbody>
</table>
The comparison of the overall annual costs shows that environmentally-friendly products often perform better than typical products even if the purchase price is higher. Table 3 shows how it works:

Anyone who chooses a 120-litre fridge with a four-star freezer compartment and A++ energy efficiency class, as recommended by the EcoTopTen campaign, will for example pay around 330 Euro up front. The overall annual costs – including the costs of a year’s electricity consumption – are of 49 Euro. A typical fridge of a similar size in energy efficiency class A is, for example, around 20 Euro cheaper to buy. But the annual costs for operation are 66 Euro, because it uses 230 kWh of electricity or around 100 kWh more than the EcoTopTen fridge. Hence, the EcoTopTen fridge will cost the consumer about 17 Euro less each year – even if it costs more up front.

Another example: Oeko-Institut has calculated the overall annual cost of lamps, including the annualized purchase price and the annual cost of electricity. With a typical service life of 6,000 to 15,000 hours and a daily lighting time of three hours, an 11-watt compact fluorescent lamp (CFL) costs the consumer 3.10 Euro a year. In contrast, the typical service life of a comparable 60-watt incandescent light bulb is approximately 1,000 hours. Due to the higher substitution rate and the higher annual energy costs the overall costs add up to 12.40 Euros a year, although the initial cost of buying a CFL is higher, at about 15 Euros compared to 50 Cents for a conventional incandescent lamp.

Finally, there is the possibility for cross examination of overall annual costs between several product groups (see table 4). The margin within a product group is usually due to the products’ different size or configuration. For example, the detailed analysis shows that overall annual cost of chest freezers is lower than those of equal freezers.

In general, EcoTopTen gives an impression on the allocation of consumers’ budget and provides the possibility for eco-efficient prioritising – e.g. using compact fluorescent lamps or green electricity with little additional costs instead of spending much more money for buying a new freezer with little more efficiency compared to the old one.

Table 4: Range of overall annual costs (Euro/year) of several EcoTopTen-products

<table>
<thead>
<tr>
<th>Product Type</th>
<th>Overall annual cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lamps (CFL)</td>
<td>2-5 €</td>
</tr>
<tr>
<td>Fridge</td>
<td>50-80 €</td>
</tr>
<tr>
<td>Chest freezer</td>
<td>50-80 €</td>
</tr>
<tr>
<td>Freezer</td>
<td>50 – 100 €</td>
</tr>
<tr>
<td>Fridge freezer</td>
<td>80 – 130 €</td>
</tr>
<tr>
<td>Tumble drier</td>
<td>90 – 100 €</td>
</tr>
<tr>
<td>Dishwasher</td>
<td>170 – 270 €</td>
</tr>
<tr>
<td>Cars (small/mid-class/family)</td>
<td>4,500 – 7,500 €</td>
</tr>
</tbody>
</table>
3.3 Quality approach of EcoTopTen

In Germany, the independent consumer magazine STIFTUNG WARENTEST regularly conducts quality tests for numerous product groups. Considering tumble driers for example, Stiftung Warentest examines the specific functions in different programmes, environmental aspects like energy consumption or noise, and the handling of the appliances.

Unfortunately, products tested by Stiftung Warentest only represent a small range of products available on the market. For example, the latest quality test of tumble-driers is from November 2003 and represents only a selection of models. Therefore, the results of those quality tests cannot generally be included in the overall assessment of EcoTopTen-products. As far as results of quality tests exist, they are taken into account. Minimum requirement for the admission in EcoTopTen is the quality grade “good” (1.5 to 2.5 points). On the other hand, there is no devaluation of EcoTopTen-products, if no quality test exists.

Figure 1 shows an extract from the EcoTopTen-flyer for tumble-driers [4]. Besides information on different technologies, energy efficiency classification, energy or gas consumption and costs, the last column shows the test results of those products tested by Stiftung Warentest in July 2000 and November 2003 respectively.

![Figure 1: Extract from the EcoTopTen flyer for tumble-driers – illustration of quality aspects](image)

Notes:

Technology: A = Air vented drier; A* = gas heated tumble drier; K = Condenser drier; K* = condenser tumble drier with a heat pump.

Energy efficiency classification: Officially, there is no energy efficiency classification for gas heated tumble driers. However, the primary energy demand and the global warming potential (GWP) of gas heated tumble driers are even lower than those of tumble driers with energy efficiency class A.
3.4 Social approach of EcoTopTen

The vision of EcoTopTen in the long run is an integrated assessment of environmental, economic, qualitative and social aspects. For the latter, this would imply gathering information on social aspects during the whole manufacturing process of each EcoTopTen-product – including suppliers. However, there is little product specific information available at present, especially not for complex technical products like computers, cars or domestic household appliances. Furthermore, this little available information could not be evaluated and certified so far. This is especially due to the vast supply chains, which often cover more than 1,000 individual parts per product and nearly as much suppliers. Textiles and groceries are an exception: For both product groups the possibility for certification processes already exists and consumers find labels that certify products being fairly produced or traded.

Regarding groceries for example, in 1992 the non-profit association TransFair first started its activities. Its aim is to support disadvantaged producers in Africa, Asia and Latin America and to improve their working and living conditions through fair trade. Being an independent initiative, TransFair itself does not trade, but concedes its label to products traded fairly and according to license agreements. Fair Trade criteria are based on the international standards of the Fair-trade Labelling Organizations International (FLO)\(^1\). Regarding textiles, the International Association Natural Textile Industry (IVN) created two labels “Natural Textile – IVN certified” and “Natural Textile – IVN certified best” which both include social criteria, e.g. child labour, working conditions, wages or discrimination\(^2\).

In these two product fields, EcoTopTen gives an overview on local chains providing wholefood and fairly traded products. Due to the fact that many consumers do not know where to buy fair traded products or rather think they have to visit special stores, EcoTopTen shows that recently more and more conventional stores and even some discounters offer fair traded products to some extent.

Beyond EcoTopTen, the Oeko-Institut currently carries out the project “Measuring Social Aspects in the Production of Computers”, also funded by the German Federal Ministry of Education and Research. This project is meant to conduct a case study on social aspects during production of computers, its components and subcomponents. In recent years, several reports on workers’ rights manipulation in the electronic industry and the role of the ICT sector for coltan-mining activities in the Democratic Republic of Congo gained considerable media attention. The project’s task is to develop a method to systematically analyze the social impacts within the life cycle of ICT products. The goal is to evaluate social impacts in the production phase of computers, determine a set of indicators for a systematic assessment of social impacts, evaluate the opportunities, challenges and obstacles of social life cycle assessments, and to derive further options for action.

