



*Proceedings*

**International Workshop**  
**on**  
**Driving Forces of and Barriers to**  
**Sustainable Consumption**

**University of Leeds, Leeds, UK**

**March 5-6, 2004**

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**With the Assistance of Anamika Barua and Dabo Guan**

**Organized by**

**Leeds Institute for Environmental Science  
and Management (LIFE) at the School of the Environment,  
University of Leeds, UK, and  
Research Centre for Life Cycle Assessment, AIST, Japan**

**In Cooperation with the**

**United Nations Environmental Programme (UNEP)  
Heterodox Economics for the Environment  
and Development (HEED)  
European Society for Ecological Economics**

## PREFACE

This workshop serves to promote international cooperation on sustainable consumption research. For LiFE, this is part of a series of activities on Sustainable Consumption, including a variety of research projects, and a follow up of a successful first workshop on this topic between researchers of the UK and the Netherlands in September 2002. LiFE has just started a new project on “Trade-offs in decision making for sustainable technologies” funded by the UK Economic and Social Research Council (ESRC). Also recently started was a collaborative research project with the International Institute for Applied Systems Analysis (IIASA) in Laxenburg and the Institute for Social Ecology, Vienna, Austria to investigate consumption patterns in different residential areas in Vienna. This project focuses on learning about (1) motives for sustainable consumption, (2) institutional driving forces and barriers, and (3) the rebound effect which might offset isolated environmental behaviours. Another exciting project is modelling environmental effects of lifestyle change in China. Its economic growth, urbanization rate and challenging demographics within a mixed political economic system provide interesting insights into environmental problems and policies in a (fast) developing country. Simultaneously, researchers in LiFE undertake theoretical work on alternative foundations of consumer behaviour, especially the needs and capabilities approaches.

For the Research Center for Life Cycle Assessment, AIST the workshop is an opportunity to collaborate on an important Japanese project named “The promotion project in international research collaboration on global climate change”. This project was started in November 2002 by the Ministry of Economy, Trade and Industry (METI) of Japan. As part of the programme, the Society of Non-Traditional Technology (SNTT) promoted a new project, “Life Cycle Approaches to Sustainable Consumption”. The aim of this project is to find new ways to reduce CO<sub>2</sub> emissions through changing consumption patterns, e.g. by promoting Product Service Systems. A steering committee consisting of members from academia, research institutes, and industry headed by Dr. Atsushi Inaba of the Research Center for Life Cycle Assessment of the National Institute for Advanced Industrial Science and Technology (AIST) was founded.

A series of workshops has been organised in cooperation with the Sustainable Consumption programme at the United Nations Environment Programme (UNEP) in Laxenburg, Austria (Nov. 2002), Paris, France (March 2003), Tokyo, Japan March 2003 and November 2003.

The Environment Programme of the United Nations, is one of the organisations responsible for encouraging and implementing the ten year framework on sustainable consumption and production (as agreed upon at the Johannesburg World Summit on Sustainable Development). In particular through its Paris-based Sustainable Consumption programme the organisation facilitates and organises global and regional meetings on this issue, and provides substantive support to governments and other stakeholders on issues such as improving the scientific knowledge base (like sustainable product criteria, through its Life Cycle Initiative), promoting business involvement in the issue (with instruments such as voluntary initiatives and partnerships, eco-design, product services systems, corporate social responsibility), assisting governments to implement policies (implementing UN Guidelines on Consumer protection, sustainable procurement, carrying out consumer awareness campaigns) and involving civil society (consumer, women and youth organisations).

The organizing committee is very much interested in deepening and extending our collaboration on the mentioned activities. It would be our great pleasure to have your collaboration.

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# **TOPIC ONE**

***-Opening Session-***

# Current Status of the SC Project in Japan - From “What is the practical way to Sustainable Consumption?” in Tokyo, Japan to “Driving Force and Barrier of Sustainable Consumption Implementation” in Leeds, UK -

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## Overview

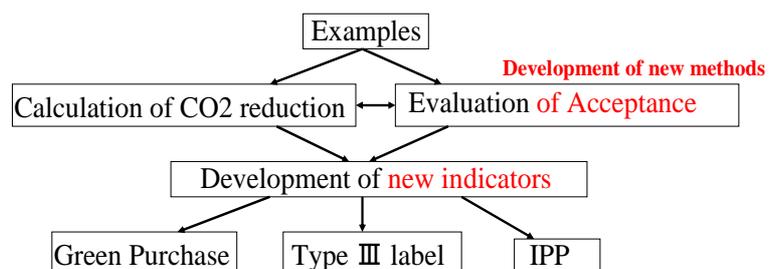
Since November 2002, the project on Sustainable Consumption (SC) has been initiated by the Society of Non-Traditional Technology (SNTT) led by Dr. Atsushi Inaba, the Director of the Research Center for Life Cycle Assessment, national Institute of Advanced Industrial Science and Technology. This project is funded by the Japanese Ministry of Economy, Trade and Industry within the framework of “The Subsidy Program Supporting Projects for the Development of Carbon Dioxide Fixation and Utilization Technologies.”

The aim of the entire project is to find new ways to reduce the CO2 emission from the viewpoint of consumers. This project has two main goals: 1) to establish environmental efficiency indicators in order to evaluate both CO2 emission reduction and consumer acceptance, and 2) to present ways of utilizing such indicators in the environmental tools and policies (e.g. Green purchasing, Type III Eco-labeling, and Integrated Product Policy (IPP in short). To achieve these goals, the project consists of five main fields: 1) collection of examples/cases; 2) development of methods to measure/evaluate consumer acceptance; 3) calculation/ evaluation of the CO2 emission reduction; 4) development of new indicators to present the relationship between the

## Research on the Development and Utilization of Indicators for Sustainable Consumption

The Subsidy Program Supporting Projects for the Development of Carbon Dioxide Fixation and Utilization Technologies, METI

- ◆ To find the ways to reduce CO2 emission by changing Consumption Patterns Nov.2002-Mar.2004

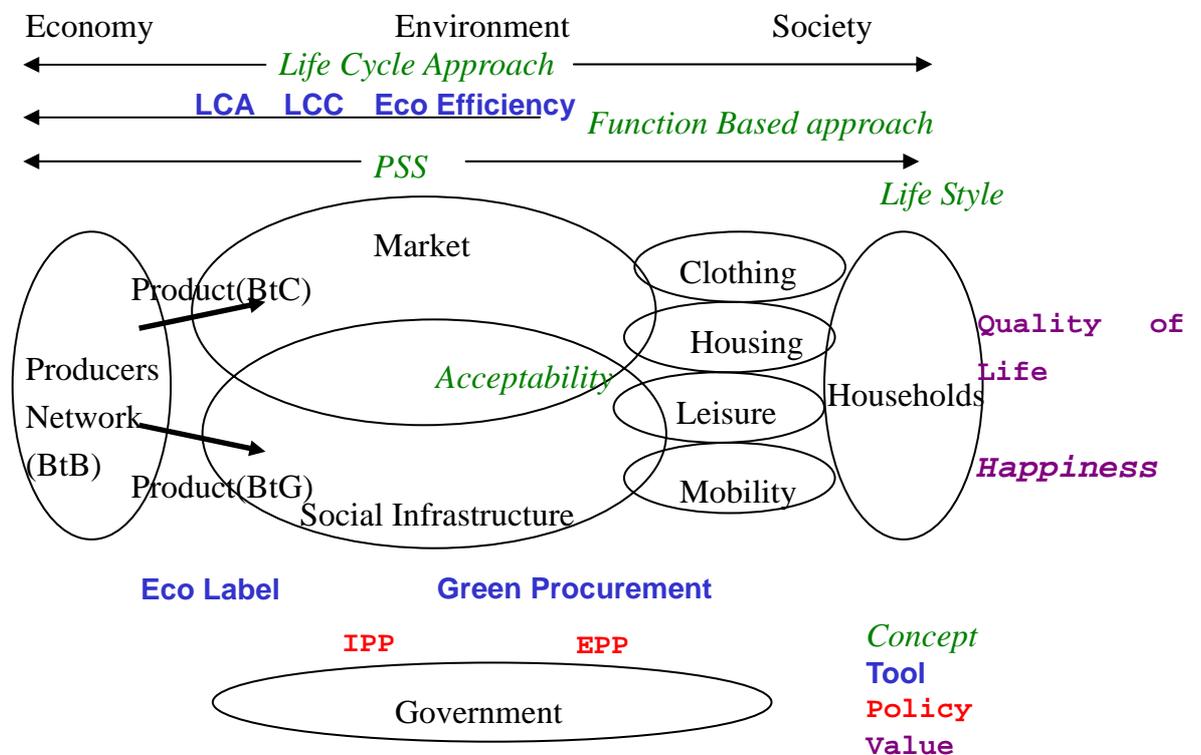


consumer acceptance and the CO2 reduction potential; and 5) the use of the indicators in Green purchasing, Type III Eco-labeling, and IPP.

During the fiscal year of 2002, several accomplishments in the above five fields have been made, which were reported in the first International workshop on Sustainable Consumption held on 19-20 March, 2003 in Tokyo<sup>1)</sup> In this paper, the research framework discussed in the project is described to clarify the target of the activities around Sustainable Consumption in the world. And then, the highlights of the studies of the project on the fiscal year of 2003 are illustrated, which were reported in the Second International Workshop on Sustainable Consumption held on 11-12 December, 2003 in Tokyo<sup>2)</sup>.

### RESEARCH FRAMEWORK OF SUSTAINABLE CONSUMPTION

In order to collect examples of sustainable consumption, following three workshops were organized in the fiscal year of 2003. 1) IIASA/AIST/UNEP Workshop on Life Cycle Approaches to Sustainable Consumption in Vienna, Nov.22, 2002<sup>3)</sup>. 2)AIST/UNEP Scientific Expert Meeting on Life Cycle based Policy Tools for Sustainable Consumption in Paris, Mar. 3-4 2003<sup>4)</sup>; and 3)The First International Workshop on Sustainable Consumption in Tokyo, Mar. 19-20, 2003<sup>1)</sup>. As a result of these workshop, a summary figure of the key words and the framework of sustainable

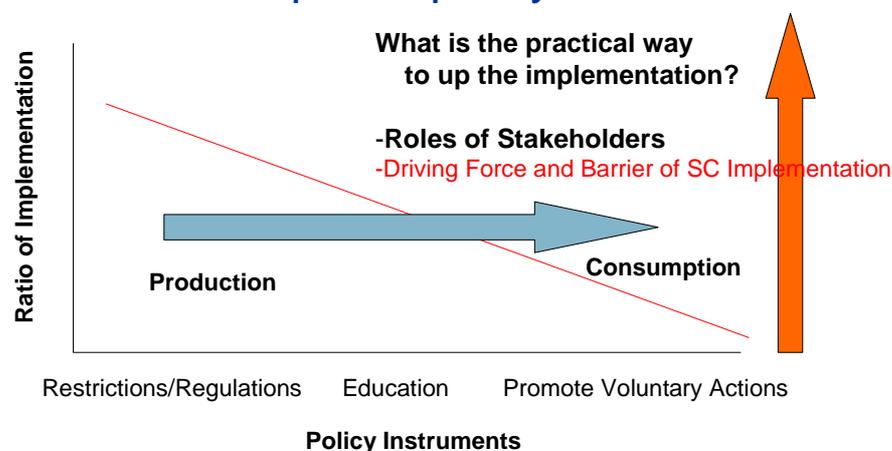


consumption was presented by the project leader Dr. Inaba.

Sustainable Consumption and Production are two pillars for Sustainable Society. In order to establish a sustainable society, it is not enough for producers to provide products and services in sustainable manner. It is crucial for consumers to accept these products and services. Therefore, consumers' acceptance is one of the most important topics in this project. Regarding Sustainable Consumption, "United Nations Guidelines for Consumer Protection," by the United Nation's Environmental Programme, states the following: "Responsibility for sustainable consumption is shared by all members and organizations of society, with informed consumers, Government, business, labor organizations, and consumer and environmental organizations playing particularly important roles. Informed consumers have an essential role in promoting consumption that is environmentally, economically and socially sustainable, including through the effects of their choices on producers."<sup>5)</sup> It is significantly important to know the roles of each stakeholder.

From the political viewpoint, there are three methods to implement sustainable consumption: restriction/regulation, education and voluntary actions of consumers. The former two implementation schemes have been relatively discussed previously. In this project, practical ways to promote the last one must be discussed, which might be independent of the political instruments that were previously experienced and deeply depend on awareness of consumers, although the governmental supports were needed. Fig.2 shows the target audience of the sustainable consumption in the relationship with the political instruments, which were discussed in the second International workshop in December in Tokyo. We have to find the practical ways to up the implementation on the voluntary actions of the people.

## The Target of Sustainable Consumption in the relationship with policy instruments



Original Concept by Dr.T.Mizuno of SNTT

We discussed also the roles of many stakeholders to promote sustainable consumption in the second Tokyo workshop. As the results, some missing keywords were added into the research framework, shown in the fig.3. “Community” is one of the added keywords, which might be important to consider the practical ways for sustainable consumption.

It was pointed out that the old types of rural communities were still alive in the developing countries. In other hand, the new types of cyber communities are being established in the internet circumstance, in which the people having the same type of life style image on sustainable consumption are joined and they are exchanging information keeping their society on their sustainable image. It might have strong power to distribute sustainable lifestyle and to promote sustainable consumption as a result.

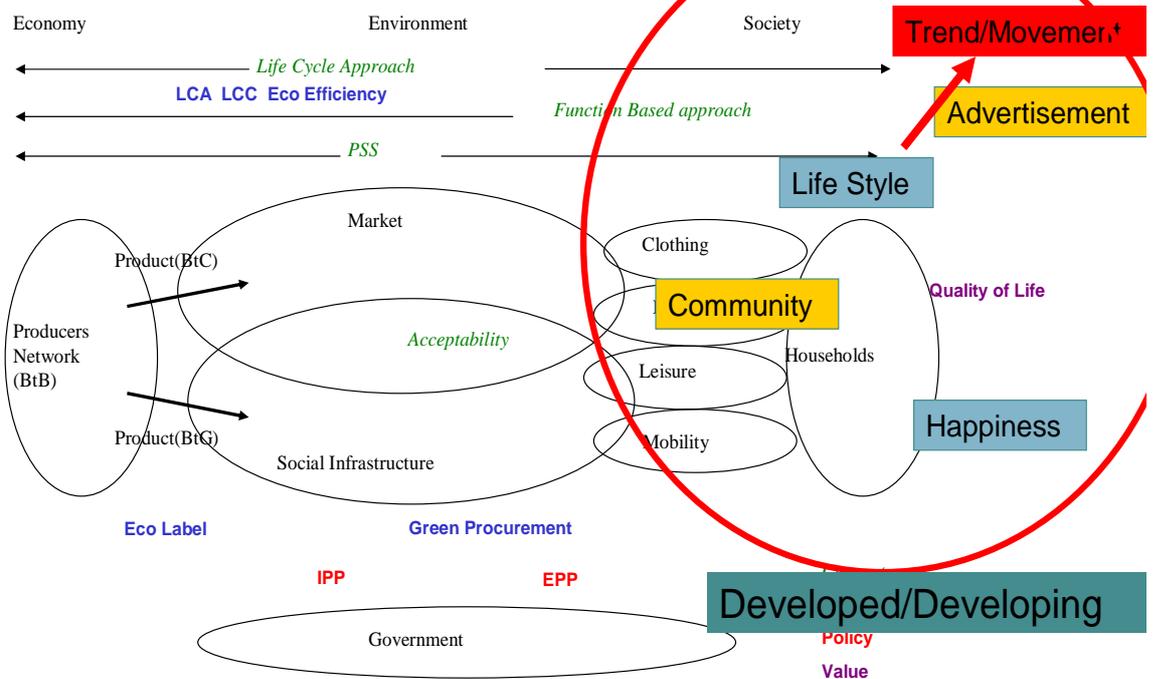
## Tokyo Workshop: 12-13 Dec. 2003 -What is the practical way?-

We need to take into account :

- Stakeholders; Consumer/Industry/Government
- Level; Individual/Community/Society
- Market; Niche/Mass
- Information; Declaration/Advertisement
- Region; Developed/Developing
- Values; Lifestyle/Happiness

### HIGHLIGHTS OF ONGOING STUDIES IN THE FISCAL YEAR OF 2003

## Research Framework on Sustainable Consumption/Production(2)



To create voluntary actions of consumers for Sustainable Consumption, consumers' behavior, lifestyle and its background must be analyzed. And then, as one of the targets of the project, the indicators must be developed, which will be shown to consumers and used to promote the change of consumption patterns. In the fiscal year of 2003, the following studies could be highlighted of the studies in progress in the project.

<Consumers' Behavior/Lifestyle>

- # "Social acceptability of ecological lifestyle" by H.Yamana/Institute for the Arts
- # "A Method of Case-based Evaluation of Consumer Acceptance" by S.Toyoda/MRI
- # "Quantitative Evaluation of Social Acceptability of Products and Services" by T.Ozawa/AIST

<Development/Use of Indicators>

- # "Evaluation of CO2 Efficiency for Product Level" by K.Tahara/AIST
- # "Type 3 Environmental Declaration" by C. Nakaniwa/JEMAI
- # "Development of Products' Environmental Evaluation Method and its acceptability to consumers" by H.Sato/GPN

The project has international collaborators as follows.

- # "Minimizing CO2-emissions per unit of happiness" by P.Hofstetter/BAO
- # "Impacts of consumption on lifestyles and well-being in the supply chain"  
by G.Norris/Sylvatica and Harvard School of Public Health
- # "Methods for evaluating sustainable consumption initiatives"  
by K. Hubacek./University of Leeds
- # "Indicators for Triple BottomLine Innovation Management"  
by M.Kuhndt /Wuppertal Institute for Climate, Environment, and Energy
- # "From ownership to service-based lifestyle :the case of power tools"  
by O.Mont/ Lund University

One of the additional highlights of the fiscal year of 2003 is the establishment of the working group of Sustainable Consumption in Japan. The project raised participants of the working group and has organized three meetings in series by the end of October. Every meeting drew some 40 participants and certain topics, such as "how consumer can accept ecological way of behavior," and "what is the persuasive sustainable indicator" are enthusiastically discussed led by Professor Nakahara of Musashi Institute of Technology and Professor Washida of Toyohashi Sozo Collage as co-chairs. It is expected that these activities would become an incubator for future research projects concerning Sustainable Consumption.

Organizing a series of workshops is another accomplishment for the project. After Tokyo workshop in December, the workshop at University of Leeds, UK is organized on 5-6 March, 2004 by Dr. K.Hubacek. The aim of the workshop is to discuss about "Driving Forces and Barriers" for Sustainable Consumption, which could follow up the aim of this Tokyo Workshop, Practical ways for Sustainable Consumption.

## **FUTURE VISION/CONCLUSION**

Since the start of the project last year, in Japan, some researchers/consumers seem to have gradually realized the concept of Sustainable Consumption to be crucial and have begun enthusiastic discussions about it. Those are probably the most important outcome of the project.

It is now just at the middle point of the project period. The project must be completed by the end of March, 2005. We have to develop new indicators involving consumers' acceptance and to find practical ways to use those indicators.

Although "Sustainable Consumption" is very broad concept, in this project, we have found almost the research framework and future research tasks at least. It might be useful to go to the next research step. In addition, it is crucial to look at a wide range of fields, such as technology, science, social studies, physiology, economy and ethics. Collaborations and partnerships within each stakeholder are the most important.

## **REFERENCES**

- [1] The first Tokyo workshop;  
<http://unit.aist.go.jp/lca-center/english/sustainable/e-sustainable.top.html>
- [2] The second Tokyo workshop; <http://unit.aist.go.jp/lca-center/english/symposium.htm>
- [3] IIASA workshop; <http://www.iiasa.ac.at/cgi-bin/pubsrch?IR02073>
- [4] Paris workshop; [http://www.uneptie.org/pc/sustain/events/eventsunep\\_aist.htm](http://www.uneptie.org/pc/sustain/events/eventsunep_aist.htm)
- [5] <http://www.uneptie.org/pc/sustain/guidelines/un-guidelines.htm#1>

## **Consuming Paradise?**

### **- Unsustainable consumption in cultural and social-psychological context**

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‘An individual’s main objective in consumption is to help to create the social universe and to find in it a creditable place.’