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1 Data source: [www.transfair.org](http://www.transfair.org)
2 Data source: [www.naturtextil.com](http://www.naturtextil.com)
4 EcoTopTen in comparison to other programmes and initiatives

4.1 European Eco-design Directive for Energy using Products (EuP)

In line with the Integrated Product Policy (which promotes the principle that requirements on the environmental performance of products should address all environmental aspects during the complete lifecycle of the product), in August 2003 the Commission decided to propose an integrated framework for setting “eco-design” requirements for Energy using Products (including energy efficiency requirements). By adopting the proposal (Directive 2005/32/EC), the European Parliament and the Council have granted the Commission a mandate to regulate the environmental characteristics of energy-using products (except vehicles) through adopting implementing measures (daughter directives) laying down eco-design requirements for particular Energy using Products.

Directive 2005/32/EC [5] provides for the setting of eco-design requirements for energy-using products (EuP). First step in considering whether and which eco-design requirements should be set for a particular product is the elaboration of a preparatory study recommending ways to improve the environmental performance of the product. The preparatory studies shall provide the necessary information to prepare, in particular, the impact assessment and possible draft implementing measures.

Compared to the suggested procedure of the EuP preparatory studies, EcoTopTen offers a very similar approach. Both focus on similar product groups that are relevant with respect to environmental impacts respectively optimisation potentials, e.g. refrigerators, freezers, washing machines, tumble-driers, televisions, PCs, printers, boilers and lighting. Both take existing legislation and labelling into account as well as market trends, consumer expenditure data and consumer behaviour. Both apply methods like Life Cycle Analyses and Life Cycle Costs in order to identify and assess the improvement potential of energy using products. EcoTopTen as well as EuP include manufacturers’ views on the improvement potential of products and best available technologies.

Nevertheless, there are also some differences between EcoTopTen and EuP: First of all, EuP is a political process with a focus on implementing measures for the eco-design of products. EcoTopTen on the other hand is an information campaign with a survey of the best products already available on the market and a clear focus on consumers. This means that not only the annual total costs but also innovation goals for products are identified from the consumers’ point of view. In cooperation with the Institute for Socio-Ecological Research (ISOE) own consumer research is carried out for EcoTopTen. In different focus groups with respect to a specific product group, consumers are interviewed on use patterns, motivations for the purchase of products, purchase criteria including relevance of environmental criteria, information sources or the relevance of tests and labels.

In the following, the consumer research on bicycles is illustrated exemplarily. In opposition to eco-design requirements, EcoTopTen does not focus on the environmental friendliness of materials. This is due to the fact that regarding material flows, bicycles are most of all environmentally friendly when they are used instead of a car.
Results from consumer research show that people would rather prefer to take their car due to bicycles being too often out of order - being particularly valid for the functionality of lights, brakes or tyres. Thereupon, EcoTopTen transmitted these restraints into innovation goals for bicycle manufacturers [6]. Bicycles that shall be recommended in EcoTopTen have to be safe as well as have a low effort for maintenance. Translated into components this means that such bicycles should, amongst others, be equipped with dynamo hubs, roller brakes or special tyres that protect against flat tyres. Öko-Institut itself assembled a bicycle according to those criteria and presented it to the consumer research groups. The results, like feedback on design, costs and on the different technical components, will flow into further development of minimum criteria for EcoTopTen bicycles. This example demonstrates a new and outstanding approach for integration of consumers' views into innovation goals and product requirements.

4.2 Japanese Top Runner Standard

Another well-known programme with similarities to EcoTopTen is the Japanese Top Runner Standard [7]. Due to oil crisis in the past, Japan already focused on measures concerning rational use of energy at an early stage. Amongst others, Top Runner Standard has come into existence in light of this situation. This system uses, as a base value, the value of the product with the highest energy consumption efficiency on the market at the time of the standard establishment process and sets standard values, also considering potential technological improvements which are added as efficiency improvements.

In cooperation with industry, the energy consumption efficiency of all products currently on the market is measured. Using the resulting data, the most up to date maximum efficiency value is determined. Target years are determined giving consideration to the degree of how society demands the equipment energy conservation and efficiency as well as to manufacturers' product development planning and capacity. Target standard values (Top Runner Standard values) are determined by evaluating potential technical development toward target years, as well as adding technical development to maximum efficiency values.

Compared to EcoTopTen, one can once again find some overlapping between relevant product groups, e.g. vehicles, refrigerators, freezers, cookers, televisions, computers, printers or lighting. Furthermore, both initiatives follow the same approach of identifying the most efficient products on the market and setting innovation goals for future products. The major difference between EcoTopTen and Top Runner is the implementation of measures. EcoTopTen is primarily a consumer information campaign and therefore the criteria and innovation goals are not binding for manufacturers and their whole range of products. Top Runner, on the other hand, is prescribed under the Japanese “Law Concerning the Rational Use of Energy” and therefore an obligation for manufacturers to make efforts in improving the energy efficiency of their products.

Both initiatives not only address manufacturers but also consumers. For this purpose, Öko-Institut’s researchers regularly publish recommendations on www.ecotopten.de supported by press releases that are picked up by many national media as well as by manufacturers being used in their own marketing activities.
The advantage of Top Runner is that the Japanese Energy Conservation Law has established a display system for Top Runner target products so that buyers can obtain information concerning, for example, the energy efficiency directly at the time of purchase. To promote the popularization of highly efficient products that have achieved Top Runner Standard values, a voluntary labelling system was established in addition which can be displayed in product catalogues as well as on packaging or the products themselves.

Finally, the Top Runner System also includes retailers in order to further accelerate the popularization of efficient products, because these are places where manufacturers and consumers intersect. Under the so called "Energy Efficient Product Retailer Assessment System", individual large-scale home electronic retail outlets and stores are recruited to be identified as outlets that actively provide information and carry out sales promotions and are identified as "Outlets that Excel at Promoting Energy-Efficient Products." Including rankings, the results are publicized through newspapers, magazines, bulletins of consumer groups and non-profit organizations as well as brochures of local public agencies to raise consumer awareness. A logo is established to provide "Outlets that Excel at Promoting Energy-Efficient Products" to be used for this purpose.