Douglas (1976: 207)

#### **Behind the Consumer Society: Commonality and Difference**

We are living in a consumer society. To say this, is not just to make obvious points about the massive expansion in the availability of consumer goods in developed economies over the last fifty years. It is not just to point to the structural reliance of those economies on consumption growth, or even to highlight the extensive commercialisation of previously public goods and services. All these things are important. But almost certainly there is more going on. Fundamental aspects of our cultural identity are different now from what they were a hundred and fifty or two hundred years ago. Modern consumer society has its own logic, its own dynamics, its own epistemologies and ethics, its own myths and cosmologies. And all of these are identifiably different from those of other times and places (Baudrillard 1970, Baumann 1998, Campbell 1987 & 2003, Cushman 1992, Giddens 1991, Robbins 2002, Taylor 1989).

None of this is very surprising. What defines culture is difference. Anthropologists and sociologists would be surprised – and worse still out of a job – if different societies at different times were all found to operate in pretty much the same way, under the same logics and the same narratives. At the same time, most social sciences – including anthropology and sociology, and almost certainly psychology – would founder if it were not possible to regard at least some aspects of human functioning as common across even quite striking cultural differences. At the very least, these sciences would be absolutely useless to us in understanding either society or human motivation if it were not possible to identify some features of both that could be regarded if not as strictly constant, then at least as evolving rather slowly over time.

A part of the aim of this paper is to illustrate how this ability to negotiate between commonality and difference is vital to an understanding of (unsustainable) consumer society. It is also as I shall argue extremely useful in helping us to develop policies for a sustainable society. The substantive part of my paper however is to argue in favour of three inter-related social-psychological ‘propositions’ which I hope can help us both to understanding unsustainable consumption and to further sustainable consumption.

#### **The Naming of Names**

Before elaborating these propositions, however, let me illustrate this balance between commonality and difference with two specific examples, whose relevance will I hope become clear later on.

The first example comes from anthropology. Anthropologists have always placed a good deal of importance on the existence and functioning of exchange rituals. Gift-giving, barter, trade, betrothal, slavery, dowry, the 'droit de seigneur', human sacrifice, and the swapping of football cards amongst (usually male) teenagers: these are all examples of exchange rituals. There are often striking differences between the particular kinds of ritual which predominate and the forms these exchanges take in different cultural groups. Indeed, these operational differences can be as profound as whether private property rights are or are not recognised within a particular group; whether the rights of the individual are more or less important than the rights of the group; or, more spectacularly, whether one cultural group recognises the basic rights of another cultural group at all – as for example in the case of slavery. But the importance of exchange, its relevance to kin relations within the family, to social relations within the group and to the defining of similarities and differences with other groups is taken as read. In other words, exchange is regarded as a necessary prerequisite for certain kinds of social functioning – in all societies (Levi-Strauss 1949, Douglas 1976, Douglas and Isherwood 1980).

A second example of the balance between commonality and difference is provided by the concept of social or psychological 'anomie' – a potentially catastrophic 'loss of meaning' that can threaten the stability both of society and of individuals within society. Sociologists and social philosophers have paid considerable attention to this phenomenon ever since Durkheim's work on suicide. But they have also emphasised the countervailing force of 'nomization' – a continuing social process of meaning creation and maintenance that is essential to keep anomie at bay – both at the personal and at the social level. Meaning is created, maintained and sometimes destroyed through a variety of different kinds of social and institutional processes and relations, including personal and social identity, nationalism, communalism, kin relations, governance, cultural narratives and various forms of religious structure and organisation (Berger 1967, Camus 1966, Durkheim 1897, Giddens 1991, Weber).

The specific forms of these processes again differ widely in different societies. In one society organised religion plays a key role. In another society anomie may be kept at bay through strong nationalism and binding institutions. In yet another, meaning is negotiated via myths, story-telling and forms of folk religion. What these societies hold in common is their aim of negotiating meaning and staving off anomie.

The two examples are connected. One of the key avenues of nomization – as the etymological roots of the word indicate – is the 'exchange of names' (Levi-Strauss 1949). When male teenagers (and sometimes grown men) exchange pictures of their favourite football players, or engage in hours of banter regarding the latest exploits of their favourite team, they are – to use Mary Douglas' (1976) phrase 'enjoying the conversation of names'. When a whole nation unites behind a particularly skillful fly-half who has dramatically clinched victory in a world cup competition by drop-kicking a spectacular goal in the dying minutes of extra-time – they are engaging in a process of nomization: the maintenance of social and cultural meaning – pursued through the collective recognition and repetition of a name: in this case, of course, Jonny Wilkinson.

And just in case we find ourselves tempted to dismiss this kind of activity as puerile and beneath contempt, we should perhaps pause to recognise that 'sustainable consumption' is itself a name. There is a sense in which what we are engaged in here at this workshop is an exchange ritual. And much of what we exchange here, in addition to erudite papers, constructive comments and the occasional ascerbic barb, can be construed as a process of

nomization. As a research community, we define ourselves around a name, 'sustainable consumption', and set of ideas expressed in a common language which for us provide a framework of meaning within which communication is possible. And if you think carefully about this name, sustainable consumption, you will find that it only really makes sense within a particular context: the context of a certain community, operating in a particular history of policy development and dialogue, and probably within a limited period of time.

But my point here is not to deconstruct the underlying anthropological nature of the sustainable consumption debate. It is rather to illustrate how anthropology and sociology and psychology continually negotiate between commonality and difference, between underlying psychological, sociological or anthropological concepts and processes (for example: exchange, anomie, nomization) and historically and culturally contingent social phenomena (such as football cards, rugby matches and sustainable consumption workshops). To be more precise what these sciences help us to do is to understand contingent phenomena in terms of underlying processes.

### **A Proposition about Human Functioning**

But let me proceed straight to the first of my propositions about these underlying processes. This is something I have in a sense already primed you for. In my 'naming of names' example, I already suggested that both anthropologists and sociologists recognise the importance of exchange to certain social and psychological processes. My first proposition is a social psychological proposition that links these processes to human motivation.

***Proposition 1:*** The motivations of human beings can be construed in terms of a variety of common 'functionings'.

It would be hard to believe from a casual observation that this seemingly innocuous proposition is in fact an attempt to negotiate an extraordinary minefield of disagreements both within and outside the discipline of psychology. You might perhaps be able to recognise the source of these disagreements if I replaced the word 'functionings' with the word 'needs'. In fact, in this form, Proposition 1 would look very much like something that characterised the development of social psychology for around the first sixty or seventy years of the twentieth century. From William McDougall's early characterisation of instincts to Abraham Maslow's hierarchy of needs, social psychology has made a series of concerted efforts to understand motivation in terms of underlying needs. And it might have made a lot of sense for me to phrase my proposition in terms of needs, precisely because the discourse of needs is something that sustainable development is broadly familiar with (WCED 1987).

Unfortunately, that discourse attracts as much criticism as it does praise, particularly amongst anthropologists and sociologists (whom I would, for the moment at least, like to keep on-side). These social scientists tend to accuse proponents of needs theories of a variety of crimes. Baudrillard (1968), for example, argues that the whole needs discourse is a 'naïve and absurd moralism'. And Campbell (1998) suggests that the use of the word need is a purely rhetorical device whose aim is to impute moral legitimacy to the object of the alleged need. The claim 'I need a pair of Nike trainers' appears to carry more moral weight than the statement 'I want a pair of Nike trainers' or 'I desire a pair of Nike trainers' and to offer greater moral legitimacy to sweatshop labour in the process!

As recently pointed out in a paper which I jointly authored with Sigrid Stagl and Wander Jager (Jackson et al 2004), there is a sense in which these arguments are missing a critical

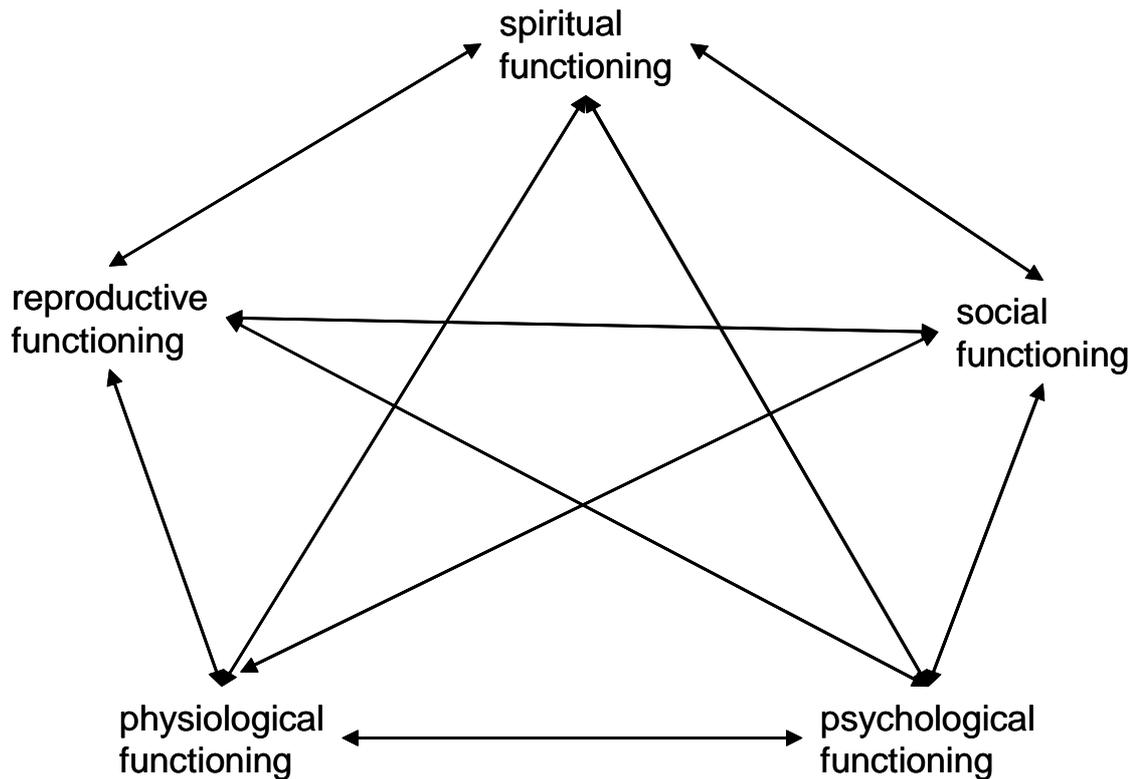
distinction – highlighted by later needs theorists such as Mallmann (1980) and Max Neef (1992) – between needs and satisfiers. But for the sake of avoiding this by-now almost intractable argument, I have couched Proposition 1 in terms of functionings.

Interestingly, this language was offered to the debate by nobel laureate Amartya Sen (1984) precisely in order to avoid using the word need. So it clearly fits the job I intend it for. And it is relatively easy to see that what Amartya Sen had in mind in talking about functionings is not dissimilar to what needs theorists had in mind in using the term needs. So for example we can talk about healthy or effective physical or physiological functioning. Or equivalently we can talk about the need for subsistence or protection (Maslow's physiological needs). We can talk about social and psychological functioning or we can talk about needs for identity, participation, affection, belonging and so on (to use Max Neef's (1992) categories). Participation and belonging are means of social functioning just as nutrition and protection are means of physiological functioning.

It is already clear from this discussion that the range of functionings in which we might be interested is more than purely material. Healthy physical functioning is essential to survival of the organism, and requires certain minimal nutritional inputs, and material requirements for physical protection – clothing, houses, and so on. But as any cursory overview of the basket of consumption goods of the modern household will reveal, our consumption habits motivated as much by social and psychological factors as by purely physiological ones.

For the purposes of discussion, I want to distinguish here five possible interrelated kinds of functioning in which we might be interested. These are illustrated in Figure 1. Interestingly, not all of these functionings find a corresponding category in the needs theoretic frameworks. For example, reproductive functioning is not included in either Maslow's hierarchy or in Max Neef's categorisation. And yet, one of the key lessons from evolutionary psychology (Jackson 2002) is that reproductive functioning offers some explanation for motivations – and in particular for consumer motivations – which have the character and flavour of sexual desire (Baumann 1998, Belk et al 2003, Campbell 1987). In fact, noone who has been living on planet earth for any length of time could doubt that we are motivated – in no small measure – by reproductive functioning!

The fifth element in my framework – spiritual functioning – may look a little unusual too. It is perhaps questionable to some whether human motivations have anything to do with spiritual functioning – or indeed whether there is any such thing as spiritual functioning, as distinct from psychological or social functioning, at all. On the other hand, the self-actualisation need – in Maslow's terminology – and transcendence – offered as a possible tenth need in Max Neef framework – clearly have some suggestion of functioning that transcends social-psychological functioning. So for the moment at least, I would like to retain the possibility that spiritual functioning is an identifiably distinct component in the mix.



**Figure 1: Five inter-related forms of human functioning**

It might be tempting to suggest that some of these kinds of functioning – for instance physiological or reproductive – are more important in terms of underlying motivations than others. After all if we don't get enough food, we die. If we don't reproduce, the species dies. However, there is strong evidence to suggest that good social and psychological functioning is also key to survival and continuance. One of the key reasons for the sociological interest in *anomie*, was to begin to understand why apparently healthy individuals would commit suicide in spite of good physiological health (Durkheim 1897). Lessons from evolutionary psychology on social positioning indicate that higher social status is allied with increased chances of bearing healthy progeny, and increased chances of them surviving (Wright 1994). Recent work on the relationship between health and inequality has suggested that those in lower income groups suffer higher health risks not simply because they have worse access to basic services but also because of the psychological stresses associated with being in a lower position in the 'pecking order' (Wilkinson 2000).

This evidence illustrates an important aspect of this model of functioning: namely that the different types of functioning are all strongly inter-related. For example, anthropological evidence suggests a key role for social relations in providing resilience in the face of physical shocks (Douglas and Isherwood 1980). In the case of an emergency – the lights go out, unemployment looms, a loved one dies – the strength of our social relationships can make the difference between a successful transition to a secure new support base and a potentially disastrous collapse of the support mechanisms that guarantee full physiological functioning. Social functioning is important not just for its own sake but because it contributes to physiological and reproductive functioning. That social and psychological functioning are strongly inter-related is a point I shall return to below.

## **A Life without Shame**

At this juncture, and before proceeding to my second proposition, it is worth pausing briefly to explore briefly the relation between functioning types and material requirements. This after all is of paramount interest to us from the point of view of sustainable consumption. We would clearly like to know how much or how little material consumption we can get away with in seeking to achieve healthy functioning in these various categories. And in particular it is vital to contemplate whether we could get away with less material consumption without impairing different levels and kinds of functioning.

At a first glance, it would appear that only one kind of functioning – physiological – demands, *a priori*, given levels of material inputs: specifically, of course, as I have already mentioned: food, water, clothing and shelter. There seems no *a priori* reason to suppose that social, psychological or spiritual functionings require material inputs. Belongingness, affection, transcendence, for example, do not obviously and necessarily appear to be mediated by material goods – although clearly in our society they often are.

Perhaps more interestingly, there is now an intriguing body of evidence to suggest that healthy psychological and social functioning may actually be impaired by high levels of materialism (Kasser 2002). In fact, this suggestion has provided the basis for a long-standing critique of materialism that had its roots in the debate between the Stoics and Epicureans about the nature of happiness several millennia ago. This critique was renewed with some vigour in the neo-Marxist critiques of industrial society that populated the first half of the twentieth century. And the same basic idea still informs many modern green critiques today: far from being necessary to our survival, materialism threatens our environment, engenders inequality and does not even make us happy.

If this were the whole story, it would be a very happy state of affairs for sustainable consumption. Reducing material consumption would not only protect the environment it would also make us all happier. We could all live better by consuming less. Unfortunately, things are not so simple, as Sen himself has pointed out. In a passage harking back to something Adam Smith (1776) once said about the desire to live a ‘life without shame’, Sen (1998, 298) argues that:

‘To lead a life without shame, to be able to visit and entertain one’s friends, to keep track of what is going on and what others are talking about, and so on, requires a more expensive bundle of goods and services in a society that is generally richer and in which most people have, say, means of transport, affluent clothing, radios or television sets, and so on... The same absolute level of capabilities may thus have a greater relative need for incomes (and commodities).

Sen is clearly saying something recognisable about modern consumer society: namely that in this particular society we do appear to require a more expensive bundle of goods and services in order to carry out the functions he identifies. And we could certainly at this stage agree – provided that we accept Proposition 1 – that these functions are themselves fundamental aspects of human motivation. At the same time there is something unsatisfactory in Sen’s explanation. Or rather, it is not really an explanation at all, merely a description of a contingent state of affairs: we behave this way in rich societies, because this is what rich societies are like, Sen seems to be saying.

The clue to enabling us to get beyond this, I contend, lies in the word ‘shame’. Shame is both an affective and a cognitive construct – an emotion and an idea. Certainly we *feel* shame – but usually as a result of cognitive responses to a specific situation. Equally

importantly, however, this ‘shameful’ situation is always an interpersonal one. In feeling shame, an individual is responding to a relationship between his or her individual actions and others or the expectations of others. Shame defines itself *between* the individual and the group. It is also, vitally, a key signifier of the boundary between meaning and anomie – a point to which I return below. This apparently innocuous appeal to ‘a life without shame’ thus points us to an absolutely vital element in the search for an understanding of unsustainable consumption: the relationship between self and other.

### **A Proposition about Self and Other**

A little reflection shows that shame is not unique in this sense. Pride, approval, disapproval, loyalty, envy, belonging, affection, even disaffection and hate: these are all negotiations between self and other, between the individual and their peer group. The injunction to a life without shame is one that demands that we look to our relationships with others in pursuit of healthy functioning. We are driven, in other words, towards an undeniable overlap of social and psychological functioning, and to a second key proposition in support of our understanding of consumer society.

***Proposition 2:*** The self is socially constructed.

This overlap between social and psychological functioning is, once again, a key contribution from the field of social psychology. One of the earliest and most influential writers to make this relationship between self and other explicit was George Herbert Mead. For Mead (1934), both the mind and the concept of self arise out of a fundamentally social process: communication. He distinguished two evolutionary phases in the communicational processes of species. The first phase he called the ‘conversation of gestures’ which he described through the now-famous analogy of a dog-fight:

‘Dogs approaching each other in hostile attitude carry on such a language of gestures. They walk around each other, growling and snapping, and waiting for the opportunity to attack... The act of each dog becomes the stimulus to the other dog for his response. There is then a relationship between these two; and as an act is responded to by the other dog, it, in turn, undergoes change. The very fact that the dog is ready to attack another becomes a stimulus to the other dog to change his position or his own attitude. He has no sooner done this than the change of attitude in the second dog in turn causes the first dog to change his attitude. We have here a conversation of gestures.’

This essentially unconscious process – prosecuted through gestures that are recognised only implicitly by the participants in the conversation – is to be distinguished from what Mead called the ‘conversation of significant gestures’ in which participants in the conversation remain not only fully aware that they are participating in a conversation, but must also gain familiarity with the ‘significant symbols’ (ie language) through which communication occurs. This transition from the conversation of gestures to the conversation of significant gestures is an evolutionary process. Only in humans, according to Mead, is a conversation of significant gestures possible.

It is clear from his writing that Mead is thinking of the conversation of significant gestures mainly in terms of language itself. However, it is in principle possible to envisage linguistic processes that are not carried out in full consciousness or awareness. The concept of cognitive scripts that facilitate more or less habitual communicational responses – even in language – blurs the distinction between significant and non-significant gestures. Likewise, we can in principle conceive of non-linguistic ‘conversations’ in which it is possible to retain a level of awareness or reflexivity on the process itself. For example, clever use of ‘body language’ is not always unconscious. Just ask the cat-walk model!

Aside from these subtleties however, Mead's concept of a conversation of gestures is still a useful one for understanding processes of social communication. In humans, according to Mead, the conversation of significant gestures – ie conscious or aware communication – supercedes – although it never entirely replaces – the unconscious conversation of gestures. That we communicate both consciously and unconsciously through these social conversations has important implications to which I shall return below.

The most important aspect of Mead's ideas about communication is their implication for the concept of self and for identity. For Mead (1934, 135), the self only exists as a result of conversations of significant gestures.

‘The self is something which has a development; it is not there at birth, but arises in the process of social experience and activity, that is, develops in the given individual as a result of his [sic] relations to that process as a whole and to other individuals in that process’.

The self only exists in relation to social conversation. Personal identity, in other words, is an emergent property of inherently social relations. In Mead's view this emergent self plays an essentially evolutionary role. It is there to support the cohesion of the group. And it is able to achieve this precisely because it is a result of social conversations. These social conversations provide the mechanism both for negotiating and for internalising (in personal identity) the values, attitudes and beliefs of the social group. At the same time, it is clear that the concept of the self also plays a key role in negotiating and perpetuating culture. Cultural norms are internalised in individuals by way of social conversations.

The relationship is a dialectical one. Some of those conversations may, subtly and over relatively long periods of time, shift, mould and fashion the cultural beliefs themselves. Without this dialectic, culture itself would remain essentially static. But by the same token, the process of cultural transition can never be one that is within the gift of any one individual. Indeed, at the individual level – and sometimes even at the societal level – cultural transition is an inherently violent process. It threatens the entire meaning-structure on which social cohesion depends. For an individual to challenge this, as many would-be revolutionary has discovered – is to invite resounding punishment.

There is a clear link here to the conversation of names alluded to above. Indeed, the retribution inflicted on dissenters and revolutionaries has something in common with the violence inflicted by one set of football fans on another. The conversation of names defines a social territory. To know and to applaud a particular name or set of names defines allegiance to a territory, and membership of a social group. To challenge those names is to invite hostility from that group. What appears at one level puerile is, at another level, a powerful agent for social stability and the repression of dissent – as Bourdieu (1984) has pointed out.

### **The Boundaries of Rationality**

The implications of this view for understanding consumer society are quite profound. In the first place, of course, it undermines key principles of modernity, such as the centrality of individuality and individual choice. The suggestion implicit in Proposition 2 is that individualism is in some sense a kind of myth. Methodological individualism – which holds that it is individuals operating as more or less unilateral agents under the influence of largely free choice who determine behavioural patterns – looks almost entirely untenable under the assumptions of Proposition 2.

Instead we must look to social processes, social conversations, interactions between self and other as being absolutely vital influences on behaviour at both individual and social level. None of this is to deny the existence of individual cognitive deliberations. But it all points to the limits of deliberative processes, and the centrality of social influence at the heart of those deliberations.

An immediate casualty of this position is the rational choice model that lies behind most economic analyses of consumer choice. The economic model suggests that people make choices on the basis of a cognitive deliberation over private costs and benefits. Provided that certain conditions hold – in particular the availability of ‘perfect’ information – then such choices are assumed to be in the best interest of the individuals (ie ‘rational’) and therefore to be robust guide to actual behaviour. The failure of the model in real life – people rarely behave as economists might wish them to – is usually attributed to either a lack of information, or else to the existence of a series of ‘hidden’ costs and benefits that act as barriers or perverse incentives at the individual level.

The policy prescriptions that flow from the rational choice model tend to be relatively few and relatively straightforward. Typically policy-makers are enjoined either to improve information flows (eg through labelling, information campaigns and so on) or else to use financial incentives and disincentives to shift the balance between individual costs and benefits to reflect the existence of hidden social costs and benefits.

The limited success of such interventions is one of the reasons for a resurgence of interest in understandings of consumer behaviour and public attitudes. From the social-psychological perspective outlined here, limited success is only to be expected. The individual is constrained in taking pro-environmental or pro-social action by a variety of important factors. In addition to the economic and physical constraints that are conventionally acknowledged, the individual must negotiate his or her own conflicting motivations in terms of the functionings defined in Figure 1. But in negotiating these, he or she is bound as much by the social fabric in which self is negotiated as by purely ‘personal’ constraints.

### **A Proposition about the Symbolic Role of Artefacts**

Again, it is worth pausing here briefly to raise the question of materiality. What does this social conception of self tell us about our relationship to material goods? Interestingly, it does not yet tell us much. Of course, the fact that our identities are socially constructed offers an insight into the vital importance of social and psychological functioning and some understanding of the interaction between these two. And as we have already seen social functioning has strong links to physiological functioning.

We also know, from experience, that identity is a key driver of material consumption in modern society (Gabriel and Lang 1995, Baumann 1998). But this appears on the surface to be only a contingent fact. It does not yet allow us to understand the underlying process which gave rise to this feature of modernity. We cannot yet understand this key difference of modern consumer society from its predecessors in terms of any underlying commonality with them. To make sense of the way in which the social construction of modern identity relies so heavily on material goods we need a third key proposition, namely that:

***Proposition 3:*** Material artefacts embody symbolic meanings.

Over the second half of the 20th Century, the insight that material artefacts possess symbolic properties has become an increasingly important defining feature of sociological debates about consumption (Dittmar 1992, Miller 1995). The hypothesis itself has arisen from the confluence of some rather diverse intellectual influences including the semiotics of Charles Morris (1946), the structuralism of Roland Barthes (1966), the social philosophy of Baudrillard (1968, 1970), the social anthropology of Marshall Sahlins (1976) and Mary Douglas (1976), and the consumer and motivation research of Ernest Dichter (1964), Elizabeth Hirschmann and Morris Holbrook (1980), Russell Belk (1988) and others.

It would be impossible to do justice to the breadth and scope of this literature here. Nonetheless, the most important lesson from this huge body of work is very clear. Material commodities are important to us, not just for what they do, but for what they signify: about us, about our lives, our loves, our desires, about our successes and failings, about our hopes and our dreams. Material goods are not just artefacts. Nor do they offer purely functional benefits. They derive their importance, in part at least, from their symbolic role in mediating and communicating personal, social, and cultural meaning not only to others but also to ourselves.

The anthropological evidence for this symbolic role is perhaps the most interesting and most persuasive, in particular because it suggests that the symbolic role of artefacts considerably precedes modernity. Anthropological evidence for the cultural role of artefacts as symbols can be found in a wide variety of societies over long periods of time. Goods play key symbolic roles in exchange rituals, and have done for many millennia, as Levi-Strauss (1949) first pointed out. Douglas (1976, 2006) points in particular to their role in the provision of what she calls ‘marking services’.

‘First, let us assume that the ultimate object of consumption activity is to enter a social universe whose processes consist of matching goods to classes of social occasions. Second, for entry into such a universe, the individual needs the services of fellow consumers. These services are either in the form of personal attendance at consumption events or of material contributions of goods (eg flowers) and their object is to create or confirm a grading of the occasion.’

Douglas’ description of this process points to the apparent arbitrariness and unpredictability with which particular goods are associated with particular meanings, and their value in terms of grading social activities. At one point it might be a particular brand of fine wine, at another a particular composer. These values both determine and are determined by social exchanges. In a sense the exchange of goods (and values) achieved in marking services is quite precisely a conversation of gestures. The symbolic role attributed by human beings to material artefacts creates a whole new realm of symbols which become the subject and the object of whole new social conversations.

Whether these conversations are significant – in Mead’s sense – is a very interesting question. Given that material goods operate as symbols, and that the formation of symbols appears to require particular creative faculties that belong within the realm of awareness, then presumably Mead would have answered this question in the affirmative. However, there is also plenty of evidence to suggest that our everyday responses to symbolic signals occur at a sub- or semi-conscious level. We may be fully aware, at some level, that – as one respondent in Belk, Ger and Askegaard’s (2003) lovely study on consumer desire pointed out – ‘noone’s gonna spot you across a crowded room and say, “wow! nice

personality!” But that doesn’t mean that we literally and consciously ‘clock’ every visual signal carried by material objects at every moment of our waking lives.

Sometimes our sense of whether we do or do not belong in a certain group is nothing more than an uncomfortable feeling of displacement. In all probability, it swept over us almost instantly upon entering the room, conveyed by a myriad subtle but undeniable visual signals: the clothes we were wearing, the clothes others were wearing, their demeanour, their haircuts, the way they tied their shoes, the shade of wallpaper on the walls, the kind of pictures hanging there, the fabric of the upholstery on the chairs.

Thus the conversation of gestures opened up to us through the symbolic role of material goods is one that is neither fully aware, nor fully unconscious. As such it protects itself with a peculiarly powerful veil of ‘collective misrecognition’ (to use Bourdieu’s phrase). We ‘know’ intellectually that the symbolic nature of goods plays an important role in social conversations. But we do not carry this awareness into every such conversation with us. And we seldom articulate it in a fully conscious conversation of ideas. As such, the symbolic conversation of gestures embodied in the use, exchange and trade of material goods presents us with an incredibly difficult domain for policy intervention. I shall return to this difficulty in the final section of the paper.

The key point here is this: that in facilitating an entire ‘new’ realm of social conversation (ie separate from the realm of animal gestures and separate from the ‘significance’ of the linguistic realm), the symbolic meanings of material artefacts fits them perfectly for an absolutely vital role in social and psychological functioning. Moreover, this is not – as some observers have suggested – a defining feature of modernity. The symbolic role of commodities was ever employed in this way.

### **Symbolic self-completion**

There are few places where the symbolic character of material commodities 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. In spite of an equally popular disdain for the fact – cars have come to symbolise (for their owners at least) a wide variety of cultural ‘goods’: social status, sexual prowess, personal power, freedom, and creativity (Freund and Martin 1994, Haggett 2000). Like many other material artefacts, they are now deeply imbued with cultural meaning, as the New York columnist Benjamin Stein cleverly illustrates:

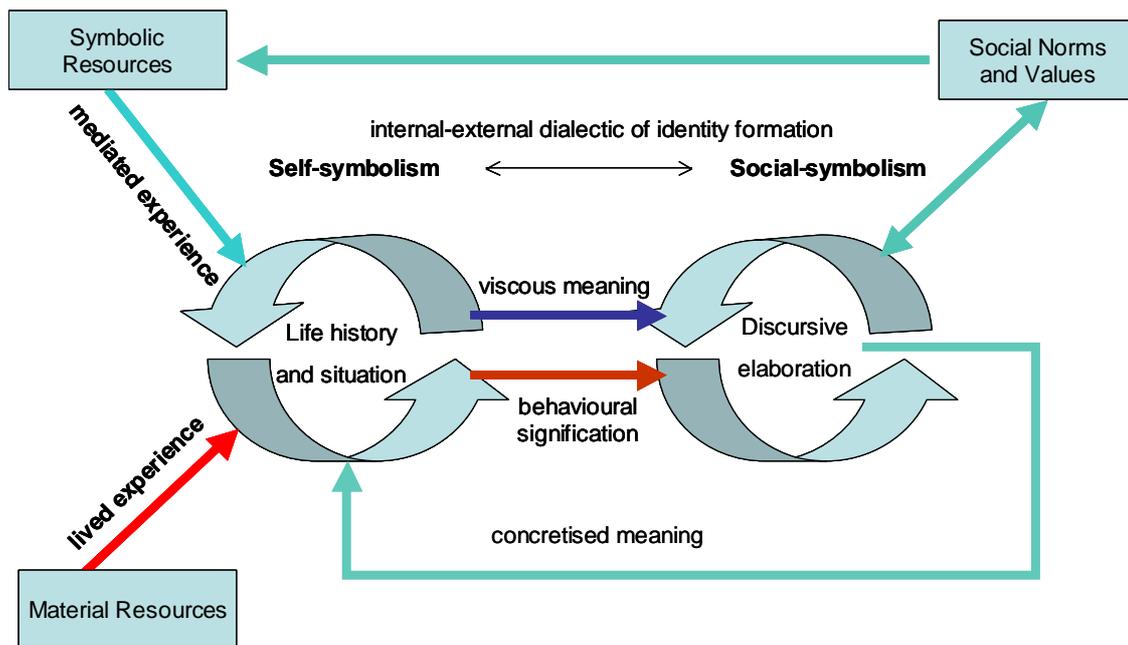
Sometimes I test myself. We have an ancient, battered Peugeot, and I drive it for a week. It rarely breaks, and it gets great mileage. But when I pull up next to a beautiful woman, I am still the geek with the glasses. Then I get back into the Porsche. It roars and it tugs to get moving. It accelerates even going uphill at 80... It makes me feel like a tomcat on the prowl.. with the girls I shall never see again pulling up next to me, giving the car a once-over, and looking at me as if I were a cool guy, not a worried, over-extended, 40-year-old schnook writer (Stein 1995).

But the task of constructing and maintaining symbolic value – like the task of constructing and maintaining an identity – is a fundamentally social one. Symbols – like identity – are by their nature socially constructed. The value attached to symbols is constantly negotiated and re-negotiated through social interactions within a specific cultural context (Elliott and Wattanasuwan 1998). In the hands of certain sociologists and social philosophers, this insight has become the basis for a quite specific view of consumer society. According to this view, the individual consumer is locked into a continual process of constructing and reconstructing personal identity in the context of a continually renegotiated universe of social and cultural symbols.

Giddens (1991) points to the ‘dilemmas of the self’ faced by the individual in modern society, and the opportunities that modernity appears to offer for ‘symbolic self-completion’ (Wicklund and Gollwitzer 1982) through the continually enlarging choice of consumer goods. McCracken (1990) points out how effectively consumer goods embody displaced meaning – allowing us to pursue our highest ideals, by embedding them in consumer goods, without ever exposing the ideals themselves to the withering light of scrutiny. Baumann (1998) points to the convenient resonances between the process of perpetual reconstruction of identity, and the impermanent, transient nature of modern consumer goods. ‘Aggregate identities, loosely arranged of the purchasable, not-too-lasting, easily detachable and utterly replaceable tokens currently available in the shops,’ he writes, ‘Seem to be exactly what one needs to meet the challenges of contemporary living.’ Cushman (1992) postulates that this ‘empty self’ which is constantly in need of ‘filling up’ is a cultural artefact generated quite explicitly by and for the commercialism of modern society.

Once again, however, it is worth pointing out that the fundamental basis for this process – the symbolic conversation of gestures inherent in material use and exchange – is not unique to modernity. In the light of the anthropological and social-psychological understandings of the preceding sections, we must see symbolic self-completion as an essential feature of the human condition. And we must regard the use of material artefacts in this process as something with long roots in antiquity. Indeed, it appears that Wicklund and Gollwitzer (1982) construed symbolic self-completion in precisely this way. Narrative identity theory (Ricoeur 1984, 1992) also casts the problem of symbolic identity construction as a task common to the human condition. Jenkins (1996) emphasises how this task must be continually validated through social interaction. We are born, in some sense incomplete. We are faced as human beings with the project of social-symbolic self-completion. We use whatever resources are available to us for this project.

Clearly, the precise nature of those resources may differ from one society to another. In one society, symbolic self-completion may primarily occur through the social-symbolic importance attached to particular trades and capabilities. In another, it might be pursued mainly through the exchange of mythical social roles and narratives (Campbell 1959). What characterises our society, in the eyes of Baumann, Giddens, McCracken and others, is that symbolic self-completion is mainly pursued through the consumption of material goods imbued with symbolic meaning. But the project itself (Figure 2) is common across all societies.



**Figure 2: The social-symbolic construction of identity**  
(adapted from Elliott and Wattanasuwan 1998)

### A Proposition about Consumer Society

My final proposition is one that in some sense I have been building up to throughout this paper, and should come as little or no surprise to the reader, although it operates at a slightly different level than the other three propositions. It is a proposition about the nature of consumer society.

**Proposition 4:** Consumer society is a cultural defence against *anomie*.

In one sense, this is a fairly empty proposition. As we have already seen, and has been argued with enormous cogence by Berger (1967) in particular, *every* society is a defence against *anomie*. The evolutionary role of social structure is precisely to provide the social rules and institutions that preserve the integrity of the society in question and defend it against shocks and intrusions. Perhaps most importantly, these institutions must provide for nomization – the continual creation and protection of meaning – and defend against *anomie* – the ever-present threat of loss of meaning.

These threats to meaning occur in a variety of ways. For example, they can occur through the external influence of another cultural group. They can occur in addition through rogue elements – the disenfranchised, dispossessed and occasionally the purely sociopathic elements – within the given group or society itself. They also occur as a matter of course both at the individual level and at the social level through disaster, personal and collective loss, bereavement, and the ever-present threat of personal mortality.

Collective loss – the recent earthquake in Iran, the Lockerbie bomb, the attack on the World Trade towers – is in a sense the polar opposite of Jonny Wilkinson's last minute drop-goal in the rugby world cup. A sense of helplessness and futility pervades our responses to such crises. All the collective meanings that we hold dear – our nationhood, our sense of cultural pride, our belief in progress, our adherence to the stability of global markets, our faith in humanity, our faith in the divine – all these things tremble and shake

under the influence of such tragedies. That they are perhaps less common as occurrences in modern society (at least in the West) does not for a moment reduce the threat they pose, nor the efforts we take to create meaning structures with which to defend ourselves from them.

The same is true at the personal level, where interestingly there is only a rather marginal diminution in the frequency and severity of this kind of loss. There is less infant mortality. There is, in the West at least, less in the way of apocalyptic wars. Children seldom die in infancy now. Parents generally outlast their children. But the ever-present prospect of our own mortality and those of many of our relatives and friends still confronts our meaning-structures with a formidable task: how to ensure healthy functioning in the face of personal and social *anomie*.

In modern society, there is very little in the way of discussion of the social significance of this kind of meaning-threat outside the remnants of religious discourse, and the reflections of a few psychologists and sociologists (Becker 1973). Fortunately, however, the rather lengthy history of the concept of *anomie* within sociology, and the equally impressive discussion of rituals within anthropology provide us with a rich source of evidence for the importance of these issues to the structure and nature of society.

The insights from these sources suggest that every society must protect itself from the threat of *anomie*. Every society engages in cultural myths and narratives that provide for a sense of continuity and meaning in the face of the ever-present threats from both outside and within. In earlier societies, this task was assigned mainly to religious institutions and structures. These institutions engaged in often rather complex 'theodicies' (Berger 1967) in defence of meaning: attempts to defend the central propositions of the religious order (the benevolence and omnipotence of deities, for example) in the face of personal and collective loss.

It should not surprise us therefore to find that the consumer society, at some level, incorporates these meaning-defence mechanisms into its own rationale. In fact, as I have proposed elsewhere (Jackson 2002), and others have also argued in some depth, there are some clearly visible meaning-defence mechanisms inherent in the consumer society. These include: the concept of economic growth – operating at the collective level to provide a sense of continuing intergenerational progress (Jackson 2004); the symbolic role of consumer goods in negotiating and defending boundaries between the sacred and the profane (Belk et al 1989); the evocative power of material goods to embody our displaced ideals (McCracken 1990); the function of consumer goods in processes of hedonic 'dreaming' (Campbell 1987); and the role of consumption as a terror-management strategy (Sheldon et al 2003).

Consumer society could not hope to operate in this way were it not for the symbolic power of material artefacts, the fact that symbolic meanings are negotiated socially through processes of discursive elaboration and conversations of gestures, and the fact that these processes overlap significantly with processes of symbolic self-completion. Social and psychological functioning in the consumer society are subtly intertwined and mediated crucially through the evocative power of material goods. Meaning is negotiated and defended. Nomization is facilitated. And for most of us, for most of the time, these vital social conversations hold *anomie* at bay and allow us to function.

## **Implications for Sustainable Consumption Policy**

There is, in the literature on sustainable consumption, an on-going debate about the relationship between internal social psychological factors and external institutional constraints in influencing consumer behaviour. The emerging opinion is that a full understanding of environmentally-significant behaviours requires a model of both internal (social-psychological) and external (institutional, economic) factors but that once such a combined model is in place, it should be possible to identify appropriate policy interventions to encourage pro-environmental behaviours. The attitude-behaviour-constraint model and value-belief-norm model of Stern (2000) and his colleagues (Stern et al 1999, 1995) are attempts to provide exactly that sort of framework for environmental policy-making.

The arguments I have put forward in this paper, don't contradict that case. However, they add another – and rather considerable – level of complexity to it. What I have attempted to show in this paper is that some absolutely vital social and psychological functionings are mediated through our interactions with consumer goods. To the extent that we can achieve these functionings without the use of consumer goods, it would clearly be possible to shift attitudes and behaviours away from environmentally significant consumption towards sustainability. But the complexity of the relationships between identity, goods and social functioning should warn us against any simplistic prescriptions of social change in this direction. Moreover, the extent to which vital social functionings – such as identity creation, social cohesion and the defence against *anomie* – are mediated through material goods in the consumer society, suggests that resistance, indeed quite violent resistance to change is to be expected.

So what exactly can we offer policy-makers from the understandings pursued in this paper? Is it all just bad news for sustainable consumption? Or is there something positive we can take from it?

Certainly, in the first instance, we can make some quite useful recommendations about the way in which change is to be negotiated. Since identity is constructed socially, and social norms and expectations constrain individual choice in quite fundamental ways, we can certainly make a good case for arguing that behaviour change initiatives should involve peer groups, local communities, and social processes rather than attempting to effect individual change purely through generalised incentive or information schemes.

We can also point to the key role played by symbolic resources, both in the social construction of identity and in the negotiation of symbolic meaning. As Figure 2, illustrates these symbolic resources provide a vital link between the external and the internal dialectics of symbolic identification. But a crucial question arises here: who or what controls these symbolic resources? Do they lie within the control of the social actors who make use of them? Are they amenable to public policy intervention? Or are they subject to control and influence by agents who seek to profit from their influence on others?

To some extent, all three of these relations hold. The one that is potentially the most problematic however, is the third. Control over the symbolic resources available for discursive elaboration of meanings and the social construction of identities lies mainly in the realm of the marketing strategies of corporate actors. These actors not only have a vested interest in controlling such resources, they also have a long and rather sophisticated experience in effecting this control to their own best advantage.