4.3 Other initiatives

Besides these two politically approaches, there are some other initiatives and databases promoting energy efficient products with a clear focus on consumer information. For example the database www.spargeraete.de of the German Niedrig-Energie-Institut (NEI) lists energy efficient large household appliances in the categories refrigerators and freezers, washing machines, tumble driers and dishwashers. The database www.energiesparende-geraete.de of the Berlin Energieagentur (BE) lists energy efficient large household appliances in the categories refrigerators and freezers, washing machines, tumble driers and dishwashers, as well as Consumer Electronics (TV, DVD, Video, Audio) and office products like computers, monitors, printers or copiers. Compared to both databases, EcoTopTen represents a broader section of environmental relevant product groups: consumers also find recommendations for cars, car-sharing services, bicycles, heating systems, low-energy houses, and energy saving lamps, textiles or food.

To some extent, EcoTopTen’s criteria are stricter than those of NEI and BE. For computer monitors at the BE database solely energy consumption plays a role, whereas EcoTopTen only recommends energy efficient monitors that are labelled with TCO’03 which also includes better ergonomics and low emissions. EcoTopTen only recommends refrigerators and freezers with energy efficiency class A++ whereas NEI also lists A-classified refrigerators although those products might consume up to 45 percent more energy than A++. For tumble driers, NEI also lists products with energy efficiency class C or D, whereas EcoTopTen only recommends A-classified driers.

In the BE database consumers find more than 7,000 household appliances, 1,000 consumer electronics products and 1,500 office products listed. In contrast, with the market overviews and precise recommendations, EcoTopTen puts consumers in a position to take quick decisions in favour of sustainable products.
The internet-based database www.office-topten.de of the German Energy Agency (dena) only lists office products (computers, notebooks, monitors, printers, copiers, scanners, multifunctional devices and fax machines). Basis for the choice of recommendable products is the European Energy Star database. Contrary to the dena database, which lists CRT and LCD monitors, EcoTopTen only recommends flat screen monitors because they consume around 70 per cent less power than CRT monitors. As already mentioned above, in EcoTopTen not only energy efficiency plays a role for office products. All the monitors recommended in the EcoTopTen are also certified to the current TCO'03 standard, which guarantees that they meet additional minimum requirements in terms of image quality, low emissions and recyclability.

The initiative of the Topten International Group www.topten.info is most similar to EcoTopTen. The consumer-oriented online search tool presents efficient appliances in various categories like office products, lighting, household appliances, mobility, consumer electronics or electricity. The key criteria are energy efficiency, impact on the environment, health and quality. Topten was launched in 2000 in Switzerland, 2004 in France, 2005 in Austria. In 2006, the European IEE-project Euro-Topten was started with other countries following to build up their own national Topten sites. The German national website of Euro-Topten links to EcoTopTen and Office-Topten.

5 First evaluation of the consumer information campaign EcoTopTen

About one and a half year after the official start of the consumer information campaign in March 2005 there is quite well resonance of media, consumers and producers. Numerous online portals, regional and national newspapers, magazines, professional journals as well as several radio stations and TV regularly pick up the press releases on new EcoTopTen recommendations. Especially we would like to point out that there is a large proportion of conventional media, which means not explicitly “green”. For example, the market overview on energy-saving cars was published in several automotive magazines or the market overview on energy efficient flat screen monitors was picked up of several ICT-magazines.

Besides media partners, EcoTopTen cooperates with the consumer advice centre in North Rhine-Westphalia, the largest consumer advice centre in Germany. In more than 50 local information centres consumers find the EcoTopTen flyers and can get advice on ecological products.

Meanwhile, more and more manufacturers of recommended products also use the possibility to refer to EcoTopTen, for example via own press releases, links on their websites or articles in their newsletters or employee magazines. Some companies distribute the EcoTopTen flyers, e.g. at trade fairs, others developed own stickers with the EcoTopTen logo for the labelling of their recommended products. One manufacturer of large household appliances has even integrated the EcoTopTen logo into sales brochures of large retail stores with some million editions.
6 Conclusion

In the previous chapters you find a presentation of the German consumer information campaign “EcoTopTen” on sustainable products and exemplarily explanation of the methodological approach, as well as a synopsis of essential similarities and differences of EcoTopTen compared to the European EuP-Directive, the Japanese Top Runner Standard and other similar initiatives and databases promoting energy efficient products. In conclusion, EcoTopTen provides a reasonable complement to the two political initiatives. With the consumer information campaign EcoTopTen, Oeko-Institut already fulfils the recommendation of the EuP-Directive which says: “In order to maximise the environmental benefits from improved design it may be necessary to inform consumers about the environmental characteristics and performance of energy using products and to advise them about how to use products in a manner which is environmentally friendly.”

Especially, the consistent pointing out of annual total costs in EcoTopTen as well as the integration of environmental, economic, social and quality aspects is quite a new approach and should be applied to other initiatives for sustainable consumption. The latter mainly establishes the basis for the further development of eco-labels towards product sustainability labels. In this context two major restraints have to be resolved: On the one hand, too little independent quality tests on products exist. Most of them only represent a small range of products provided on the market and only a selection of models. On the other hand, there is not enough information on social performance of products regarding their whole life cycle.

An advantage of the EuP-Directive as well as of the Japanese Top Runner Standard compared to EcoTopTen is the binding character for manufacturers. Finally, a great advantage of the Top Runner Standard is the inclusion of retailers to further accelerate the popularization of efficient products because they have an influence on their assortment of goods presenting efficient or non efficient products to consumers. Being one of the important players in life cycle thinking, often unattended in former times, this approach should become standard practice also for other initiatives for sustainable consumption.
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ENER Are sustainable electricity production and use possible?

The Hungarian case

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1 Introduction

Attention towards sustainable energy use and energy conservation first arose during the 1970s in relation to the energy crisis and in the alarm of fossil fuel depletion. Later, concern about global environmental problems and climate change added to the existing awareness, and even supplanted that (Abrahamse et al., 2005; Shove, 1998). Today in Europe, energy security fears culminate again (EC, 2005b) and volatile prices drive public concern about energy consumption. Significant efforts have been devoted to curb the increasing energy demand and related CO₂ emissions in technological, political and to some extent in social sense.