The commercial nature of this relationship is particularly problematic where children are concerned. From about the age of five onwards, social and developmental psychology suggests that the social community within which discursive elaboration of symbolic meanings occurs shifts gradually away from parental influence and towards the peer group. And yet it is clear that – at least until the early teens – this peer group lacks the critical faculties needed to resist, select or accommodate that complexities of these messages. It is precisely for this reason, that some Nordic countries have banned advertising for those under 12, and why the National Institute for Parenting and Families, in this country, has called for similar measures.

Though vital important in relation to the young and more vulnerable members of society, concern over the social control of symbolic resources is by no means restricted to advertising targeted at children. Asymmetries of power and resources in the relationship between advertisers and their target audience suggest the need for much stronger public control of commercial media – extending at least as far as exerting strong advertising standards, and possibly including the outlawing of certain marketing practices.

The same asymmetry of resources also exists, incidentally, between commercial and public sector marketing. The idea that we can market sustainability through concerted public information campaigns fails to bear scrutiny, particularly when we compare the resources available to government for this task against those available to private sector interests.

There is moreover another structural asymmetry against which public sector marketing struggles. Commercial marketers have an extraordinary range of human motivations on which they can draw in suggesting, proposing, insinuating or otherwise negotiating symbolic meaning. This is particularly true, if they are also in the position of being able to shift their product strategies – and indeed their products – to maximise the use of such motivations. A good product – in a commercial sense – is one that has a ready-made marketing strategy with strong links to underlying human motivations. Take the gel-filled bra as a classic example. All this product needs in the way of marketing is the merest suggestion that it enhances the appearance of a key signifier of sexual attractiveness. The massive allure associated with reproductive functioning will do the rest.

The same strategies of persuasion are simply not available to those attempting to ‘market’ sustainability. The particular (pro-social, pro-environmental) nature of the message and the constraints on the symbolism which can be applied to marketing it simply cannot compete with the free rein available to commercial interests. Those interests will always be able to out-run or out-last public sector information and behaviour change campaigns – unless they are subject to some kind of social control.

Advertising is only one of a number of areas in which government policy determines not so much the nature of individual choice, but the social context in which identity is constructed, symbolism is negotiated and individual agency is constrained. There are a number of other such areas including trading standards, product standards, corporation law, social policies (such as family support and distributional policy), education, support for public sector broadcasting, and the frameworks within which religious institutions and other community groups operate. A key lesson from the analysis in this paper is that government must seek to intervene more creatively not just in changing individual behaviour but also in shaping the social context within which individual behaviour is negotiated.

A particular attention should perhaps be paid to the question of religious and community groups. If the analysis in this paper is right, if a key function of the consumer society is the pursuit of meaning and the defence against *anomie*, then the transition to a sustainable society cannot hope to proceed without the emergence or re-emergence of some kinds of meaning structures that lie outside the consumer realm: ‘communities of meaning’ that can support the kind of essential social, psychological and spiritual functioning that has been handed over almost entirely in modern society to the symbolic role of consumer goods. To proceed without attention to this kind of insight into the underlying processes of consumer society – processes that are held in common with just about every society we know of – is to invite a spectacular failure, not just in environmental terms, but in social terms as well.

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# **Analysing long-term changes of everyday life in an environmental perspective**

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The background of this paper is an interest in the ever growing consumption in the industrialized countries. The macro level growth rate changes over time, but most years it is positive and over the long run the increase is impressive – for instance, a growth rate of 2 percent implies a doubling time of 35 years. In spite of technologically induced reductions in the average environmental impact of each monetary unit spent on consumption, it is hard to keep up with the quantitative increase and, in particular, to cope with accumulated problems like the greenhouse effect and to make room for increasing consumption in developing countries. This problem of ever increasing quantities of consumption ought to be placed high on the sustainable development agenda, and it calls for research on the dynamics behind the growth to improve the possibilities for curbing it.

A real challenge in relation to this issue is that the increases in consumption are imperceptible and that most people in the industrialized countries are preoccupied with managing their everyday lives and do not experience that they live in any kind of extreme luxury. Some years ago I wrote a paper dealing with this issue in general terms, trying to identify some trends that can explain why we do not become satiated. In the first part of this paper I summarize these ideas, and in the second part I try to take some steps further to discuss how changes in everyday life can be studied in more detail. This part relies heavily on the reading of Elizabeth Shove's new book on "Comfort, cleanliness and convenience". The paper must be seen as preliminary reflections, as this is really work in progress.

## **General long-term trends in everyday life**

Data on consumption in most industrialized countries illustrate continuous growth for most consumption categories. The rates of growth differ between the categories, so the composition of consumption changes gradually, for instance, the proportion of food decreases, whereas the proportion of transport and travelling typically increases. Although the composition of consumption thus changes over time, the most obvious feature of the development is the continued growth in almost all areas. Of course, some products become outdated and disappear, but they are usually replaced by new products in the same category, so the growth continues. In a previous article (Røpke 2001), on which this section is based, I have presented statistical material illustrating the content of the growth in consumption: we have more clothes, more shoes, larger housing areas, more equipment in households, we eat more meat, drive further, travel more, visit restaurants more often etc. – we seem to use more and more of the same without reaching a saturation point. Part of the explanation is that the growth in consumption is intertwined with social and technological changes, so

quantitative growth is intertwined with qualitative changes. Examples of such long-term trends characterizing everyday life are:

\* Continued **diversification and specialisation**. An example can be the growing consumption of footwear, which does not mean that each person has a large number of identical pairs of shoes, but rather that each person has shoes that are specially designed for all sorts of different purposes: for a large number of different social situations, for various forms of sport and leisure-time activities, for different types of weather, and to match different clothes. In the same way, kitchen equipment has been diversified, so there are special tools for many different purposes, and diversification of food means that we eat more animal products and far more products that have been imported from various places in the world, freeing us from the limitations of growing seasons.

\* **Improvement of standards**. Even the most traditional products are altered all the time: they are designed a little differently and, if at all possible, their qualities are changed so they can do a little more than the previous generations of the same product. The durability of the products is rarely better, but the functional features are improved and set new standards for what is comfortable, practical, aesthetically acceptable etc. Improvements of standards help to increase the speed of the renewal process, so many things are replaced by new ones long before they are really worn out. Improvements of standards also have an effect on the design of the infrastructure and the socio-technical systems that are integrated with private consumption: more or less imperceptibly, the standard is raised for what is considered a comfortable train journey, for example.

\* Continually increasing **individual independence**. Both young and old people have increasingly got their own homes, and in families dissolved by divorce, it has become possible for both parties to get their own housing. The continually increasing proportion of small households is thus an important part of the background for the growth in the number of housing square metres. At the same time, a greater housing area is used within the framework of the family to give the individual more private space and the opportunity to withdraw. The households ensure greater independence of each other by each procuring equipment, even though it is used comparatively rarely, and within the family, more televisions, music equipment etc, are acquired so that the consumption of one member of the family does not limit the consumption possibilities of the others. In addition, changes in the residential pattern with the establishment of extensive one-family housing areas can be seen as a means of ensuring individual independence, just as the car, more than anything, is the symbol of independence.

\* Increased **mobility**. The establishment of the one-family housing areas and the use of the car associated with this have meant that considerably larger distances have to be covered each day. The distance between home and job has increased, greater distances have to be covered to do the shopping, and the individual's action radius in connection with leisure-time activities has extended considerably.

\* **Mechanisation** of household chores. Household chores have changed in pace with the fact that domestic help has largely disappeared. Some jobs have been taken over by industry, while others have become mechanised. In some cases, the acquisition of labour-saving machines has meant that households have taken over jobs that were previously done as services outside the home. The increase in productivity in domestic work has been converted both into the increased use and the higher standard of many services (clothes are

washed more often, more varied meals etc.), into taking on new jobs (for example the transport of children), and in some countries, into more leisure.

\* **Intensification** of the use of time. In addition to labour-saving technologies, we also use technologies and organisational principles that enable us to 'pack' everyday activities more efficiently. In this way we increase the number of activities that can be pressed together in a given period, and our ambitions with regard to what we should get from both work and leisure time increase constantly. Closely related to the intensification is the increased **complexity** that we have to cope with in everyday life.

\* Introduction of **new activities**. Many of the characteristics mentioned are linked to new ways to do well-known activities, from washing-up, to sport and travel, while only a few of them add really new activities to everyday life. But occasionally, the growth contains completely new activities such as the possibility of watching television, which is one of the most striking examples of a fundamentally new activity that has changed the patterns of everyday life since the beginning of the 1960s.

These characteristics of the growth of consumption give a condensed illustration of what we have achieved simultaneously with the growing amounts: we have become more personally independent and more mobile, we use our time more intensely, we can make use of ever more diversified and specialised products in our activities, and goods are constantly being improved and renewed. The trends indicate why the increasing amounts do not lead to satiation: we do not accumulate just more of the same, but use it in our untiring activities to maintain and transform our daily life. Simultaneously, these trends, which cut across several consumption categories, summarize some of the features of consumption that are really costly from an environmental point of view: considerable environmental costs are associated with being independent and mobile, with being busily occupied with intense and diverse activities, and with renewing things. Therefore, strategies for sustainable consumption should also consider the general tendencies to diversify, renew, mechanize, intensify, become more mobile and independent etc.

Do these trends still apply to the changing everyday life? Do they outgrow the attempts to change consumption in more sustainable directions? This can probably not be clarified in such general terms as those applied above, and furthermore, the general trends cannot be changed at a general level. For this purpose it is necessary to get deeper into how changes in everyday life come about.

### **Analysing specific changes**

Searching for theoretical guidance for the study of changes of everyday life, I came across Elizabeth Shove's new book on "Comfort, Cleanliness and Convenience". The book is extremely interesting and relevant, and in this section I will outline some of her findings. What I do here is not to give a summary of her book, but rather to 'translate' it into a kind of guidelines for studies of everyday practices. The outline of my presentation differs much from the original – so don't blame Shove for the following. Furthermore, it should be emphasized that this presentation has a very preliminary character and needs more elaboration.

Shove is basically motivated by environmental concerns and argues that some of the daily routines and conditions that we do not think much about and that are not considered in an environmental perspective can be among the most environmentally costly everyday practices. What really counts environmentally is the long-term changes of ordinary,

routinized and taken-for-granted practices, and therefore, it is so important to understand how these normal practices are constructed. Her ambition is to "assemble a framework of ideas useful in understanding the sociotechnical, social-symbolic and sociotemporal configuration of habits that people take for granted but that are changing all the time" (p. 193).

Most of Shove's examples illustrate how different everyday practices have become more environmentally costly in terms of energy and water consumption, e.g. the costly trend towards global harmonization of indoor climate, the habit of daily showering, and the enormous quantities of laundry. However, she also emphasizes that standards are not always increasing (as I suggested above), as e.g. the fall in temperature of washing water illustrates. Another example could be the reduced use of ironing and mangling.

A basic theoretical question related to the study of consumption and everyday life concerns the delimitation of the object of study. When the research interest is related to the environmental impact, it is not so surprising that many focus on the process of acquisition – why do we buy things? This is what I have done myself, studying 'the willingness to consume' and the consumption dynamics related to the acquisition of new things. The acquisition can be conceived as the most important link between everyday life in modern societies and the environmental impacts of this life: through acquisition we appropriate material resources. Obviously, it is important to include also 'the acquisition' of electricity, water, housing etc. that is not bought through usual shopping, but organized via different institutions. There are also other links between everyday life and environmental impacts, e.g., the handling of waste, our behaviour when we use nature for leisure activities, our behaviour when we are at work etc., but the main appropriation takes place through acquisition. However, the study of acquisition is insufficient for understanding everyday life.

Interesting insights can be achieved through the focus on acquisition, but with this focus it is difficult to get a deeper insight in the everyday life that provides the framework for the acquisitions. The separate goods that people buy constitute parts of broader endeavours which should be the focus of study. Shove says: "Much literature on consumption focuses on the acquisition of things...relatively little notice has been taken of how families of consumer goods are deployed together in the achievement of 'higher level' enterprises like those of constructing a cosy home or a welcoming environment" (p. 164). However, it is not easy to define what these broader endeavours are about and how they can be delimited. Shove suggests a concept of 'composite services' meaning something like "composite accomplishments generating and sustaining certain conditions and experiences" (p. 165). She also suggests to think of 'cleanliness' as an example of a "composite service, formed and given meaning by the activities undertaken in its name" (p. 161). She also approaches the definition of the concept of composite services in several other ways, so I am not sure that I have grasped her idea in the following interpretation. She distinguishes between practices such as bathing and laundering on the one hand and the composite service of cleanliness on the other. For an economist like me, this can be interpreted as a distinction between a 'flow' and a 'stock' concept: the 'flows' or processes of laundering and bathing provide a 'stock' or a state of cleanliness. The distinction is not a distinction between aspects of material and meaning, as both aspects are included at both levels. Cleanliness must be described both in material terms and in terms of meaning, just as the social practice of laundering both includes some actions and must be understood in terms of meaning. (The idea of distinguishing between processes and states in relation to

consumption is also used by others, e.g. Boulding 1966. However, Shove elaborates much more on the complexity of such states).

The idea of composite services differs from the traditional concept of needs. Shove describes services as 'systems of need' emphasizing the interdependency of different elements (p. 164), and collective conventions figure more prominently in the service concept. In the study of the changing everyday life it will be useful to identify such composite services – such meaningful states and conditions that people strive to achieve in a given society. They have powerful effects as frameworks of understandings that trigger actions (p. 161). Some of these states/conditions will be related to conceptions of the good life, but they can also comprise conceptions of necessary means to achieve a good life. They are matters of course in everyday life – they often appear to be beyond discussion (these statements appear similar to the understandings presented by Gullestad 1989 and Bech-Jørgensen 1994). To understand the dynamics of consumption in relation to some group of goods it is thus necessary to identify the more encompassing services that they contribute to achieve.

Composite services are constituted by a large number of elements. For the case of cleanliness Shove lists the following elements: "scientific rationales, signifiers of difference and order, sociotechnical configurations, sociotemporal structures, systems of provision, experience and expectation" (p. 161). In other words, the concept of service depends on a "blend of method, meaning and hardware" (p. 166), it is the outcome of "situationally specific complexes of belief, practice and technology" (p. 123). In the study of the development of such services two core concepts thus emerge: co-evolution and integration. The different elements of technologies, skills, understandings, practices etc. co-evolve, and they have to be integrated as meaningful parts of everyday life.

The dynamic processes behind the development of the composite services and the related practices differ according to the character of the practices involved. Shove analyses in detail the development of air-conditioning, bathing, laundering and adds a little on lighting and on different convenience technologies. Through the case studies she identifies how different everyday practices differ according to a number of characteristics (p. 80, 117-121):

- The extent to which the practices are soaked with moral and have social and symbolic significance. Habits related to cleanliness are highly soaked with moral, whereas habits related to room temperature are not. Practices related to e.g. cleanliness have a strong symbolic character - about policing of social boundaries and restoration of social order (p. 84, 100).
- The extent to and way of which scientific understanding forms part of the practice.
- Some practices have the character of work (such as laundering), whereas others are more related to relaxation (as bathing can be).
- Some practices are bound up with gendered identities and with the division and management of domestic labour.
- Some practices involve only one central technology (as air-conditioning), whereas others involve the coordination of multiple sociotechnical systems (as laundering).
- The complexity of the task from simple to composite. The degree to which the task consists of a series of discrete activities.
- The systems of provision behind the services differ, e.g. the extent to which they are provided privately, through the market or by public arrangements.

The character of a social practice must be taken into account in an analysis of the practice, as different aspects must be emphasized according to different characteristics. In the analysis of bathing Shove emphasizes the development of discourses, because the practice is highly related to social and symbolic aspects, whereas she gives priority to technologically oriented accounts in the analysis of air-conditioning - and in the analysis of laundering she suggests a combination of the two. It should also be included how a given practice is related to wider social trends (p. 120), and how it is related to the sociotemporal structure of everyday life (see below).

Some guidelines regarding the study of the transformation of everyday life can indirectly be identified from the case studies. Shove suggests to focus on co-evolution and interdependencies between three main elements or aspects of everyday life: devices, systems and practices (p. 48), or in other words material objects, technical arrangements and ways of life (p. 43). It is important to emphasize that each of the elements has both a material and a symbolic side: the sociotechnical devices or objects have both material and symbolic qualities, the systems comprise both sociotechnical systems and collective conventions and arrangements, the practices comprise both the practical actions or habits of users and their expectations. The co-evolution between the three elements imply three relationships between:

- objects and practices
- objects and the systems they are part of
- practices and the systems they are part of.

The changes of everyday life can originate in different parts of the overall system. An obvious source of change is the provision of technological innovations from different industries. However, when a new technological device is introduced, it does not just correspond to a need - the need has to be constructed, or the 'definition' of the composite service related to the device has to be changed. Shove describes how this happened in the case of air-conditioning. Particularly interesting in this case is the invocation of scientific evidence in relation to the specification of the optimal conditions of comfort and the critical role of technical standards in the mediation between science, design and social conventions (ch. 2). In this process nature is used as a point of reference both by the proponents of air-conditioning and by its critics (p. 41).

New scientific understandings can be sources of change, also when they are not related to new products. Thus the understanding of bacteria co-developed with new social practices in relation to cleanliness.

Sometimes new technologies strongly influence social practices. For instance, air-conditioning implied an abolishment of the siesta. Certain devices can also rescript the meaning of related activities, as e.g. the washing machine effectively imposed a new classification of dirt and cleanliness. However, in other cases changing practices and associated changes in meaning can come about without any important changes in the technologies applied, as Shove demonstrates for the case of bathing. So co-evolution should not be interpreted as a form of determinism. This is also emphasized in relation to the introduction of the same technological devices in different cultures: different cultures can share the same overall technological systems, and still the use of specific shared devices can be integrated in different social practices and be associated with different meanings, as the case of lighting illustrates.

When the practices involve the coordination of multiple sociotechnological systems, the dynamics of change can originate in different parts of the system. Shove describes the case of laundering as a system of systems comprising the washing machine manufacturers, the producers of detergents etc., the textile and fabric manufacturers, and the households (p. 137). Each of the systems has its own actors defining their own problems and trying to fix them. Change is driven by the specification of problems and the management of 'reverse salients', i.e. bottlenecks and features that impede the advance seen from a specific actor perspective. Thus there is a movement on a number of fronts at the same time and sometimes in different directions, and further dynamics originate from the integration of the systems through mutual adaptation and adjustment (p. 157).

The everyday practices of individuals, including both the actions and the meanings attached to these actions, co-evolve with collective conventions. As mentioned, these collective conventions can be influenced by scientific developments (such as new understandings of disease), and they can change in accordance with new social structures and related symbolic systems and with changing institutions and infrastructures. Simultaneously, they are also formed in the interplay with the practices of individuals, as they are reproduced through the daily routines: "Conventions are reworked as individuals reinvent what they believe to be personal styles and strategies" (p. 153). Shove suggests that "private habits are constructed as people steer their own course through culturally and temporally specific landscapes of legitimating discourse and classifications of ordinary and extraordinary behaviour" (p. 94). The discourses provide rationales that are both guides to practical action and justifications of it, and therefore, it is important to study the changing discourses to understand the changing practices. The rationales can be difficult to recover, but certain aspects are embedded in the design and style of the objects related to the practices.

In relation to a given field of everyday practices people justify their actions by tapping into a contemporary repertoire of reasons and rationales (p. 115). These reasons and rationales can refer to core concerns that can be identified for long historical periods. In the case of bathing Shove argues that three enduring anxieties are central:

- the positioning of self in society
- the conceptualization of body and nature
- the relation between pleasure and duty (p. 94).

In the study of other everyday practices it is worth considering both whether these concerns are relevant and whether other core concerns can be identified. The development of practices is influenced by the co-evolution of relevant rationales and discourses, and in some cases interlocking regimes of ideas, arguments and rationales can be identified (p. 114f).

When people construct their own way of doing things, they are engaged in a complex process of integrating appliances, practices, sociotechnical systems and component ideas into something for them coherent. Consumers are thus doing much integrative work, in particular integrating meaning and practice (p. 156f, 164). A further aspect of this integrative work concerns the integration of different fields of practice into the sociotemporal order of everyday life (ch. 10). The shared temporal order of society is increasingly being eroded, so individuals have to construct schedules of their own. As "individuals struggle to cope with the contemporary challenge of allocating activities and co-ordinating them and other people in time and space" (p. 183), they develop a demand for convenience technologies, and paradoxically, these technologies tend to contribute to the increasing complexity of the coordination task (a similar point has been made by others,

e.g. Cowan 1983). Some everyday practices are directly concerned with the management of schedules, but it is important to include the sociotemporal order in studies of other everyday practices as well, since all practices have to be integrated with each other.

### **Brief conclusion**

The outline of some of the ideas from Shove's book illustrates how demanding serious research in everyday practices can be, as it has to cover the interplay between appliances, technological systems, social conventions, practices etc. It seems to me that such research is highly needed to get a deeper understanding of the transformation of everyday life and of the related environmental impacts. As the increasing use of information and communication technologies is an outstanding feature of the present changes of everyday life, it could be interesting to apply Shove's ideas in analyses of the practices and composite services in which these technologies are integrated. Such analyses could contribute to an understanding of the emerging normality and the assessment of the related environmental impacts.

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## How Much Money Do We Need in the Affluent Society?

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In his 1957 analysis of American economic life, The Affluent Society, John Kenneth Galbraith argued that except for pockets of poverty, were it not for the forces of emulation and advertising, the marginal utility of money devoted to private consumption in the US would be zero.

The idea that money devoted to consumption has a diminishing marginal utility is not new. Indeed, an awareness of the diminishing importance of money, as one got more of it, long preceded the development of marginal utility theory by nineteenth century economists. As far back as Aristotle, in The Politics, we can find the idea that beyond a certain point having more money provides no advantage to the individual. Indeed, Aristotle put forward the radical thesis that beyond a certain point the incremental value of money was negative, that it did the individual harm to have more money. If one aggregated this up to the societal level one could make the inference that beyond a certain point not only was there limited positive value to economic growth, but that it was in fact negative on balance.

Galbraith's thesis however went beyond a theoretical assertion about the relationship between individual well being and higher levels of consumption. Galbraith was saying, as far back as 1957, almost a half a century ago, that America was already there; that we had reached the point at which additional increments to private consumption were doing us no good.

It is important however to remember Galbraith's caveat. First, he was talking about private consumption. He did not believe that we had reached a point at which there was no need for increased public consumption. Indeed, Galbraith was making the case for what today would be a shocking thesis: higher taxes. He believed that we should transfer income from the private to the public sphere, precisely because private spending was doing us no good and public spending, whether for parks or better schools or more beautiful cities or a cleaner environment, would in fact make us better off.

Secondly, we must attend to his caveats about the forces of emulation and advertising. Galbraith's view was that were it not for advertising and emulation, the marginal utility of money would be zero. But we have emulation and advertising, so it was not zero. By emulation, Galbraith was calling attention to a fact about the nature of our desires. He was maintaining that we have a powerful tendency to want things simply because someone else has them. Thus we tend to be, uncritically, in the grip of a mechanism for the perpetual creation of new desires, an endless cycle in which we all want more and more as we see each other getting more and more. Put in different terms, we could say that one person's higher consumption results in another person's dissatisfaction with his lot, and with the creation of new desires. Such a process can go on forever, and is one of the reasons why we in fact don't experience money as having zero marginal utility.

Given this aspect of our psychology, in truth, each increment of money doesn't have zero marginal utility, because having been made unsatisfied by our neighbor's higher consumption, our next purchase which either equalizes or allow us to exceed the neighbor, does in fact increase, or at least restore, our utility. But of course it is short lived. Our utility declines when the neighbor in turn increases his consumption. Put in still different terms one could say that a decline in the neighbor's utility is a negative externality created by my increase in consumption. In Galbraith's imagery we were like squirrels racing on a wheel that turned and turned, but never advanced.

In addition to the effect of this psychology of emulation, Galbraith focused on advertising as the other great force that keeps the marginal utility of money from actually being zero. Advertising was constantly creating new desires where there were none previously. It was essentially a mechanism for creating dissatisfactions, dissatisfaction that could only be satisfied by new purchases. Thus, advertising joined emulation as the second force that kept the squirrel wheel spinning. And advertising was part of the overall process of production, creating new products and creating the demand for them.

When one considers the various costs of such a production/consumption process – the negative externalities on the environment associated with higher and higher levels of production and consumption, the opportunity costs associated with the starved public sector, the direct and indirect costs on family life and individual well being associated with excess labor in pursuit of higher incomes – the indictment of the dominant ideology that maintained that ever higher levels of private consumption implied true increases in the standard of living was powerful indeed.

Galbraith's implicit belief was that by being aware of these facts about the psychology of economic life, we would be empowered to do something about it. For instance, we could recognize that as individuals we could not advance our well being, but that through collective action, the free action of a group within a democratic polity, we could in fact find a way to act rationally. As noted above, for instance, we could in recognition of this reality about ourselves, decide to regulate ourselves, use democratically determined law, to prevent higher private consumption, shifting through taxes, income to areas where real gains in well being were possible. Similarly, a mature democratic polity could decide that we needed to use the law to regulate ourselves by limiting our overall income, production and consumption through restrictions on the amount of work-time that would be permitted. Thus, it might be maintained that as individuals, because we are caught in these forces of emulation and advertising, we can't make collectively rational choices about how much to work. Instead, we need to impose on ourselves, through the democratic state, collective restrictions on labor time, thus limiting private consumption but giving us each much greater leisure, and well being.

So understood, one of the greatest barriers to avoiding excessive consumption, consumption that did not increase collective well being, but did have a variety of serious costs, was our lack of insight into our collective dilemma. And along these lines, one could conclude that a book such as Galbraith's that allows us to see this collective dilemma, provides the beginning of the answer. Of course it would take more than one book. What would be needed would be some real change in consciousness, a move to a collective sophistication about who we really are, and what our economic life is really about.

## The Problem Galbraith Didn't Solve

There was however one rather fundamental challenge that Galbraith faced that he didn't solve. He never demonstrated that what he was saying was actually true. What he laid out was a tremendously interesting and tremendously appealing theoretical possibility that he claimed was true of the American situation in the 1950's. If he was right, then in fact we had reached a remarkable point in human history. We had reached the point at which the economic realm was in fact satisfying, at least in the private sphere, all of our genuine economic needs. Everything beyond that point was artificial, and could, if we could implement adequate mechanisms, be dispensed with. Thus in principle because of higher and higher levels of productivity, the economic resources were abundantly available to deal with vast unmet problems, not just unmet public needs in our own society, not just our environment, not just our need for greater leisure, but also the problems of others in the world. If we had little need for higher levels of consumption, then our higher levels of productivity could be put to the service of others, not just the pockets of poverty in our affluent society, but the sea of poverty within the world.

And if this could be credible maintained by a prominent economist and public figure in 1957, how much more credible must this thesis be after having undergone another half century of economic growth, that after adjusting for inflation has resulted in close to a tripling of per capita personal consumption expenditures since 1957.<sup>1</sup>

Of course, income and consumption is not distributed equally, and as Galbraith was aware, there were certainly in 1957 Americans who did not have all the personal income they required to meet core needs. And indeed, the same case could be made today. But Galbraith's thesis was about the mainstream, about the middle class. And he was saying, back in 1957, when the middle class had about 1/3 of the income it has today, that it had enough, enough in the sense that having more private consumption just wouldn't make one any better off. If Galbraith had it right in 1957. then today with three times the income, at least 2/3's of our personal consumption would be superfluous.

Was Galbraith correct? How can we know? How does one demonstrate that, except for the influence of advertising and emulation, except for pockets of poverty, all of our legitimate needs for private consumption have been satisfied? The most straight-forward answer to this question is a three step approach:

1. You determine exactly what it is that people really need.
2. You go out into the market place and collect price information about the costs of the specific goods and services that are needed.
3. You aggregate these costs into a total, which we can call "Need required income" and you compare that with the actual income that people have.

Essentially, such an inquiry seeks to answer the question "How Much Money Do We Really Need?" or "How Much is Enough?" As it turns out, in the United States there is a long history of such inquiries. They run back almost one hundred years. For a

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<sup>1</sup> In chained 1996 dollars, per capita personal consumption expenditures in the United States rose from \$8,303 in 1959, to \$22,390 in 2001. (Table B-31, Economic Report of the President, February 2003).

considerable period of time, they were carried out by the U.S. Government. Indeed, one of the earliest and most interesting studies was requested by the US Congress during World War One, as it sought to figure out how much it should pay Congressional employees. Congress called on the Bureau of Labor Statistics to determine how much it costs to maintain a family in “health and decency” in Washington DC.

The Bureau of Labor Statistics studied such costs, in various parts of the country, until the 1980’s when, during the Reagan Administration, the program was closed down. The approach they took, however, reappeared shortly afterwards in the form of what are today known as “Living Wage Budgets.” These have been used by various municipalities and advocacy groups as part of efforts to raise minimum wages.

The intellectual history of these efforts is complex, but one thing that stands out is a continued history of “unease” with respect to methodology. This was evident back in 1906, in the earliest studies, and it came to a head in the 1980’s when an outside panel of experts concluded that there simply was no adequate methodology for conducting such studies.

The recurrent problem, as one might expect, lies in the very first step, in specifying exactly what it is that a person needs. Let me illustrate the issue from the food sector. I choose food for several reasons. First, it seems to be the most solid of the needs areas, the sector most supported by scientific inquiry into nutritional needs. Second, for much of the twentieth century, food was the largest sector of household consumption expenditure and remains so in most countries around the world. And third, in the US, the official poverty line is calculated as a multiple of dollar amounts calculated for the food sector. Thus, if the food sector is problematic on methodological grounds, it would appear that the general enterprise is in significant trouble.

There is one fixed point that can be identified in the food sector. We can obtain from nutritionists, an up-to-date specification of the specific nutrients that a person “needs.” Here the term “needs” can be used in a very precise manner. What we mean is that if such nutrients are not part of the individual’s diet, then the person will with very high probability develop significant problems to their physical health. In short, they will become sick and possibly die. At the very least, their growth will be stunted. This is the one solid point of reference that we have.

And based on this one point, one can launch the marketplace investigation: “What is the least amount of money that a person living in such and such place at such and such time, requires to purchase food that supplies the needed nutrients.” While straight-forward enough, there is a problem here. To illustrate it, let us assume that food nutrients come down to a list of required vitamins and minerals plus a caloric requirement. So stated however, the food needs could be satisfied by a vitamin enriched rice. We know that the vast array of vitamins and mineral contained in formulations such as “One a Day Brand Vitamins” which can give you 100% of daily requirements of scores of vitamins and minerals, can be provided for pennies a day. And if we buy our rice in 100 lb. sacks, it too can be obtained for little daily expense. This tells us is that nutritional food needs can be met at extraordinarily low levels of expenditure – something in the range of a few hundred dollars per person annually. There is one problem however: This number is largely irrelevant. Even the poor spend vastly more than this for food. Thus, in 2002, in the United

States the average annual expenditure on food was over \$2,000 per person, and for persons in the lowest quintile of income, expenditures on food average around \$1,800 a person.

Even back in 1919 when the first BLS study was completed, the income required for food was not computed in this way, and the reason is not hard to find. If one is seeking to find a basis for setting the salaries of Congressional employees, it is largely irrelevant to tell them that for pennies a day they can meet the biological requirements for food nutrients. To try to impose such a wage standard would cause a riot.

In this early study, which used the general rubric “health and decency” the term decency serving as the necessary factor to ensure relevancy. Yes, the idea was to determine a minimum dollar amount that was required in various sectors. In the food sector, this was constructed within certain implicit limits. Though not fully explicated they appear to have included limits on cost saving purchases (e.g. no one is expected to buy and store a ten year supply of rice, no one is expected to go to twenty different stores to buy twenty items at the lowest price), limits on food preparation time (e.g. no one is expected to bake all their own bread even if this is cheaper than buying prepared bread) and most importantly, the diet involved must roughly conform to the habits, tastes and expectations of the public in question.

The 1919 study, unlike many subsequent studies was quite clear on this, with respect to the clothing sector. Here it spoke not just of clothing that would provide protection from the elements, but clothing that would allow “the family members to appear in public and within their rather narrow social circle without slovenliness or loss of self-respect.” And indeed, when BLS defined this too narrowly in the eyes of the wives of the government employees, (who were typically male) there was a very forceful protest and the clothing numbers were raised by 30%.

What lessons should we draw from this? Some, having noted the inevitable presence of such issues in these cost of adequate living studies, over many decades, simply concluded that there was an inevitable arbitrariness built into the entire enterprise and it ought to be abandoned.

I would argue for moving towards a different, more complex, and more sector specific response, one which delves much more deeply into the nature of our needs, and seeks to build our approach to economics on a stronger psychological and mental health basis. Things are not as simple as Galbraith tended to present them.

## 1. Food and clothing.

We do not have legitimate needs on one side, and the force of emulation and advertising on the other. In every society, even the poorest, the role of food and clothing has always been complex, and has always been social in character. Food is not just about nutrients – human beings around the world have meals, and meals are social. Food is prepared and presented, often by some members of the family to others. There is an art to this aspect of life, and the ability to live well in relation to food is both enormously important, and a vital part of life across cultures and across the income spectrum, no less true in poor societies than in rich, no less true of the poor in rich societies than the wealthy. Meals are structured around food,

but they are not mere matters of ingestion. At best they are times in which people come together and enjoy themselves and each other. They take delight in flavors and spices and the beauty of food-sculptures that last no longer than the sand paintings of Buddhist monks. Getting this part of life right, is no easy matter. Today it involves significant issues of time allocation, of work roles, of conceptions of family life and scheduling. One aspect of this has to do with a vast shift from food consumed at home to food away from home. In 2001, of total expenditures for food, over 40% went for food away from home. This, of course, varied by income group, with those in the highest quintile devoting almost 50% of food expenditures to food away from home. But what is most striking, is that this has been a major trend across the spectrum, with those in the lowest quintile devoting over 1/3 of food expenditures to food away from home. If one were to construct a least cost way of gaining food nutrients, no money at all would be spent for food away from home. It is simply cheaper to prepare it oneself: zero labor costs, and zero cost for physical restaurant capital. But what does this tell us? Are we to conclude that eating out is just part of the superfluous consumption of the Affluent Society or are we talking about cultural transformation within which some degree of regular eating out has become part of a decent life? There is no easy answers here, and the issue is not simply one of saying yes or no to eating out, but also how to define superfluous consumption within meals taken at restaurants, after all there is an enormous difference between a dinner that costs \$10.00 and one that costs \$50.00.

Clothing is particularly interesting because probably above all others, this sector is saturated with advertising, and indeed, our changing desires have a great deal to do with emulation, with seeing what the other person is wearing and coming to view what we have as out of style. If there is a realm in which advertising and emulation would have its sway, this is it. Yet what is most striking is that if we consider the historical picture, we find that as overall income levels rose in the United States, over many decades, the percentage of expenditures devoted to clothing declined dramatically. At the beginning of the 20<sup>th</sup> Century data indicates that as much as 15% of the household budget went for clothing. Today, we have less than 5% of total expenditures going for clothing, and this is true across the income spectrum, with the percentage going for clothing varying little between income classes. What this suggests is not that advertising and emulation are minor forces, but that they don't work in quite the way Galbraith suggested. It seems they are far more potent in getting us to spend our money for this kind of clothing rather than that kind, while having far less power to get us to spend more and more for clothing, or to shift expenditures from non-clothing to clothing.

Taken together food and clothing today account for under 20% of consumer expenditures in the United States. Even if we were to conclude that some significant component of this is superfluous, say 25%, we are only talking about 5% of total consumption.

## 2. Transportation

The most explosive growth in consumer expenditure over the last 100 years has been in transportation. In 1900 this was so small that it was contained within miscellaneous expenditures, and came to only 1%-2% of the total. In 2000 transportation accounted for almost 20% of household expenditures, more than food and clothing combined and approximately the same size as the shelter component of housing expenditures (housing minus utilities, household furnishing, supplies and operations). That is, our rent and

mortgage payments were about the same as our car payments. What are we to make of this? Is this a clear case of superfluous private consumption, consumption that goes well beyond what we need?

One hundred years ago the automobile had just been invented. Today everyone has them; indeed by 2002 the number of vehicles per household in the United States rose to 2.0. Given the extreme environmental challenge posed by automobile use, it is fortunate that this level of ownership is not presently experienced by the rest of the world. But how should we understand it? Does it, either in quantitative or qualitative terms (size of cars, gas mileage, etc.) serve as a solid example of what Galbraith wrote about – consumption that does not emerge from legitimate need, but from emulation and advertising?

One useful way to think about these matters is in functional terms. Economist Amartya Sen has suggested that in thinking about the concept of standard of living, we use the language of “functionings and capabilities” to understand the relationship between the things we buy and the well being they might provide. Thus, in the clothing sphere Sen called attention to a point made by Adam Smith – that across various cultures and periods of history, it was enormously important to personal well being that people be able to “appear in public without shame.” This may be referred to as a “functioning.” The ability to do so, however, requires the possession of very different commodities in various times and places. Thus Adam Smith pointed out that in England, to be without shame, both men and women needed shoes on their feet in public. However he maintained that in Scotland this was only true of men, and in France, both men and women could appear in public without shoes and without shame. Thus, we may think of well being as related to various capabilities and functionings, each of which has a commodity specification which varies depending upon the cultural and historical context.

In the transportation sector, I suggest that the central capability on which personal well being depends is “the ability to get around relatively quickly to the loci of everyday life” – one cannot live well if one cannot get from one’s home to work, or from home to school, or to the marketplace, or to the homes of friends. The texture of everyday life, in virtually all cultures and across vast historical periods, requires that people be able to take part in the activities that such loci embody. However, at some points in time, in some cultures, work and schooling and relatives were either at home or close to home, and there was no daily need to enter a marketplace. In order to satisfy the “getting around” function, all one needed was the ability to walk, perhaps a pair of sandals. In other cultures and times, a bicycle might have been required, or conceivably access to a horse. But in American life today, except in a few unusual urban environments such as Manhattan, most people cannot “get around” without a car. This is not a matter of principle – it has to do with the availability of public transportation, and with the patterns of work and housing and commerce. But given those realities, without a car, people are stranded. Indeed, with the full participation of women in the formal workforce, most two parent families need two cars to be able to maintain personal autonomy. With teenage children it is even worse.

Here it is important to recognize that automobile ownership is not at all confined to upper income groups. If we look at income quintiles we find that vehicles per household rise with income. The lowest quintile has 1.0 vehicles per household, whereas the highest quintile has 2.8 vehicles. However, if we consider the number of adults within the household, the

variation in vehicles per adult is considerably less, ranging from .7 vehicles for the lowest quintile to 1.2 for the highest. And if we further adjust for income earners within the household, we find that there is very little variation across the income spectrum.

What is true, of course, is that upper income households have more expensive cars, and this is not at all related to satisfying the need to be able to get around to the loci of everyday life. But even here we must not exaggerate the extent of superfluous consumption. If we compare the total vehicle cost per vehicle, that is the cost of purchase plus operations and upkeep per car, we find that the highest quintile spends only 1.7 times as much per vehicle as households in the lowest quintile. And when we compare the middle quintile with the lowest quintile we find that those in the middle are spending per car only 16% more per year. Thus, I would suggest that for the bulk of the American population, even automobile consumption does not emerge as superfluous consumption.

## Efficiency

It may be useful at this point to consider the concept of efficiency. Efficiency is a matter of achieving outputs with lower levels of inputs. It applies to efficiency of automobiles where we speak of miles traveled per gallon of gas consumed, and it applies to economies where we might speak of levels of output achieved in relation to productive inputs.

But it is also possible to think of a society's efficiency in relationship to the attainment of valued functionings or the satisfaction of core needs. And here we might consider the relationship between the attainment of a key functioning, such as "the ability to get around to the loci of everyday life" in relationship either to the commodity specification that this involves, or in relation to the income it takes to purchase those commodities, or in relation to the labor time it takes to earn the income required to purchase those commodities.

From this perspective we can compare societies at a given point in time, or examine changes in any specific society over a long period of time. And we can compare with respect to the attainment of the functioning (or the satisfaction of the need) how much product, income or labor time was required.

Let me now offer a formal definition of what I call "The Social Efficiency of Money"<sup>2</sup>

Start with the identity:

1. Needs Satisfaction = Needs Satisfaction

Multiplying the right hand of the equation by 1 (per capita income/per capita income) we have :

2. Needs Satisfaction = Needs Satisfaction X (per capita income/per capita income)

Rearranging terms we on the right side we have:

3. Needs Satisfaction = per capita income X (Needs Satisfaction/per capita income)

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<sup>2</sup> I first introduced this idea in my book, Graceful Simplicity.

This last term in the equation (Needs Satisfaction/per capita income) is what I term the Social Efficiency of Money. Equation (3) which is a tautology is quite interesting nonetheless, for it tells us that the level of needs satisfaction in any society is a matter of two factors, the level of per capita income and the Social Efficiency of Money. Along these lines, we can understand how in certain poor societies, such as Sri Lanka, there can be very high needs satisfaction (say measured in low levels of infant mortality) because the social efficiency of money is very high.