Energy efficiency improvements between the 1970s and today are substantial (Figure 1). Without policies, campaigns, legislative and regulatory framework for energy efficiency, the energy demand in the EU would be 2500 Mtoe, close to 50% more than it is the actual demand in 2003 (EC, 2005b).

Similarly to energy efficiency, the use of renewable energy sources (RES) has increased significantly during the last decades. Figure 2 shows the example of wind energy capacity that has grown in the EU from practically zero in 1990 to 40,000 MW power in 2005 (Amon, 2006), with which the EU target for 2010 was reached in 2005 (EWEA, 2006). Wind energy was growing 6% per year in the beginning of the 2000s, facing administrative and grid obstacles rather than a market limit to increase capacity and demand (EWEA, 2005). Other renewables have experienced a more moderate boom, nevertheless the average growth of renewable capacity in the EU has been noteworthy, 3.3%/year between 1990 and 2003 (EEA, 2006).
Figure 1: Development of energy demand and “negajoules” in the EU25. Negajoules are energy savings calculated using the 1971 energy intensity (EC, 2005b based on EUROSTAT data).

Figure 2: Cumulative installed capacity of wind power generation in the EU15 (EWEA, 2006)

Such progress broke the hitherto typical linkage between energy need and GDP growths; decoupling started to take place and the energy intensity of the economies of the developed countries decreased by a third between 1970 and 2003 (EC, 2005b). Since then, however, improvement is less significant, less than 1%/year.

In spite of the significant attempt to increase the sustainability of energy use and production, the Living Planet Report 2006 – among others – confirms that we are using the planet’s resources faster than they can be renewed (WWF, 2006). Humanity’s Ecological Footprint, has more than tripled between 1961 and 2003, and the largest contributor to the Footprint is energy generation.

In the case of Hungary, the ecological footprint followed a different path, basically mirrored the political, and resulting economic changes in the country, as can be seen in Figure 3. Still – although Hungarians have the smallest per capita footprint in the EU -, just the energy-related footprint in
the country is larger than the world average available biocapacity (based on 2001 data, WWF et al., 2005).

From these data it is clear that in order to achieve sustainable energy systems, an integrated approach to the problem needs to be taken, and it is not possible to direct our focus exclusively on demand or on supply, or indeed on energy vs. sustainable consumption and production separately. The EU and our countries need to adopt a strategic approach to rapidly increase the sustainability of the energy systems as compared to unsustainable uses and production processes.

The current paper does not provide the solutions or sets out this strategic approach, it is more of an exploration of the situation in a specific country (Hungary) that is also part of a larger community, the EU. Thus, what follows below is an attempt to describe the existing situation with indications for future research directions in order to achieve sustainable electricity production and use in Hungary and in other EU countries.

Figure 3: Hungary’s per capita footprint is the smallest in the EU, but still larger than the world available per capita biocapacity or world average per capita footprint (adapted from WWF et al., 2005)

2 Current energy situation in Hungary

The Hungarian economy, similarly to the neighboring post-communist regimes, has been undergoing significant structural changes. The country has engaged in privatization and liberalization of – among others – the energy sector during the 1990s and 2000s respectively (INFORSE-Europe, 2006,
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Key characteristics of the energy supply in Central Eastern Europe (CEE), thus in Hungary, are the low source diversity, high dependence on monolithic fuel mix, large share of nuclear energy, and particularly high level dependence on Russian energy imports. At the same time, the result of the Soviet energy policy is a well-developed district heating system and similarly developed gas-distribution system, which allows these countries to use one of the least polluting fossil fuel sources in a large share (almost half of the energy supply in Hungary is natural gas). Legacies from the socialist era are both positive and negative; however, the most problematic area is the wasteful energy production and use as a result of the socialist attitude (Molnar, 2004; Urge-Vorsatz et al., 2003). The change of regime had significant positive impacts on energy use in terms of environmental impacts and energy efficiency.

The country accessed the European Union in May 2004. EU membership has had further positive impacts on the energy sector (liberalization, prioritizing energy efficiency, RES targets, strategic thinking as few examples), and the obligation to meet the EU political agenda is straightforward. However, the effective and true implementation of the EU agenda poses significant financial, political and social challenges (Urge-Vorsatz et al., 2003).

Final energy intensity has changed from 0.438 koe/00 PPP of GDP in 1991 to 0.285 koe/00 PPP of GDP in 2004 (Elek, 2006). Figure 4 illustrates the development of the final energy demand of the main sectors in Hungary. Energy demand in the production sectors (industry and agriculture) has decreased substantially, mainly due to the economic collapse and closure of energy intensive heavy industry during the 1990s and the following restructuring and efficiency improvements, while the result of the growth in service sector and economic development resulted in growing energy demand in the domestic and tertiary sectors (Figure 4).

![Figure 4: Final energy demand trend by sectors in Hungary (Elek, 2006)](image)

At the same time, the fuel mix has moved in a more environmentally friendly direction: the share of coal decreased from 21% to 14%; while the
share of gas increased from 31% to 46 %, and the share of renewables increased from 1.3 % to 3.4 % in 1990 and 2003, respectively (INFORSE-Europe, 2006). The share of renewables in electricity production is over 4% as of 2006, which means that the country has already surpassed the RES target of 3.6% for 2010 (INFORSE-Europe, 2006).

2.1 What is available for the basis of a sustainable energy system in Hungary

2.1.1 Energy source diversity

Figure 5 depicts the evolution of the primary energy supply in Hungary. It shows that the importance of oil and coal are slightly decreasing, while that of gas is decidedly increasing. The share of nuclear has been fairly constant since the beginning of the 1990s.

![Figure 5: Evolution of Total Primary Energy Supply from 1971 to 2003 in Hungary (Amon, 2006)](image)

The picture is somewhat different if the role of the different types of fuel in electricity production is examined (Figure 6). It can be seen that in this case, looking at 2003 data, production is dominated by gas and nuclear, closely followed by coal, with oil and renewable sources having a much smaller share, 5% and 0.9, respectively.

![Figure 6: The share of different energy sources in electricity production in 2003 in Hungary (INFORSE-Europe, 2006 based on IEA data)](image)
Nuclear energy is probably the most controversial issue of the Hungarian energy sector. It is the major source of electricity in the country, accounting for almost 40% of total national electricity production. Hungary is the 11th country with the highest share of nuclear in the electricity production according to the International Atomic Energy Agency (IAEA 2006).