And correspondingly, we can understand how it can be that despite a hundred years of growth of per capita income in the United States, the need to be able to get around to the loci of everyday life, is not any the more adequately satisfied than it was a hundred years before. During this period we have a dramatic decrease in the efficiency of money as a tool for satisfying transportation needs.

If we view this from the point of view of labor inputs, we can say that one hundred years ago we were able to achieve the key transportation capability (“getting around to the loci”) with at most one weeks labor. Today, however, even with vastly higher wages, we have to work one fifth of the year, two and a half months, in order to achieve this capability. This represents a vast loss of social efficiency. Indeed, we can say that today, when it comes to the labor inputs or income resources required to achieve the basic transportation capability linked to personal well being, the United States is the least efficient society in human history.

It should be noted however that this situation varies enormously sector by sector. Thus, going back to food and clothing, one hundred years ago we had to work approximately eight months of the year to satisfy our needs for food and clothing. Today we have to work only two and a half months to satisfy those needs. This is likely the least amount of work time required by food and clothing needs in human history.

## Housing

With these concepts of functionings and efficiency in mind, it is easier to consider the housing sector. Housing represents the largest share of personal consumption expenditures, roughly 1/3 of the total. Within that roughly 60% goes for shelter – an amount equal to that for transportation.

When economists typically consider shelter, they see a rather clear case of economic progress. Houses are bigger, there is more space and air per individual. Indoor plumbing and electric lighting long ago became universal within the United States. In warmer areas of the country air conditioning is standard. Viewed in material terms there is no doubt that there has been very substantial progress. Moreover, our taste for luxurious housing seems to be completely open ended. Here at last is an area in which Galbraith’s imagery seems appropriate indeed. In the middle class our legitimate physical needs are clearly satisfied, yet we want more and more. And our desire for more is closely related to what other people have. We are very conscious of how our house looks in the neighborhood, is it the biggest or the smallest on the block? How does the landscaping compare to our neighbor’s? What do the relatives have, and how do they respond when they visit?

In this area, all of us have a capacity to appreciate greater and greater material increments. With respect to food or clothing, truth be told, most of us can't tell the difference between a \$15 bottle of wine and a \$150 bottle, and most of us can't appreciate the gap between a \$200 suit and a \$1000 suit. But with houses it is quite different. We can immediately respond to luxury, immediately appreciate a beautiful home, a vast swimming pool, or whirlpool bath tubs.

Yet for all this, there is a very different way of looking at the housing sector, one that I believe is considerably more informative. Here again, the key question is about functionalities and capabilities – what is it, in functional terms, that is most important to us about housing? There is no single answer here. Clearly, there are key needs tied to protection from the elements, to having a residence and so forth that are part of what shelter provides in any context. However, if we consider the American marketplace, I suggest that there is something else that is central: living in a safe neighborhood with access to good public (free) schools. For most families this is central desiderata that combines with cost to determine their housing choices, within reasonable distances from where people work.

What does it cost in the US to live in a safe neighborhood with access to good schools? This depends enormously on where in the country one is living. But consider the area where I live, the suburbs of Washington DC. We live in a house presently valued at around \$400,000. In many ways it is a nice middle class neighborhood. Yet a few weeks ago a neighbor was knocked to the ground in a minor theft. Another neighbor fled from someone who walked up to him at dusk and simply asked for his wallet. Several years ago a man around the corner was stabbed by a stranger on the street, and few years earlier my neighbor across the street, when she was five months pregnant has someone stick a gun in her side and demand her purse.

How safe is safe enough? I use the “go out and play” standard. When I was a child some fifty years ago, living in New York, when we were getting to be a burden in the house, our parents would say, “go out and play.” Today, almost no one I know would say this to a young child in our neighborhood. And certainly no adult would feel comfortable taking a walk during the night hours. There are some neighborhoods in our area which are considerably safer. The schools are better there as well. Yet in those neighborhoods houses rather than selling for \$400,000 sell for \$700,000 or more.

What this means is that a rather basic housing related function “living in a safe neighborhood with access to good schools” is in fact financially out of reach for the vast bulk of the population. So here too, we find that Galbraith did not quite get it right with respect to the affluent society. It is true that our notion of physically acceptable housing may be on an upwards escalator, but it is also true that very legitimate, very basic needs, needs often satisfied in much poorer countries are simply not met. And as a result, the middleclass accurately senses that it does not have enough money, that life would in fact be significantly better if it had a fair bit more.

At the same time it is important to realize that having more income, while a solution for any given individual, may not represent a social solution. If only 10% of the neighborhoods

meet the “go out and play” criteria, and if everyone experienced a doubling of income and this allowed 20% of the population to buy those \$700,000 houses, the result would be a bidding war that would drive prices to the market clearing level, to the point at which only 10% could afford the 10% of homes that satisfy the criteria. Viewed from this point of view, while Galbraith didn’t get it quite right, he emerges as correct about the adequacy of trying to improve our lot through expanded personal consumption. It might work for a given individual, but not for the group. The group needs to increase the supply of good neighborhoods, to go from 10% of neighborhoods to 50% -- and to do this may require more public spending to deal with the social problems of crime, unemployment, over crowded schools, and plain old urban ugliness.

Put differently, we can say that under present conditions, “need required income” in the United States is strikingly high. This is simply the other side of saying that in important sectors, the social efficiency of money is very low. But what may be required to alter this is not still higher levels of personal consumption, but political change, that sets as its objective, the attainment of very high levels of social efficiency, or to put it differently, sets as its objective that families with modest incomes can nonetheless meet their core needs. Yet at the same time it must be said, in the absence of such collective approaches to our unmet needs, for each individual, the pursuit of yet higher levels of income and consumption emerges, by default, as the predictable answer.

## **TOPIC TWO**

*-Consumer's Behaviour,  
Well-being and Happiness -*

# The Consumption of our Discontent

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In the chatter of public voices, there are some which claim that we should strive for a sustainable world and sustainable consumption. But we, who demand this seriously, sometimes – and with reason – feel like members of a special sect with common prophets and language. It is imperative to find a way to join a broader discourse and this paper is an attempt to discuss ways forward to this.

The prophets demand factor decreases in resource use – 4- 5- or 10-fold (Daly 1991; Meadows et al. 1992; Lovins et al. 1995). This comes out as very drastic in relation to the single digit percentage reductions of the Kyoto protocol (and it is well known that even that is rejected in some quarters today). Thus factor decreases have a somewhat quixotic character.<sup>2</sup>

As a consequence such demands are ignored by most people. And even those who accept the scientific conclusions try to accommodate their feelings either by referring to a soothing time frame that tends to accompany the demand – 50 years or so – and to the future achievements of technical development. The latter, apart from being unrealistic in many instances, however begs the question about the rebound effect.

This paper will discuss where to locate the issue and look for possible solutions. To this end, it will swing between individualistic perspectives and the way our political and social institutions work. It will question the common scarcity view of our present world, present a typology of “over-consumption” and a model of society to illustrate the conflicting interests. But it will also present some evidence – with data of a kind which is often overlooked or even intentionally disregarded – that people’s attitudes to consumption and related issues of work and time open a real opportunity for change. This leads to the conclusion that to move forward from the status of a sect of sustainable consumers, it is necessary to discuss downshifting at work and other changes in life style. Another conclusion is that this will require actions in the political field and the paper suggests that civil society organisations play a problematic role because they may fail to represent people's basic opinions.

## **A surplus economy!**

My point of departure is that we live in a surplus economy. As a society, we are beyond scarcity. Not beyond desire but beyond satisfying reasonable needs. We are in fact “Keynes’ grandchildren” who have solved the “production problem” and should no longer have to be greedy and concerned about making our living since the productive capacity is sufficient – I limit this analysis to Western countries. (Keynes 1983)

Such a statement of course sounds politically incorrect because uneven distribution still leaves some people poor, at least relative to the norm. But this skewed distribution is a

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<sup>2</sup> To readers who, like me, are puzzled by the term: "having ideas that are not practical and plans based on unreasonable hopes of improving the world" or “impractically idealistic” (Collins). Think of Don Quixote!

political problem, not one of lacking resources. There is no excuse to postpone an adaptation to more sustainable ways of life today when we are aware of the limits to growth; it just makes it even more compelling than when Keynes expressed his interpretation of human progress. But Horkheimer and Adorno were outright about the political problem at hand when they characterize ours as “a society which skilfully manages to keep a threatening surplus at a distance”. (Horkheimer & Adorno 1972)

### **A typology of overconsumption**

“Over-consumption” is the problem and we can highlight different aspects of the issue – partly overlapping and non-excluding but still distinguishable: WASTE, SUMPTUOUSNESS and AFFLUENCE.

WASTE<sup>3</sup> implies that consumption takes a larger toll of resources or pollution than required. It is simply inefficient in relation to the satisfaction derived – as with an old car using too much petrol for the transport service rendered. In an ecological perspective, such waste lacks positive meaning and normal technological rationality would be to try to reduce it with new and more efficient technologies.

SUMPTUOUSNESS<sup>4</sup> stands (here) for "elitist" consumption/activities which are only available to a limited group and characterized by a high specific resource/pollution density. In line with the example above e.g. the most "thirsty" snob cars (like SUVs). Sumptuous consumption evidently has a social meaning to serve as a social marker.

AFFLUENCE<sup>5</sup> refers to an oversized flow of consumption in relation to a specific reference or societal norm. If the reference is the supply of fossil fuel or the air quality, affluence is too many people driving their cars too far. The term gained its present negative connotations in the critique of mass consumption.

WASTE may appear as uncontroversial – at least in a consumer perspectives. Short-lived products do squander resources but a producer may rather think it a waste to make durable, simple and cheap products if that will shrink the market and jeopardize further expansion.

Combating WASTE is still superficially innocuous in the sense that it seeks to do the best of a given situation. This refers to allocative efficiency which is the basic economic drive (since economy purports to deal with scarce resource). At stake is not what to do but only how. Reducing SUMPTUOUSNESS is already more contested since it may inflict upon the relation between social groups and the issue of distribution. Reducing AFFLUENCE is definitely a delicate political undertaking since it challenges the habits of the whole population and cultural norms about the value of economic growth and consumption's utility value. While allocation and distribution are well known dimensions of economics, affluence refers to a third and novel one, the *scale* of the economy. (Daly & Townsend 1993)

The three aspects also have distinct relations to the concept NEED, a term used rather recklessly (and often persuasively) in everyday language while actually carrying a lot of political weight. WASTE obviously does not encroach on need satisfaction but merely

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<sup>3</sup> "to spend or use carelessly ... to allow to be used inefficiently" (Webster)

<sup>4</sup> "expensive or extravagant". Confer sumptuary laws/taxes "designed to regulate personal expenditure/habits on moral or religious grounds ... prevent extravagance and luxury" (Webster)

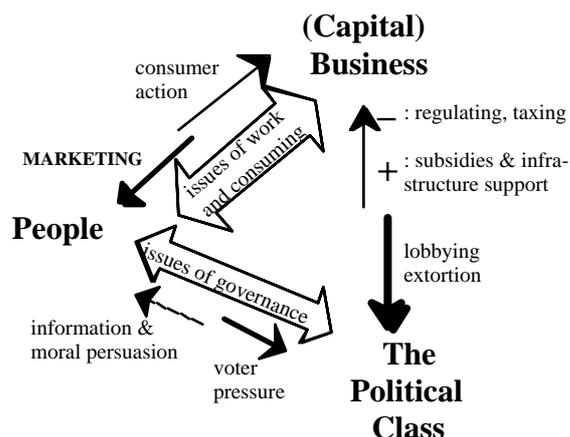
<sup>5</sup> ...having a generally sufficient and typically increasing supply of material possessions (Webster)

concerns the way it is handled. But SUMPTUOUSNESS and AFFLUENCE do presuppose an opinion on what is deemed a human need. This is in the end a social, political decision. "False needs" are those purportedly not genuine to human nature but conjured up – and catered for – by an expanding, profit-seeking production while real needs are those that a good society should provide all its members. Sumptuous and affluent consumption may surpass that. (Heller 1974)

### A model of society

My tool of analysis a crude model of society with three types of interacting actors: BUSINESS (Capital), PEOPLE, and THE POLITICAL CLASS, each with its interests and mindsets. To characterise them briefly, BUSINESS is the main organiser of production. It is profit-oriented but basically indifferent to what is being produced (although it may be sensitive to what the consumers think of its action). THE POLITICAL CLASS is composed of politicians and but also of administrators, "bureaucrats" as well as researchers who work in conjunction with the government; it is basically concerned with legitimization and safeguarding its position in power. It follows that we should not expect change to follow when and because a universal "we" (all actors) get informed and begin to act rationally and morally "right". Neither should researchers take for granted that their mission simply is to help governments' striving for sustainability.

The picture also indicates that the relations involving PEOPLE are well mapped ideologically: people act as employees or consumer versus BUSINESS and as citizens versus THE POLITICAL CLASS. The third relation remains more undefined and contested: according to what general theory can we describe what goes on between business and the political class?



Two comments about possible actors are warranted here. Media – sometimes called "the fourth estate" – are not viewed as a type of actor in its own right. It is a part of, and dependant on BUSINESS (as advertisers), in spite of its self-image of scrutinizing business and politics in the public interest. Another possible category of actors is civil service organisations (CSOs) supposedly representing particular interests for people on the political arena. I will return to both of these later.

The simplistic assumption about "people" as one of the actors is not to deny that human beings constitute all the actors. Acting in prescribed roles but also alternating between positions, individuals create bonds that makes society coherent. BUSINESS and, possibly to a lesser degree, THE POLITICAL CLASS are likely to follow an instrumental rationality while PEOPLE may be more apt to follow a "communicative rationality" with a broader set of deliberations.

Assuming that governments intend to promote a more sustainable consumption, there is a lot they can do. The State of the World report 2004, which is focused on the consumer society, suggests measure like phasing out subsidies, transfer to ecotaxes and regulating

product standards and labelling. (World Watch Institute 2004) This is important and goes some way. But it is far from done to the full possible extent and business offsets these efforts by marketing (versus consumers) and by putting pressure on the politicians. That explains governments' reluctance. In fact politicians often show a Janus face: trying to please environmentally concerned citizens by urging the public to behave environmentally correct while at the same time satisfying business by promoting increased consumption. In the latter, many politicians probably also adhere to genuine beliefs, shared with business, about the necessity and the benefits of an expanding economy: “endless economic growth is the modern religion” (World Watch Institute 2004)

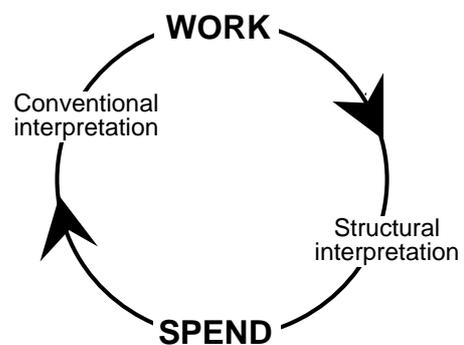
### **What do people want of consumption – and work?**

Making the individual as consumer the central figure in the quest for sustainable consumption may appear natural but involves some problems. In the first place, it may obscure how producers construct the field of consumption to satisfy their interests. It also neglects that the range of possible choices may not be so large as generally assumed due to lock-in effects and structural factors. Finally there is a certain reluctance to trust the judgment of consumers when it runs counter to certain ingrained ideas.

In the first place it is important to acknowledge that consumption is much more than shopping. Shove stresses the importance of the normal, unquestioned daily practice and the ecological relevance of “inconspicuous consumption”. This is an important remark. An iceberg could be a metaphor where the reflected consumption forms the visible part. But one may also view consumption as a "situated practice" as described by Giddens: a routine act whose intentionality can be recalled if need be. This means that consumers are knowledgeable all the way and their actions can be brought up to conscious reflection. In terms of the iceberg, even the submerged part can be subject of reflection, in particular when it is linked to the visible part (as petrol and cars!). (Giddens 1979; Shove & Warde 1998)

The asymmetrical "ratchet effect" in household behaviour expresses a related situation: marketing forces, genuine pleasure and social pressure pull to inflate consumption while habits, commitments and investments stand in the way of reducing it in order to live lightly, at least at short notice.

This leads up to the general concern of many researchers that attitudes do not bring behaviour change. Minna Antio summarises: “young people master the course of green consumerism ... but they do not necessarily act accordingly”.<sup>6</sup> One obvious reason – which often seems to be bracketed in these analyses – is that consumers meet thousands of commercial and cultural summons to consume every day. The British National Consumer Council also comments soberingly that people do indeed have “a positive” but also “passive view of sustainable consumption” and, important, “everyone has more immediate and pressing concerns...”. Another interesting comment is that people seem to expect that others, in particular the authorities, should set the conditions right rather than leave it to each



<sup>6</sup> Presentation at National Consumer Research Centre, Helsinki Nov 6-7, 2003.

person to act responsibly. (National Consumer Council 2003)

It is worth stressing that changes in consumer behaviour may have several roots. One important driver is the self-interest in safer, cleaner or healthier product such as food; another is awareness of the negative effect on the environment.<sup>7</sup> Sometimes they go hand in hand. People in the NCC study tend to identify sustainable consumption with "eco-products" and are concerned about the extra costs they carry. But this is rather a narrow view; it can, to the contrary, be shown that to follow the advice on "green" food, "green" travel or "green" living (as advocated by many authorities and other advisers) is in fact money-saving. (Alfredsson 2002) Unfortunately for the environment, spending the saved money may result in take-back effects which nullify the first order effects.

This leads to the issue of lock-in into a way of life, quite evident in the case of employment. We can describe the connection between work and consumption with a "work-and-spend" circle (developed after (Schor 1991)). Evidently most people cannot spend without prior work and earnings (upward arrow). This also tallies with the economic understanding that one's supply of work is a response to one's wish to consume. But most jobs are offered in a standard package: full-day, every day and life-long work. This institutional norm for the duration of work also determines the income. Thus the "work contract" for a majority may in effect become an incitement to consume (downward arrow) one's surplus – or "discretionary" – income. Most people's experience is of course that this is quickly appropriated by commercial forces.

This may be regarded as a case of "rebound effect". Normally this is tied to gains in technological efficiency, which, contrary to naive expectations, by way of lower costs may lead to increasing volumes which offset the initial gain. Such "take back effects" are extremely important because they undermine the logic of environmental improvements by technical efficiency. Work also regularly becomes more productive (efficient); this is in effect the dominant cause of economic progress. But historically, only a minimal fraction of this productivity increase has been used to reduce working hours – almost all of it has been turned into higher incomes (or profits).

Objections to this argument usually refer to the idea of consumer preference and consumer sovereignty etc (neglecting the well-known critique that one cannot express a preference in the market for things like fresh air, safe school ways and many other urgent issues). Such notions have a strong hold in the discourse – even to point of depressing scientific and folk doubts about the merits of a continued growth in consumption. A recent trend is, however, to question the satisfaction derived from consumption. The classic question "Does Money Buy Happiness?" (Easterlin 1973) has become topic of late, in the academic field as well as in politics. This is demonstrated by the recent British government report about the state of knowledge of life satisfaction and whether this is an appropriate area for political intervention. A main point, not really new to scientists in the field, is that higher consumption fails to improve happiness ratings for a group above a certain income (which for countries is as low as the 1950s-level in Britain). More relevant happiness factors are social relations, a good job etc. This leads the report to propose i. a. that one should rather strive for a better balance between work and leisure, in other words shorter working hours. (Donovan & Halpern 2002)

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<sup>7</sup> A third reason is of course concern about global injustice.

This tallies well with a multitude of information about people's views on life which seems to be disregarded, possibly because it does not comply with the ruling paradigm of progress. Three issues merit special attention:

1. The preferred *working hours*. This is the object of a great number of surveys and experience shows that the wording of the question is crucial. Only a minority – 15-20% – is prepared to *forego income* for shorter hours in an individual decision. But a majority of 50-60% favour shorter hours *instead of a higher income* (and only a small minority prefer "increased private consumption"). This confirms that working hours is a social issue which requires a collective choice for the future. (Sanne 1995)

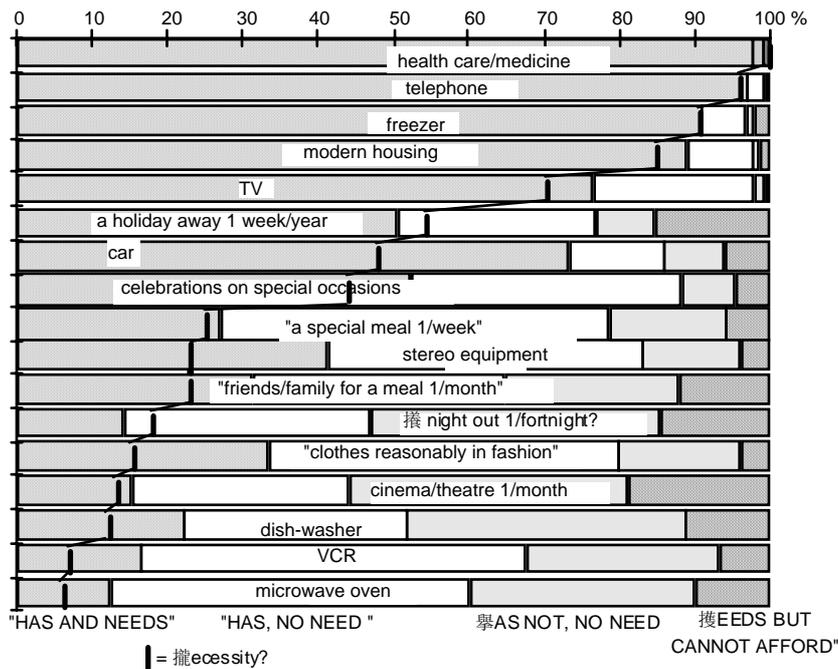
2. the *pace of life*. Time stress has become topic, in popular discourse as well as in academia, with worries about its effects on people's daily life, health and social relations. Evidently, most people would prefer a less rushed tempo. (AllensbacherInstitut 1999) It has been shown that people blame the work/consumption nexus for the time shortage. All the same most people focus on other means to handle the dilemma, e.g. how to organise and gain control over one's time. (Southerton 2003)

3. *needs and wants*. The notion of sovereign consumer, acting according to his/her preferences, rules standard discourse, effectively excluding the concept of "need". All the same there exists a popular distinction of needs versus wants (as well as one of necessities versus luxury). (Lunt Livingstone 1992) In spite of frequent objections, it is also possible to study people's conception of "needs" empirically. This has yielded some interesting results where respondents distinguish between what they have and what they consider needed, either for themselves or generally, in today's society. A Swedish survey mapped the occurrence of certain belongings and habits of consumption together with people's perceived need for them.<sup>8</sup> It shows that almost all households have-and-need a number of basic welfare means such as health care and proper housing. Some household appliances are also very common and considered essential. But as one moves down the list, there are many VCRs, microwave ovens and other gear in the homes which are not deemed "needed". The reasons for acquiring them may have been curiosity, status, comfort or wish for distinction. The category of indifference ("has not, no need") is also big. (Sanne 1995; Sanne 1998)

This indicates a "rational" approach to consumption. Respondents were able (and willing) to distinguish between essential and non-essential consumption and to identify "heterodox", contested consumption which is not hidden in the inaccessible parts of the iceberg of normality and unquestioned norms and habits. This also infers that it is feasible to argue about changing or refraining from such consumption. (Bourdieu 1977; Shove 2001; Wilk 2002)

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<sup>8</sup> The survey was initially conducted in order to map "consensual poverty" in terms of necessities for a normal life (based on a similar British study, "Poor Britain (Mack Lansley 1985)). By having people answer to what they deem "needed", one avoids the problems of defining and delimiting the elusive concept of NEED.



### Organised dissatisfaction – and beyond

The emerging picture about people above is not the conventional one of the unsatisfiable consumer. It is more in line with the claim of André Gorz (in several texts) that the typical attitude is that "we have enough" or "we can make do". (Gorz 1989) More consumption does not bring added satisfaction; there is a discontent with its unfulfilled promises, with the inability to choose something else than what the market offers and with the constant lack of time in daily life.

But this picture fails to catch on in mainstream public and political debate. It has been suggested that this is due to the lack of an established (political) vocabulary about contentment. But it is also unwanted knowledge ("cognitio non grata"). Material contentment runs counter to strong interests. The discourse is dominated by growth-oriented actors – Business and the Political Class. Economic growth thrives on dissatisfaction. This is why descriptions like the ones above are sometimes "explained away" as a "sour grapes reaction" of downwards adapted preferences or "instilled needlessness". Actual behaviour – long working hours, consumption habits – supposedly disproves stated preferences.

Here we might return to the triangle of actors. As reflecting citizens, people have an influence on politicians. But this is often mediated by organisations – political parties, trade unions and business organisations and other interest groups. An obvious dilemma is that their *raison d'être* is to give voice to what can be found of popular dissatisfaction. No organisation will thrive on the message that its members are satisfied with their conditions. This distorts the political decision process which is already characterised by lobbying and deliberately created and implanted perspectives. Agnes Heller calls ours a "dissatisfied society" and this is an *organised dissatisfaction*. (Heller 1993)

The dissatisfaction is further amplified by media, not just because of its ties to and joint interests with business (and increasingly with the Political Class). It is also in the nature of media to focus on problems rather than progress and to pay attention to losers and individuals rather than to winners and groups. So they abound with examples which underline discontentment. In this way, media and self-interested civil society organisations

form a symbiotic relation which perpetuates and normalises a world view of dissatisfaction with the present conditions, material as well as in other respects. Sometimes organisation leadership even seems to adopt the perspectives of the other leading actors in society.

It is delicate to claim to know what the “grassroots” really think and want. But there is good evidence that "living lightly" would gain wide acceptance under the right conditions. To do so, it is probably crucial to be able to point to tangible benefits. And that the necessary changes affect all people in order to be accepted as fair. To achieve this also requires enlightened citizens and a dedicated political leadership.

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# **Sustainable Economy, Quality-of-Life and Happiness**

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## **Abstract**

The notions of 'sustainable development', 'quality-of-life' and 'happiness' appeared in the social critical discourse in the late 20th century. This common ground suggests substantive links and in particular that a sustainability-turn in the economy will result in better quality-of-life and greater happiness for a greater number. In this paper I examine the links between these notions, in search for synergies and contradictions. I conclude that not everything associated with 'sustainable economy' is beneficial for all qualities-of-life and in particular not for happiness in the sense of enduring enjoyment of life-as-a-whole. Though we could be seriously harmed by an ecological disaster, we can probably live quite well with less bio-diversity and less material consumption.

# **Towards an adaptive system for environmental management in households**

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## **Abstract**

Though a large number of studies, data, and sustainability schemes in daily lives can be found in different sources, only a limited portion of them are referred to by consumers for the purpose of managing their household consumption activities in a more sustainable manner, because they are not accessible in systematic and appropriate ways. In this paper, we present our approaches to developing an automated system that supports consumers in retrieving the relevant information, manage their daily activities, and learn the issues that are directly and indirectly related to their individual pattern of household consumption. In particular, one of the key features of the envisioned system is the ability to provide appropriate quality and quantity of information and instruction to each group of consumers or individual consumer. Achievement of this feature is addressed by modeling the customization procedures of environmental balance sheets in Japan using the IDEF0 function modeling method. The envisioned system will involve these customization explicitly defined in the model to adapt to the diverse and dynamic profiles of consumers.

Keywords: Environmental balance sheets, psychological path analysis model, IDEF0 function model, customization

## **1. Introduction**

Household consumption is a complex and diverse system of activities that are carried out to attain consumers' quality of life (i.e.; contentedness, happiness, survival ...) pursued within limited resources and opportunities. As the general awareness of the need for sustainability increases, consumers are demanding more guidance to help them change their consumption patterns to achieve a more sustainable lifestyle. However, the complex and diverse nature of household consumption makes it difficult to provide the most relevant guidance from among the accumulation of conventional environmental analyses

such as life cycle assessment studies, because most of them are not directed primarily at consumer application. In order for consumers to make most of these analyses, some appropriate interpretation is needed 1) to ensure that the assumptions of an analysis apply to the individual situation of consumers, so that the responsibility of their consumption activities are informed correctly, 2) to communicate risks in an understandable manner, and 3) to enable the effectiveness of the recommended changes in consumption activities to be clearly evaluated.

Use of environmental balance sheets (EBS) is one approach to the interpretation of the scattered and complicated information to bring it into consumers' daily consumption activities. Another application of EBSs is in supporting consumers in managing their aspects of their environment in order to change the patterns of their consumption activities.

The effectiveness of Japanese EBSs in changing consumption patterns is still limited in general, but several successful examples can be seen. One of the most interesting examples is the e-nenpi system<sup>1)</sup>. The e-nenpi system supports the conscious selection and use of cars by allowing each car user to record the gasoline supply each time the car is filled to manage its performance. The system indicates the mileage, ranked against cars of a similar model, and users can also see which cars are good from the economic and environmental points of view, using actual driving mode data in addition to the official test data supplied by car manufacturers. The system also supplies specific and customized information that is useful for increasing the mileage and cost performance. The system has 252,104 registered users, for 4,525 types of cars, and the total of 81,478 full gasoline feeds has been recorded per month (as of January, 2004). The system can be accessed through mobile phone so that consumers can record the gasoline feed as they travel, and they can obtain the results immediately. On analyzing the e-nenpi system, the customization of information and interactivity seem to be the key factors that differentiate the e-nenpi system from conventional EBSs.

## **2. Objectives**

In this paper, an approach to develop an environmental management system for consumers is presented. In particular, customization (including personalization, localization, etc.) of the information that is communicated and managed for consumers is identified as a key feature. Ten different Japanese EBSs were collected and the ways they are utilized were investigated. In addition, two interviews to the administrative body of the EBSs are carried out, in order to develop a function model of environmental management activities, including customization procedures. Using this model and the collected Japanese EBSs, a prototype of a defined database and environmental management system was developed and preliminarily tested with a small number of monitors. The structure of the database is defined in such a way that it is capable of different customization approaches, such as the continuity of the positive effects of an action, and relevance to the general

social psychological parameters for environmentally conscious activities.

### **3. Adaptive customization of environmental management system for individual consumers**

To initiate the development of the envisioned system, ten Japanese EBSs, most of which had been issued from local authorities at the city or prefectural level, were collected. Most of them had similar information, which seems to be derived from the EBS issued by the Japanese Ministry of Environment in 1996, with additional extensions which individualize each one. From the collected EBSs, a general framework for the customization of information, a case example of customization, and prototype databases and a customized EBS, were worked out.

In this section, the interview results and the function model for the envisioned management system are introduced. Next, the categories of the content information to be stored in the databases are presented. Finally, the result from a preliminary test of the framework using a prototype management system (which is presented as a customized EBS booklet at this point) is shown.

#### **3.1 Construction of IDEF0 function model of the envisioned system**

From among the collected EBSs, we chose one from a local authority (Ibaraki City) and conducted an interview to obtain a case example of the customization of an EBS. We also identified another local authority (Toshima City in Tokyo), which is currently in the process of developing a new EBS for the fiscal year 2004.

Ibaraki city has been issuing an EBS for its citizens on an annual basis since 2001. They customize their EBS annually in partnership with a group of active consumer citizens, on the basis of requests from users. For example, they changed the user interface of the EBS from a calendar to a postcard returned three times a year, because users indicated that they did not need an additional calendar in their homes and it required more space and paper than simpler formats. They also modify the coefficients used to calculate the CO<sub>2</sub> emission from waste incineration, because the variation from the national emission factor is significantly high. They provide the feedback to their citizens through the EBS, but only two years after the retrieval of the returned EBS postcards. They issued 100,000 booklets in 2001, and received 77 postcards in the first month, 16 in the third or sixth months, and 10 after one year.

Development of the EBS in Toshima City is carried out by a five member team of environmental observation specialists, made up of selected volunteers. The target for this EBS is the residents of the district, with a particular focus on those who do not have great awareness and thus have less interest in environmental issues. They adopted a calendar format, with a very careful and sophisticated layout. The materials referenced for the development of the EBS were newspaper and magazine articles, books, TV programs, information from the internet, the White Paper on the Environment from the Japanese

Ministry of Environment, seminars, and original surveys. They customized the contents, for example, by eliminating a check box related to LP gas usage, because LP gas is no longer used in their district. They also avoided offering guidelines that would require a major change in lifestyle, considering the characteristics of the main target audience of the EBS, and used simple wording.

The activities, information, tools, and interrelations of these components are extracted from the two interviews, and a function model for the envisioned system is constructed using the IDEF0 function modeling method<sup>2)</sup>. Using this method, all the administration and operation procedures are broken down into “functions” which are described using verbs, and whose systematic relationships are described with ICOM: what each function processes (Input), under which conditions (Control, or Constraints), in order to produce what (Output), using which resources (Mechanism). The constructed models explicitly

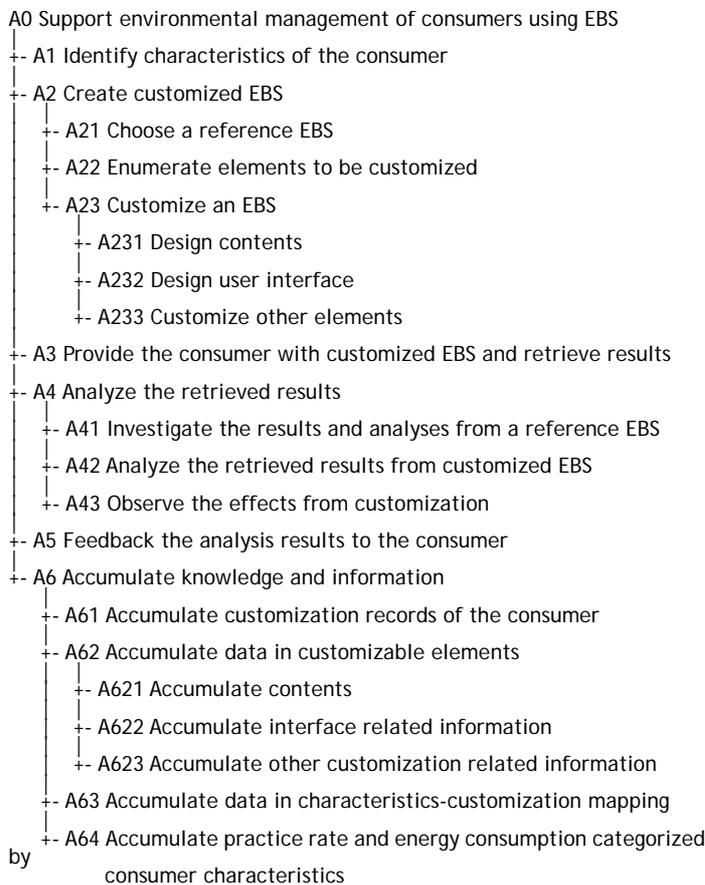


Figure 1 Hierarchy of functions in the envisioned adaptive environmental management system for consumers (partial image)

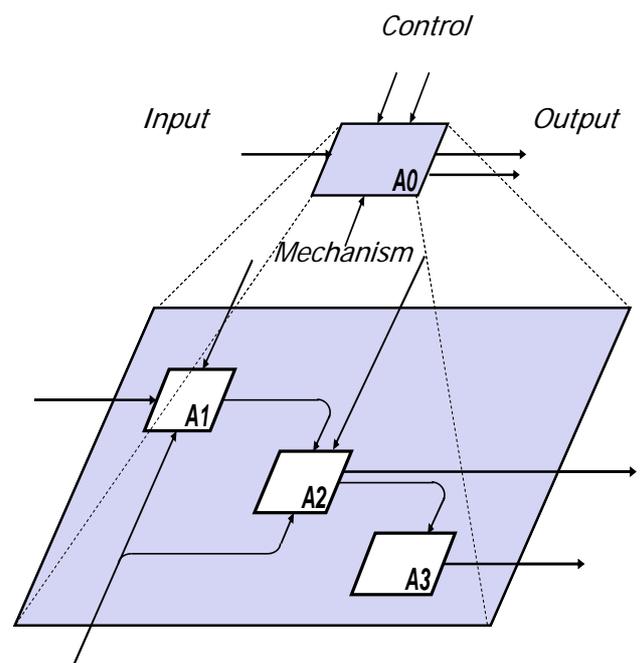


Figure 2 Hierarchy of functions in IDEF0

describe the functions of activities and their relevant elements with a hierarchical series of diagrams. The hierarchical structure of functions (Ax, x stands for ID numbers) in the constructed function model is shown in Fig.1. Those functions and ICOMs, are systematically and explicitly visualized with syntax and semantics shown in Fig. 2.

### 3.2 Categories of contents

In the function model, top activity “A0: Support environmental management of consumers using EBS” comprises activities A1-6, which are “A1: Identify characteristics of the consumer”, “A2: Create customized EBS”, “A3: Provide the consumer with EBS and retrieve results”, “A4: Analyze the retrieved results”, “A5: Feedback the analysis results to the consumer”, and “A6: Accumulate knowledge and information” respectively. The accumulated information created in A6, are used in every activities A1-A5. If we focus on the information that is to be utilized in A2, they should be categorized in ways that allow adaptive customization, to reflect the profiles and consumption patterns of individual consumers. In this study, we adopt two means of categorization, as described below.

#### 3.2.1 Social psychological parameters

Hirose<sup>3)</sup> investigated different psychological models for energy conservation and other environmentally conscious activities, and found that there are two different types of models. The first type is constructed with a focus on the driving forces of the activities, while the other type is constructed with a focus on barriers to the implementation of the activities. He reorganized the presented models, and proposed a generalized social psychological path analysis model for environmentally conscious consumer activities (hereafter, the generalized path model) as shown in Fig.3.

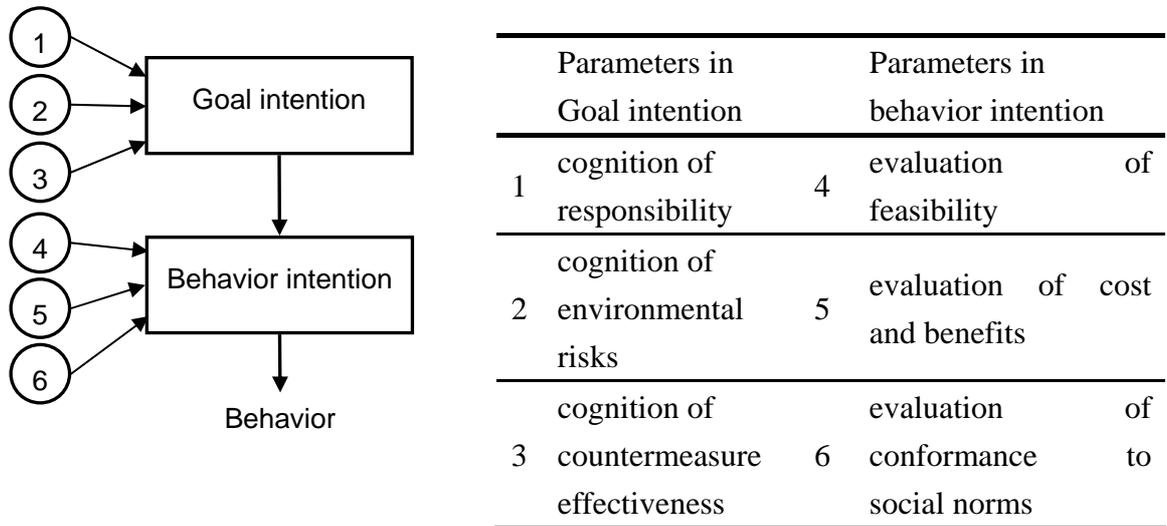


Figure.3 Generalized path analysis model for environmentally conscious consumer activities

Using the generalized path model, a more specific path model can be constructed for each activity, and the correlation coefficients for parameters can be calculated for a group of consumers, by multiple linear regression analysis of survey results.

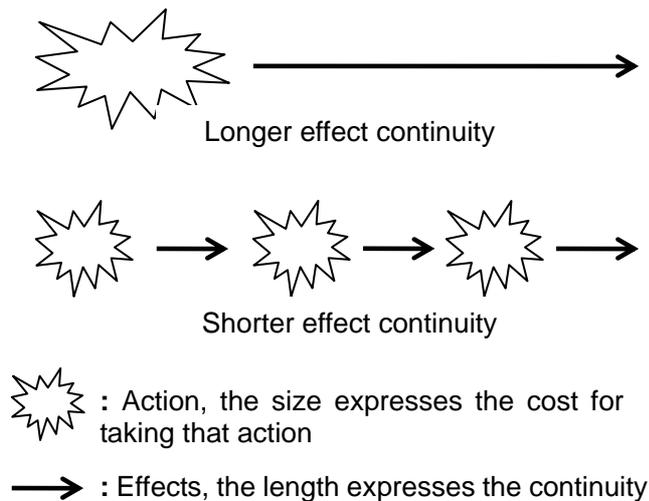
For individual consumers who will be using the envisioned environmental management system, the coefficient of parameters will vary and dynamically change, as they learn more about sustainability issues and consequently shift their consumption patterns. We have related all the elements, which will be stored in the database, to the six parameters in the

generalized path model, so that the content of a customized EBS can be adapted to such changes in consumer psychology.