2.1.2 Energy security

Energy dependence in Hungary is significant (71%), as only 19% of the gas and 26% of the oil is produced in the country. The situation is better in the case of coal, of which 85% is domestic. However, local production is declining, between 1990 and 2003 Hungary produced 40% less gas and 35% less coal. Thus, in order to satisfy growing needs (i.e. increasing consumption) as well as to reduce the dependence on imports, there is need for a more sustainable energy policy (GKM, 2005; INFORSE-Europe, 2006; Tihanyi et al., 2006).

2.1.3 Renewable energy sources (RES)

The integration of renewable energy sources into individual energy systems differs significantly from country to country, as can be seen in Figure 7. As it has already been noted, the Hungarian national target is 3.6% of electricity production from renewable sources by 2010, and it was already achieved in 2005, and is expected to reach 5.8% by the target date (INFORSE-Europe, 2006; Energia Klub, 2006). Estimations for the RES potential in the country range between 10-250% of the current energy consumption (Energia Klub, 2006). The type and share of renewables in electricity production in Hungary depend on a variety of factors, including the limited but still significant local potential, low grid flexibility, varying economic value, as well as social and political acceptance.

As pictured in Figure 7, Hungarian renewables application is particularly low. The share of renewables in electricity production has been increasing rapidly in the recent past, even doubling in some years. INFORSE-Europe (2006) provides a detailed overview of each source.

Half of the renewable energy comes from biomass. In fact, increase has been most considerable in this sector, in 2004 electricity production from biomass was 5 times that in 2003. Unfortunately, biomass based electricity production can be questioned and should not fully be accounted to the renewables share, because 90% of this electricity is produced in refurbished thermal plants with low efficiency and often relying on indigenous forests (Energia Klub, 2006). Energy plantations have started to be used more commonly only in 2005 (INFORSE-Europe, 2006).
Another half of the renewable-electricity comes from hydropower. There is a 55 MW installed capacity currently, and further potential is estimated at low values, 10-15 MW for small hydro-plants.

Finally, wind-power played a insignificant role until recently. Permissions were issued up to 330 MW capacity, at which point the Hungarian Energy Office stopped authorization due to fear of grid fragility (Pataki, 2006).

2.1.4 Public awareness

In the past, the Hungarian public was repeatedly found to be little interested in environmental problems compared to other countries. In the early 1990 surveys, such as the 1992 mammoth poll, the “Health of the Planet” survey, it was demonstrated that Hungarians cared the least about environmental problems among the 22 surveyed countries (Dunlap et al., 1992; Dunlap, 1994). The situation changed somewhat during the 1990s. In 1996, Hungarians underlined a number of environmental problems as serious (Meszaros, 1996), nevertheless, environmental problems without direct immediate impacts on the respondents were not considered to be grave.

News and information about the environment started to attract the attention of the public after 2000. In 2001, a Eurobarometer survey was conducted in the Accession Countries regarding their attitudes to the EU and issues related to the EU and the EU decision-making, such as the environment (EC 2002). Almost half of the New Member States’ respondents (48%) declared to be interested in environmental news. However, many other issues (youth, education, social issues, enlargement, etc.) were ranked to be more important. One year later, another Eurobarometer survey showed that environmental developments were the
top interest issues (61%) in Hungary; being ranked even higher than medicine, genetics or astronomy (Hungarian Gallup Organization 2003).

An ALTENER project in 2002, the 4CE (Consumer Choice and Carbon Consciousness for Electricity) survey analysis found that concern about the impacts of electricity is rather high in Hungary (around an average of 7-8 points on a scale of 10), above European average (Palmer, 2003; Kiss, 2005). In 2004, in the scope of the special Eurobarometer survey 32% of Hungarians chose climate change as one of 5 most important environmental problems that they were worried about from a list of 15 items (EC, 2005c). The ratio fits well into the NMS average, however staying way below the EU15 average (47%).

Energy saving awareness is significant in Hungary. The recent surveys (e.g. the special Eurobarometer EC, 2006; Valko, 2003) have shown that over 50-60% of the population pays particular attention to environmental/energy saving information on a product when shopping. Energy saving is among the top priorities that Hungarians actually do as environmentally friendly behavior (Lang, 2000). Valko (2003) found that respondents prioritize energy saving measures as means to reduce environmental impact.

2.1.5 Willingness to pay (WTP)

In the 1992 Gallup research (Dunlap et al., 1992; Dunlap, 1994), people could also report on their personal concern and willingness to act in the form of, for instance, having avoided certain products in the light of environmental protection. 41% of the Hungarians had done so. This ratio rose to 51% in 1994; nevertheless, Hungarians were still in the lower third of the world in this respect.

Gallup and Gallup conducted a study in Hungary on the public opinion about prices of energy, consumption of energy, and about taxing environmental damages and energy consumption (Gallup and Gallup, 2004). According to the survey, two thirds of the population support that the state should tax more those activities that exert a larger pressure on the environment. At the same time, 7 out of 10 oppose to pay more tax, even if the income would be spent on improving the environment. This attitude definitely makes it hard for the policy-maker to take harsh actions. Similar results were arrived at recently (EC, 2006), where 40% of those surveyed supported increasing tax incentive in order to increase energy efficiency. This option was the most favored among policy measures that national governments should engage in (even for more information “only” 36% voted). However, 66% would not be prepared to pay more for electricity produced from renewables, and nobody would be willing to pay more than 10% above current bills (EC, 2006). As shown in Figure 8, Hungarians are among the least willing-to-pay nations, but still score better than most of other New Member States, i.e. countries with similar historic, economic, sociological background. These findings reflect the results from 2003, when Valko found 40% of the survey participants to be sure to pay for environmentally friendly products and 30% unsure, i.e. not directly negating. He considered this level to be satisfactory (Valko 2003).
In another survey; however, 85% of the respondents would not mind paying maximum 5% more for electricity if it was produced (at least partially) from wind-power (Callis Energetika Rt., 2006).

These data indicate that the Hungarian population has developed much in the sense of being sensitive to environmental problems. People are willing to act themselves and save energy as well as support the increasing of RES in the country. To some extent, and more so than countries in a similar position, they support higher taxes/prices even if it affects their own finances, a level can that can be regarded as reasonable. Thus, these findings call for more support for the public to increase their sustainable energy use, in the form of financial incentives, loans, rebates, besides the generally quoted awareness raising and price adjustment practices.

### 2.2 Policy framework and support schemes

The most recent strategic energy document is the 1993 Energy Policy Concept (Resolution 21/1993 (IV.9) OGY). The Energy Policy Concept to some extent in fact can be considered as a modern energy strategy regarding its targets and focus. Nevertheless, it does not fully correspond with current
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priorities (Hatvani, 2006), and it is definitely out of date (building on an earlier energy, economic, social, political situation of Hungary), as well as somewhat one-sided because of its emphasis on supply-side interventions (Energia Klub, 2006). Among the targets, the Energy Policy Concept already identified the objective of increasing the share of RES to 5-6% of primary energy (IEA, 2003). At the moment, the Hungarian Government is in the process of preparing a long-term (2006-2030) energy strategy (INFORSE-Europe, 2006; Hatvani, 2006; Tihanyi et al., 2006).

Currently, energy policy in Hungary is determined by global, EU and Hungarian policies and guidelines. At the global level, the most important agreement from the point of view of energy policy is the Kyoto Protocol. Satisfying the requirements of the Protocol is embedded into EU and Hungarian policies and guidelines, so we are taking a summary look at them mentioning only those that are relevant to the discussion in the present paper.

The EU adopted the Green Paper on Energy Efficiency in 2005, which aims at reducing costs in the energy sector and promoting energy efficiency. In line with the Green Paper – Towards a European Strategy of Energy Supply (2000), it observes that increasing demand for energy cannot solely be met by renewable energy sources but have to be supplemented with measures for high efficiency in production and use. The Green Paper on Energy Efficiency sets the target of reducing energy use by 20% solely through efficiency measures. To comply with the guidelines and targets laid down in these documents, member states need to draw up national energy efficiency strategies, inform households, improve the energy efficiency of buildings, adjust taxes on energy so that they reflect real pollution levels, and introduce appropriate fiscal measures. (Tihanyi et al., 2006)

The EU and member states financially support the achievement of the above-mentioned aims from five basic sources, through:

- the EU community programmes such as the research framework programmes, the Intelligent Energy for Europe programme, etc.;
- the applications and tenders relating to the Hungarian National Development Plan and the Cohesion Fund;
- Hungarian national funding;
- national financial support mechanisms such as feed-in tariffs, purchase obligations, guaranteed prices, etc.; and
- other sources, for example bank loans, International Financial Institutions, initiating and encouraging private sources. (EC, 2005a; Tihanyi et al., 2006)

Although the aims and objectives in terms of more sustainable energy production and use are clearly stated in various policy documents, the amount of funding available, for example for renewable energy sources, does not necessarily reflect them.
Greenpeace (2005) collected data on the distribution of EU research and development funding spent on the different energy sources. Based on data from Eurobarometer and the European Commission, they found that although the public would support research on renewables, most of the funds are spent on nuclear energy research (Figure 9). This seems to hold for the 7th Framework Programme as well (Figure 10).

Figure 9: Support for R&D budgets for energy technologies vs. actual allocations (%) (Eurobarometer and European Commission Framework Programme, both quoted in Greenpeace, 2005)

Figure 10: Comparison of energy and nuclear research and development budgets (million EUR) (Cordis and European Commission, both quoted in Greenpeace, 2005)

The same can be said for the European Investment Bank (EIB) that has a larger lending portfolio than the World Bank. Based on data from the Bank and Bankwatch Network, only 5% of its lending was spent on renewables – the same amount as on coal, while most (61%) went to gas and electricity networks (Greenpeace, 2005).
In Hungary, compared to larger and economically better performing countries, only a very limited amount of resources are available for research and development in general. Based on 2005 data from the DG for Research, the average amount of financial resources spent on research in the EU25 is 1.93% of the GDP for the government, and 1.23% for business enterprises. The same numbers for Hungary are 0.95% and 0.35%, respectively. (Tihanyi et al., 2006)

At the same time, there are several important sustainable energy production and consumption support mechanisms in Hungary that need to be mentioned. First of all, the Electricity Act (VET 2001 CX) introduced a feed-in tariff system for renewable electricity from January 2003 (INFORSE-Europe, 2006). Secondly, the government has been operating a National Energy Efficiency Programme since 2000 introduced by the Governmental Decree of 1107/1999 (X.8). This sets the target of increasing the share of renewables to 5-6% of the total energy supply by 2010. The National Energy Efficiency Programme had support programmes in eight different areas, offering part-financing for households, local authorities, homesteads, SMEs, etc. Table 1 shows that the funding available in the frame of these programmes is less than there would be demand for. Furthermore, there is an increasing number of households as well as organisations interested in increasing the energy efficiency of their building and utilising renewable sources for energy generation (Fodor et al., 2005).

<table>
<thead>
<tr>
<th>Year</th>
<th>Programme</th>
<th>Planned funding million HUF</th>
<th>No. of applications</th>
<th>Claimed funding million HUF</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>households</td>
<td>150</td>
<td>289</td>
<td>150</td>
</tr>
<tr>
<td></td>
<td>all programmes</td>
<td>910</td>
<td>638</td>
<td>910</td>
</tr>
<tr>
<td>2001</td>
<td>households</td>
<td>700</td>
<td>3751</td>
<td>1133</td>
</tr>
<tr>
<td></td>
<td>all programmes</td>
<td>3000</td>
<td>4337</td>
<td>3490</td>
</tr>
<tr>
<td>2002</td>
<td>households</td>
<td>2900</td>
<td>7432</td>
<td>2308</td>
</tr>
<tr>
<td></td>
<td>all programmes</td>
<td>4000</td>
<td>7678</td>
<td>3054</td>
</tr>
<tr>
<td>2003</td>
<td>households</td>
<td>1213</td>
<td>4523</td>
<td>1440</td>
</tr>
<tr>
<td></td>
<td>all programmes</td>
<td>3240</td>
<td>4785</td>
<td>2951</td>
</tr>
<tr>
<td>2004</td>
<td>households</td>
<td>850</td>
<td>4311</td>
<td>1441</td>
</tr>
<tr>
<td></td>
<td>all programmes</td>
<td>2550</td>
<td>4601</td>
<td>2515</td>
</tr>
<tr>
<td>2005</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>no information is available yet*</td>
</tr>
<tr>
<td>2006</td>
<td>households</td>
<td>183</td>
<td>7500</td>
<td>no information is available yet*</td>
</tr>
</tbody>
</table>

Table 1: Funding for energy efficiency programmes in Hungary (adapted from Fodor et al, 2005, based on data from the Hungarian Ministry of Economics and Transport)

Unfortunately, the National Energy Efficiency Programme was stopped indefinitely in 2005 due to lack of resources (Tihanyi et al., 2006; Fodor et al., 2005). In 2006, it was re-opened for households for a very short period

* The Ministry originally planned to fund 500 (!) households.
of time (ten days!), during which an overwhelming number of applications were handed in as indicated in Table 1, supporting our claim above that households would indeed be ready to change to renewable energy sources and more energy efficient solutions should the supporting funding and infrastructure be available.

Although the programme was discontinued, a different mechanism for improving the energy efficiency of block houses was set up and is still rather popular and successful since 2000 (Tihanyi et al., 2006).

Nevertheless, as the conversion to renewable electricity sources requires long-term thinking and investment, the temporary abandonment of financial support results in high levels of uncertainty and low levels of commitment especially on the part of households and organisations lacking capital for investment (Tihanyi et al., 2006).

2.3 Energy subsidies

The European Environmental Agency (2004) states that “There is some evidence that, in historical terms, renewable energy subsidies in the EU15 are relatively low in comparison with other forms of energy during periods of fuel transition and technology development.” (pg. 5.)

There is no harmonised reporting framework for energy subsidies, thus it is difficult to know exactly how much and what form of funding is available for the various energy generations and efficiency methods (Irrek, 2002; OECD, 2002; EEA, 2004). The 2004 EEA report on subsidies, nevertheless, claims that “At current levels of political and financial support, the EU 15 renewable energy targets for 2010 will not be met.” (pg. 6.) This is even though renewable energy sources offer reduced environmental impact and increased energy independence or security, all of which are the proclaimed objectives of the EU.

2.3.1 Negative or environmentally harmful subsidies in Hungary

Several EU-level reports and studies acknowledge that there would be need to create a harmonised reporting system for all energy subsidies – positive and negative – at the EU, national and sectoral levels (OECD, 2002; EEA, 2004; Greenpeace, 2005). At the moment; however, no such system exists, which makes data collection and comparison between countries and, indeed, sub-sectors (e.g. fossil fuel and renewables) extremely difficult if not impossible.

To further complicate matters, there is no agreed definition for subsidies (Irrek, 2002; EEA, 2004). As Irrek (2002) claims, it is possible to apply a narrow (i.e. direct support from the government that can be identified in the national accounts) or a broad (i.e. any measures that result in altered prices of preferential treatment) understanding. The study conducted in Hungary (Kiss, 2006) adopted the latter definition, and identified the following four types of environmentally-harmful subsidies in the country:

- direct and indirect budgetary subsidies;
- under-valuation of natural resources;
- failure to impose external costs; and
- harmful infrastructural development funded from public funds.
Specific subsidies given to the energy sector, relating more specifically to the extraction of fossil fuels:

- royalties that were not or were only partially collected from fossil fuel extraction companies,
- indirect support for the opening of new mines, and funding recultivation from public funds after closure;
- failure to impose external costs; and
- support based on import prices, applying the more favourable import price.

Apart from subsidising extraction, the Hungarian state also provides support for electricity generation and distribution (Kiss, 2006). These are the following:

- electricity prices in Hungary, in comparison to EU15 countries, are relatively high, increasing the profit of the companies;
- people employed in the electricity generation and distribution sector are allowed to purchase electricity (20 000 kWh/person/year) at a substantially reduced price that is included in their remuneration package and thus reducing the wage-related expenditure of electricity companies and associated taxes and contributions payable to the state; and
- external costs not imposed.

3 Scenarios and projections for the future

Based on a study conducted for the Ministry of Economy and Transport (GKM) in Hungary as a background for the preparation of the new energy policy and strategy, demand for energy is projected to increase in the next couple of decades. The increase, based on preliminary data, is calculated to be between 0.4 and 1% for primary energy, and between 1 and 3% for electricity (GKM, 2005). As we argued earlier, growth in GDP is decoupled from growth in CO₂ emissions for the time being (Archibald et al., 2004), partially due to the restructuring of the industry. However, CO₂ emissions are projected to start rising again (EEA, 2005).

There is still a huge potential for energy efficiency improvement in Hungary, one of the largest (30%) for the household sector (Energia Klub, 2006; Nilsson, 2006; Figure 11). With this, and the European Union target of 20% energy saving potential in mind it should be possible to substantially increase the amount of energy saved, or in other words Hungary has a significant “negajoule” potential (Energia Klub, 2006).
Figure 11: Energy intensity of EU Member States in 2003; toe/million EUR of GDP at 1995 market prices (EC 2005).

The estimated potential for renewable energy sources varies to a great extent as can be seen from Figure 12. Based on the high estimates, it seems possible to satisfy more than twice the current Hungarian energy demand using solely renewable energy sources. As today only a very small percent of the low estimate is utilised, in their scenario for a sustainable energy future for Hungary, the Energia Klub (2006) calculated with a modest one fifth of the total high estimate. Figure 13 illustrates the resulting CO₂ emission reductions, which would satisfy the requirements of the Kyoto Protocol as well as create considerable income for the country as emission values would continuously stay below the defined targets.

Figure 12: Estimates for renewable energy potential in Hungary, PJ/year (adapted from Energia Klub, 2006, based on data from the Ministry of Economy and Transport, the Ministry of Environment and Water and various studies conducted at Hungarian universities)
The sustainable energy future scenario is built on the assumptions that

- compared to the base year of 2005 energy efficiency and energy saving measures result in a 30% reduction in per capita energy use;
- nuclear energy is not used anymore after the useful lifetime of the current blocks is completed; and
- the utilisation of renewable energy sources will be nine times more of their current use – an amount that is still about one fifth of the high estimate in Figure 12.

Obviously, at the moment this is merely one of the options and strategies suggested. As it has been stated several times, the energy and climate change strategy of Hungary are currently being debated (Tihanyi et al., 2006; Energia Klub, 2006; http://www.gkm.gov.hu)

At the same time, in order to be able to meet existing requirements related to renewable energy utilisation and support mechanisms, Hungary will need to take concrete steps soon. The EC (2005a) found that renewable energy support policies in Hungary are not coordinated sufficiently and there is a varying degree of political support that makes coordinated action and long-term planning, on part of investors, producers and consumers very difficult. Furthermore, the implementation of the guarantee of origin process required by Article 5 of Directive 2011/77/EC to move towards more transparency is only at the very initial stage in the country.

### 3.1.1 Case studies that point toward a more sustainable future

In this section, it is our intention to show that in spite of not particularly supportive policy and financing conditions, a growing number of voluntary and consumer-initiated more sustainable energy use and production oriented case studies exists. Many of these are organised and coordinated by NGOs that focus on different aspects of sustainable energy consumption and production, starting from

1. awareness raising, advice on energy efficiency at home and at work as well as teaching people how to build their own solar panels and wind turbines;
2. informing and influencing policy making; to
3. creating and maintaining demonstration sustainable energy use and production examples.

Selected examples for each of these categories include the following:

1. ▪ Operation of an energy advisory network, the Green Energy Network (ZEH) established by a number of environmental NGOs, the members of the network provide free advice on renewable energy and energy efficiency to households,¹
▪ NGOs organising workshops for people so that they can build their own solar panels and wind turbines,
▪ NGOs motivating and taking part in the creation of the Energy Efficient Local Authorities Network,
▪ Creating an NGO, the Carbonarium Association², the members of which keep track of their own CO₂ emissions, compare them with one another, implement mitigation measures, and pay the membership fee based on their calculated CO₂ emissions.

2. ▪ An interesting example of this kind of activity is the Climate Change Campaign of Friends of the Earth Hungary that encourages individuals of all ages to take their own climate change “vows”, collect these and forward them to policy makers both in Hungary and at the global level. They do this in order to educate people, on the one hand, and convince policy makers on the other to take more action (e.g. provide more support for public transport and household level renewable electricity generation) because people are ready to change.³

3. ▪ Operating training and eco-tourism facilities that are heated and lit solely by renewable energy sources. A particularly good example for this is the Gömörszőlős sustainable village initiative in Northern Hungary where the NGO that developed and manages the project also involved the local people in the construction phase so that they learn that sustainable energy is available for everyone.⁴

¹ More information is available at http://www.energiaklub.hu/en/?PHPSESSID=dd6209cfe47575d268a9119765fc8edd
² More information is available at http://www.carbonarium.com/
³ More information is available at http://www.mtvsz.hu/programok_list.php?which=12&PHPSESSID=d2a2b4749635e67bdf285dd82a050956
⁴ More information is available at http://www.ecolinist.hu/ecolinist/html/index2.html
Finally, several individual households decide to construct their own independent power system, if they are lucky with state incentive through taking part in the National Energy Efficiency Programme that was described above, or relying on their own funds. An individual project providing an example for how people can reduce the payback time of a renewable energy based independent power system is described by Richard Halmay’s master’s project (2005). He bought a small farm in the Great Plain region of Hungary that had no electricity supply. As the farm is situated some distance away from the nearest village, he was not sure that connecting to the grid would be the best solution, so he examined three potential options, which were the following: connection to the grid, operating a fossil fuel powered generator and constructing a wind and solar power based individual system. His calculations show (Figure 14) that although the individual RES based system requires more investment than the fossil fuel powered generator, in the long run, with funding from the National Energy Efficiency Programme after 8 years, it becomes the most competitive option economically as well.

4 Conclusion and considerations for future research

It is now accepted in the scientific community that in order to reach sustainable development, or using the vocabulary of ecological footprinting, reduce humanity’s overshoot, consumption and production also need to become more sustainable. Human impact on the environment is determined by the size of the population, the amount of resources this population consumes and the intensity with which the resources are consumed (WWF et al., 2006). The ways in which energy is produced and consumed play an important part in determining both the amount of resources consumed and

Figure 14: Payback time of the different options calculating with inflation and energy price increase (costs are in HUF) (Halmay, 2005)
the intensity of consumption. Thus, it clearly has a very important role to play in sustainable consumption and production (SCP) research. Indeed, it would be of great importance to encourage more discussion between energy and SCP experts to arrive at a better understanding of the issues and engage in a more successful dialogue with policy makers.

The paper addressed quite a large number of issues, and is still far from providing an all-encompassing picture of the Hungarian energy scene, which, of course, is integrated into regional and global systems. On the basis of our discussion, the following issues seem to be the most pressing or need further investigation.

1. Much more detailed studies are needed to uncover and map all types of support available for the different forms of energy in order to analyse whether the various financial support mechanisms indeed encourage sustainable consumption and production. This outcome is in agreement with the EU’s Sustainable Development Strategy (Council of the EU, 2006) that sets the objective that “By 2008, the Commission should put forward a roadmap for the reform, sector by sector, of subsidies that have considerable negative effects on the environment and incompatible with sustainable development, with a view to gradually eliminating them.” (pg. 24.) This should be supplemented with investigation at the national level.

2. The above is of vital importance as data and trends seem to suggest that not enough financial and political support is available, so neither can renewable energy capacity utilised to its best potential nor can the willingness and readiness of the population as expressed, for example, in the number of grant applications handed in, be harnessed.

3. From the point of view of effective CO₂ emission reductions, on the basis of the paper, and the literature (Gerlagh and van der Zwaan, 2006; Nilsson, 2006), an integrated and at the same time diversified approach appears to be most effective. This means that a debate (often experienced recently) on whether to finance energy efficiency or renewable electricity development would be more urging does not seem neither appropriate nor necessary, as both of them are needed to achieve the CO₂ emission reduction outlined in the different policy documents and agreements. This approach, however, should be implemented at the regional and local levels with consideration to their characteristics and capacity from the point of view of energy consumption and production (Figure 15).
Figure 15: System combinations of energy intensity in use and energy density in supply — how energy efficiency and RES come together to an integrated sustainable energy system (Nilsson, 2006)

4. At the same time, as the surveys conducted about the level of awareness on environmental and energy related issues indicate, there is a great need for the education of all segments of the population, including consumers, producers as well as decision makers. In order to achieve more sustainable energy consumption and production, people need to understand the link between environmental problems and their energy related practices. Thus, again, cooperation between energy and SCP experts would be essential.

5. There is need for more research on the environmental impacts of the various energy technologies throughout their lifecycle with reference to local circumstances as well as future potential for use. This is necessary in order to overcome the great uncertainty about the impact of different technologies (Figure 16) and their potential to satisfy demand in a sustainable way.
Figure 16: Comparing the footprints of different energy technologies (WWF, 2004)

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