### 3.2.2 Continuity of the effects of an action

Difference in continuity of the positive effects of an action is an obvious way to categorize respective content that guides consumers into the action. Consider energy conservation measures in households, which focus on the lighting. One can either switch off the light when it is not necessary, or change the lighting system from incandescent to fluorescent bulbs, and perhaps include sensors that automatically switch off the light when nobody is in the room. The former measure can be adopted without any additional monetary cost, but the effect can only be achieved if the action is taken at every opportunity, manually (as represented in the lower half of Fig.4). The latter measure can change the pattern of consumption automatically, but requires a greater initial investment (as represented in the upper half of Fig.4). Measures of these two types are distinguished in our database, because it is considered useful for adaptive customization.

Figure.4 Continuity of the effects of an action



### 3.2.3 Outlooks

By associating all of the possible content for a customized EBS with relevant Life Cycle Assessment (LCA) results, the priorities for different types of information communicated to a consumer can be set. These priorities for different countermeasures will enable more effective and appropriate customization. However, no LCA database constructed in a consumer oriented or consumption activity oriented way has been constructed.

Even if the content database has different categories that seem useful, we still lack an efficient and systematic means of customizing the information, to make the most of such a database structure. In order to automate the customization procedure, an algorithm of customization is needed.

### 3.3 Development of prototype database and customized EBS

By extracting data from five of the ten collected EBSs, a prototype database was constructed. In our function model, data from previous customization and administration of EBSs are stored and utilized in the next cycle of customization. Such accumulation of knowledge however, did not exist because this was the first cycle; hence our subjective assumptions were used instead. Using the prototype, two different EBSs were created. One is the reference EBS with no specific customization, and the other is the customized EBS. The target of customization is “students in natural scientific disciplines, living alone, in Tokyo”. The differences in content are contrasted in Table 1. Other elements such as layout were preserved, in order to see the consequences of focusing on the customization of content. The only strategy that was used for the customization was the elimination of elements which were possibly irrelevant for the target users. Categories described in 3.2 were not used in this customization cycle.

Table 1 Differences between reference and customized EBS

	Reference EBS	Customized EBS
Pages	20	11
Check box - energy consumption	13	10
Check box - activities (per day)	75 (10-12)	38 (5-6)
Characters	8684	5096
Figures	17	12
Tables	2	2

Both of the EBSs were designed to require checking of the electricity, gas, and water meters every day for a period of one week, and seven volunteers joined the test round for each of the EBSs. Even though the customization was performed not for individuals, but for a target group of individuals, several specific requests and interesting information on the customization were obtained.

The volunteers were not randomly selected, and they were cooperative (response rate was extremely high for both EBSs and questionnaire). In a real life application, the effect of customization will be reflected in the response rate, but that was not the case in this trial round. The volunteers were not informed of the aims of the study, rather, they were simply asked to participate in it and follow the written instructions in each of the EBSs.

From the survey results, the only apparent difference was in the degree of details in the requests given in the responses: users of the customized EBS raised more detailed requests. It is notable that even though they were unaware of our customization, many users of both EBSs requested further customization, and even submitted new ideas for the customization of their EBS, which indicates a high demand for appropriate customization. Conservation schemes for water, recycling related topics, and air conditioning related topics were already known to a better degree than expected. We expected that the calculation of CO<sub>2</sub> emission would not be difficult for students of the natural science disciplines, but many reported that

it was troublesome.

The collected information was completely mapped with the functions and ICOMs in the function model. The specific design of respective databases should be worked out from the collected results, as the next step.

#### **4. Conclusion**

In this paper, we have shown our vision for and approach to supporting consumers in managing their household consumption activities and enhancing their awareness of sustainability issues. Based on the hypothesis that a more personalized information flows in an adaptive management system have the potential to lower the barriers and enhance the driving forces for consumers to change their actions in their daily life, the function of the information flow in such a system was defined using IDEF0, through interview with local authorities, who have accumulation of experiences in administrating a EBS at different levels. The continuous administration of such a system will accumulate different types of knowledge that will enable the system to become increasingly intelligent and adaptive to consumer profiles. A preliminary, non automated trial was performed with prototype databases and environmental balance sheets, to verify the information flows in the function model, and to gain administrative knowledge of such a system.

#### **Acknowledgements**

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# **Behaving ‘good’ for the ‘wrong’ reasons: The marketing of environmental sustainable consumption**

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## **Abstract**

Discussions on environmental sustainability often touch upon the issue of environmentally relevant behaviour. This paper argues that environmentally relevant behaviour does not constitute a special category of behaviour requiring specific types of intervention strategies. Rather, environmental relevant behaviours differ significantly concerning, e.g., their frequency and consumer involvement. In changing behaviour into a more sustainable direction it is necessary to target the drivers of the behaviour in question. In identifying these drivers, we propose to start analysing the needs that are being satisfied by a consumptive behaviour, and the decision process that is being employed in performing the behaviour. Whereas people may be more or less aware of environmental outcomes of their behaviour, usually other needs are at focus in their consumptive behaviour. In developing strategies for behavioural change it is necessary and sometimes more effective to address non-environment related needs. Moreover, effective strategies for behavioural change address the decision process the consumer employs. For example, breaking habitual behaviour is done effectively by changing the direct experienced outcomes of the behaviour. This paper will discuss two exemplary cases of different environmental relevant behaviours. First the buying of food is discussed as a frequent (habitual) behaviour. Next the decision to install (or not) a solar power system is being discussed as a one-time high-involved behaviour. The paper will provide a perspective on potentially effective strategies to stimulate environmentally friendly behaviour for these two cases.

## **Introduction**

As consumers we buy, use and dispose a multitude of goods. Some of our consumptive behaviours are performed on a daily bases, e.g., our eating pattern or how we travel to work. Other behaviours are performed on a yearly basis or even only once or a few times in our live, e.g., going on a holiday or buying a house. Whereas all these consumptive behaviours bear environmental consequences, and hence can be captured under the heading of environmental relevant behaviour, it is obvious that the context of decision-making and associated behavioural determinants may differ widely among the variety of consumptive behaviours. Some behaviour will be performed habitually, whereas other behaviours are performed only after extensive deliberation. Considering the environmental relevance of much consumer behaviour, we have to realise that these outcomes often hardly affect the decision-making of consumers. Even if consumers do behave environmental friendly, it may be so that environmental concern only plays a minor role as driver of that behaviour. Hence, addressing environmental relevant consumption as a separate category of behaviour does not contribute to our understanding of how this behaviour can be stimulated in a more environmental sustainable direction. This paper therefore is aimed at providing a more

generic framework to distinguish between various types of drivers and behavioural dynamics that typify different consumptive behaviours. Key elements of this framework are the needs involved, the cognitive effort a consumer invests in making a decision, and the social versus individual orientation of the decision-making process. Such a framework is useful in identifying potential successful strategies in changing behaviour.

### **Needs as drivers of consumer behaviour**

Human needs function as our starting point to understand consumer behaviour. The basic idea is that people are motivated to consume goods in order to satisfy their needs. Whereas many typologies of needs exist (see e.g., Jackson, Jager & Stagl, forthcoming), an empirical grounded taxonomy is proposed by Max-Neef (1992), who distinguishes between subsistence, protection, affection, understanding, participation, leisure, creation, identity and freedom as drivers of behaviour. One need may be satisfied by different consumptive behaviours (satisfiers). For example, in satisfying your appetite (subsistence) you may eat a burger at a fast-food restaurant, or you may prepare a meal at home using locally grown ingredients of the season. The complexity of the relation between consumption and needs is enhanced by the fact that a single consumptive behaviour may affect the satisfaction of several needs simultaneously. For example, enjoying a meal not only satisfies your appetite (subsistence), but may also provide an opportunity to talk with family or colleagues (participation), to relax and enjoy (leisure) and it may be great fun to prepare a new recipe (creation), just to name a few. Whereas some consumptive behaviour has positive effects on several needs simultaneously (synergic satisfiers), often some needs are satisfied at the cost of other needs (inhibiting satisfiers). Much consumptive behaviour having a negative impact on the environment is related to such inhibiting satisfiers. The negative environmental effects of consumptive behaviour, affecting e.g. the need for subsistence and protection often emerge in the long run, on a large (diffuse) scale, and are spread over the population at large. The positive effects on the contrary are often affecting needs that are experienced here and now on a personal level (e.g., Vlek & Keren, 1992). Much consumer behaviour having negative environmental consequences bears such a dilemma like character with respect to the satisfaction of our needs.

In understanding why consumers often behave in an environmentally detrimental manner, despite their knowledge regarding environmental consequences (problem awareness), it is important to understand how outcomes of consumptive behaviour affect the different needs consumers have. These outcomes become manifest on different time-scales, and hence some will have a direct noticeable effect on need satisfaction, whereas other outcomes affect need satisfaction in a more ambiguous manner, becoming slowly manifest over longer time periods. For example, when choosing between 'normal' versus ecologically grown bananas, the short-term outcomes are usually in favour of the normal bananas due to their nicer appearance, better taste and lower price. The environmental effects are in favour of the 'eco' bananas, however, as these outcomes emerge on the long-term, at a great distance and are marginal from the perspective of a single consumer's action. The only direct positive outcome associated with buying eco bananas is the satisfaction of one's identity of being a 'responsible consumer'. In many instances one may observe that environmentally worse options often provide more direct rewarding outcomes in comparison with the environmentally friendly alternative. Even if we are aware of environmental problems, we usually prefer big comfortable cars, large refrigerators, distant holiday destinations (by plane), and tomatoes in wintertime, to name a few examples. Hence, the environmentally less favourable option often provides the consumer with more immediate rewards, whereas environmental relevant outcomes may affect the decision only through satisfaction of one's identity as a responsible consumer. Clearly, the odds are usually in favour of the environmentally detrimental behaviour. When a consumer is aware

of environmental problems, and realises that these are partly related to consuming goods that are providing the most positive direct outcomes, a dissonance may emerge between one's preferences and cognitions. As a result, processes of cognitive dissonance reduction may emerge (Festinger, 1957). As it is easier to dismiss the seriousness of the problem or one's individual contribution to the solution, these dissonance reduction strategies are much easier and comfortable than changing one's life-style towards a more environmental friendly one. The latter option would have a negative impact on many direct experienced outcomes. Hence people are likely to marginalise the environmental effects of their behaviour in order to continue behaving in an environmental detrimental manner without feeling too guilty. Media reports on scientific debates on the seriousness of e.g., the greenhouse effect contribute to consumers' tendency to dismiss information on negative environmental outcomes as ambiguous or irrelevant.

Yet, many people perform behaviour that is considered to be the environmental friendly alternative. Eco bananas are being sold, some people do invest in photovoltaic systems, and several people commute by bike instead of using the car. Yet, it can also be observed that people are behaving inconsistent from the perspective of environmental relevancy. For example, people consuming ecologically grown meat and possessing a photovoltaic system may also own a big car and visit distant countries by plane for an ecoliday. Apparently, in deciding between behavioural opportunities, the ecologic outcomes are clearly not the only outcomes taken into consideration. It may even be so that people behave in an environmental friendly manner whilst they hardly care about the environment. People may consume ecologically grown meat for matters of taste and health, and may decide on buying a photovoltaic system because of (long term) financial benefits, or as a display of their technological advancement. Hence a multitude of needs may affect people's tendency to behave in an environmentally responsible manner. The extent to which long term (environmental) outcomes are taken into consideration when deciding on a consumptive behaviour is partly being affected by the cognitive effort a consumer invests in making a decision.

### **Cognitive effort in consumer decision-making**

When buying goods, consumers display large differences in the depth and duration of the decision-making process. In buying daily groceries people often decide habitually what product to buy, whereas larger investments, e.g. when buying a car or a house, much more cognitive effort is being invested before the actual buying. The most simple decision strategies of heuristics are preconscious, and refer to automated processes. Next, noncompensatory heuristics are used to choose the opportunity with the best score on an (the most important) aspect. Compensatory heuristics are more complex and, given the same decision context, require even more cognitive effort because they include a weighting of multiple aspects. Three drivers playing a key role in people's tendency to invest cognitive effort in making a decision are (1) consumer involvement, (2) complexity of the decision, and (3) constraints (see e.g., Jager & Janssen, working paper).

Consumer involvement refers to the importance of the consequences of the decision. Tversky (1969; 1972) demonstrated that when a decision is less important (in terms of consequences), decision-makers are more likely to use a simpler heuristic instead of using all information available. The importance of a decision can be related to the underlying needs associated with the decision. The attention of a consumer for a decision problem will be higher the more important and urgent the needs involved. Because people have different needs (e.g., Max-Neef 1992), the consequences of a decision may have an impact on several needs at the same time. The more needs are relevant in the context of a decision problem, the more likely it is that the consumer will be highly involved and engage in extensive problem solving. On the other hand, the fewer (or a single) needs involved in the

decision process, the more likely it is that the consumer will employ a simple strategy in making a decision. Usually people focus at the needs that are most in focus (e.g., Sauermann and Selten, 1962; Selten, 1998). We assume that outcomes emerging here and now on a personal level are more likely to be at focus in the decision-making process than outcomes that emerge in the long run, on a large (diffuse) scale, and are spread over the population at large. Only when a consumer is very involved it is likely that a multitude of needs will be considered in the decision-making process, shaping the conditions for including long-term outcomes (including environmental) in the decision-making process.

The complexity of the choice-task is the next precondition affecting the cognitive effort people invest in making a decision. This complexity is related to the number of opportunities to choose from, the number of attributes these opportunities possess, and the degree to which trade-offs between different needs elicit emotional distress. Sometimes decision problems confront the consumer with a multitude of opportunities, each having many attributes. Buying a car is such a choice-task, where many models and types exist, and attributes such as comfort, power, space, style, image, safety and fuel consumption have to be taken into consideration. Hence, the use of a simple heuristic (e.g., non-compensatory) in such complex decision situations may require more cognitive effort than using a complex heuristics (compensatory) to select between a few relative simple alternatives (e.g., buying bananas). It has been demonstrated that people often use non-compensatory heuristics in complex decision problems, and compensatory heuristics in more simple decision problems (e.g., Johnson and Meyer, 1984; Payne, 1976). Regardless how complex a decision problem may be, if a person invests little effort in the decision-making process, he/she will perceive the problem as simple. When buying a refrigerator, a low involved person may focus only at price and size and optimise on these aspects, without considering aspects such as energy consumption, durability, the use of a 0° area to preserve vegetables for a longer time, a double compressor system, fast cooling and freezing options with electronic management and the like.

Finally, constraints refer to the available time, cognitive capacity and knowledge that can be used in the decision task. Obviously, when a person has ample time he cannot invest a lot of effort in the decision process, regardless of his involvement. For example, the pensioner orientating on a new refrigerator in the process of modernizing his kitchen will experience much less time pressure than the mother of a busy family where the old refrigerator just broke down. People also differ concerning their capacity to store and elaborate upon information, and the previous knowledge (expertise) they have on the decision problem. Hence some people do not know or find it hard to include environmental outcomes in their decision-making process.

### **Social versus individual decision-making of consumers**

Depending on the involvement of the consumer, the complexity of the decision and constraints consumers may invest more or less cognitive effort in the decision-making process. This may translate in the use of various heuristics, which are fast and frugal strategies used in the search for information, stopping the search activities, and deciding (e.g., Gigerenzer and Todd, 1999). Often people employ so-called individual heuristics in making a decision. The simplest heuristic are automatic heuristics, which employs biases, framing- and priming effects as the most basic mechanisms that simplify choice problems, often at a subconscious level. Scripts also refer to automated processes, however, in contrast to most of the processes discussed before, people may be aware of the scripts they use. Moreover, people may have (deliberately) practiced to develop scripts, for example in learning to drive a car and buying a certain brand of product. A bit more complex are the non-compensatory heuristics, where the decision for a certain product is based on comparison on product attributes. The non-compensatory character implies that a product

that scores the best on one or the dominant attribute will be selected, even if other products score better on (a large number of) other attributes. For example, one may select bananas only on price. Only if an alternative is priced (about) equally, a second attribute (e.g., appearance) will be included in the decision process. Compensatory decision-strategies are even more complex, as high scores on less important attributes may compensate for a low score on one attribute. In the case of bananas price, appearance and way of production ('eco') may all affect the decision.

Instead of making a decision pure by themselves, people often benefit from the experiences of other people in making a decision. Using information of other people's behaviour or experiences may function as a cue to simplify the decision task. Especially when people are uncertain (due to the complexity of the decision, uncertain personality) and the behaviour in question is very visible (either by observation or discussion) social heuristics are being used. Imitation is a relative simple social heuristic, although one has to realise this requires one to be attentive to the behaviour of someone else, understand and remember that behaviour, being able to reproduce that behaviour, and experience reinforcement after performing the behaviour yourself (Bandura 1977). Norms also function as heuristics to select a subset of behaviours that is appropriate. According to the Theory of Normative Conduct (Cialdini, Kallgren and Reno 1991), three distinct types of norms affect human actions. First, social norms of the descriptive kind guide one's behaviour via the perception of how most other people (would) actually behave. Second, social norms of the injunctive kind guide one's behaviour via the perception of how most other people would approve or disapprove of one's behaviour. Third, when descriptive and injunctive norms are incorporated in one's values, they become personal norms that guide one's behaviour via the perception of how one would approve or disapprove of one's own behaviour oneself. Social Comparison Theory (Festinger 1954) states that people are motivated to consciously compare their opinions and abilities with those of other people. These comparisons follow dimensions such as the possession of material goods, financial means, status, principles, attitudes and skills. Whereas social learning is primarily focussing at imitating the behaviour of others, social comparison involves more thought on the consequences of conforming to others, thus involving more cognitive effort. Especially in new (unfamiliar) situations, these comparisons provide information about what is/are proper behaviour and opinions, and thus function as efficient heuristics.

When people make actual decisions they may employ different heuristics at different stages. For example, one may be confronted with an important decision problem, perceive a multitude of options, look at friends and discuss with them what options they use and finally select one of these options on the basis of three attributes. Payne (1976) and Beach (1990) describe that such combined strategies typically start with the elimination of a number of alternatives, followed by a stage in which the remaining set of alternatives is being scrutinized more in detail. In the following sections we will theoretically analyse two different kinds of environmentally relevant behaviour using the aforementioned concepts.

### **Environmentally relevant habits: the case of food**

Most people buy food on a frequent basis, and typically many consumers do not think too much about what to buy, as they often select products habitually. Of course, people initially may have chosen for a particular brand after careful deliberation, but once a habit has been formed, the decision context has become that simple that it requires hardly any cognitive effort to make a choice. Much of our consumptive behaviour takes the shape of repetitive actions: in the supermarket we grab our usual brand of coffee, we may follow a specific route in travelling to our work and we drink coffee in the morning. All these behaviours have in common that they are being performed with a minimum of thinking.

Behaviours as such, where actions are repeatedly being performed without deliberating too much (using scripts), can be grouped under the concept of habits. Habits have been demonstrated empirically to strongly determine the behaviour of people in relative stable situations, e.g. modality choice in transportation (e.g., Bamberg & Schmidt, 2003; Gärling, Fujii & Boe, 2001; Aarts & Dijksterhuis, 2000; Aarts, Verplanken & Knippenberg, 1998). Even if a person is aware that the current habit is non-optimal because of negative (environmental) outcomes in the long run, this information may not affect the performance as long as the direct personal outcomes of the habit are satisfactory. For example, Verplanken & Faess (1999) found that good intentions are not enacted if they are interfered with by existing habits. In such situation the short term rewards are inconsistent with one's long-term intentions and goals (e.g., Ouellette & Wood, 1998). This is typically the situation for many 'environmentally bad habits', where short-term positive outcomes dominate the habit, and information on the detrimental effects on the environment hardly affects the behaviour. In buying food, people often have the choice between products differing on environmental outcomes. First, within a certain product category people may choose between ecologically versus non-ecologically products. For example, in many supermarkets one may find an assortment of eco-approved meat, fruit, vegetables, diary products, coffee, tea and the like. Changing the consumption of traditional products towards the eco-approved alternatives would not interfere too much with the existing food consumption habits. However, one may also change one's food buying behaviour in a more drastic manner by focussing consumption on locally grown food of the season. Consuming tomatoes in wintertime is a typical example of an ecologically inefficient behaviour. Clearly, such changes would require a more drastic change in one's food habits. In changing food habits it is essential to realise that many attributes play a role, e.g., price, taste, health considerations, nutritional value, environmental problem awareness and animal welfare considerations (e.g., Allen & Hung-Ng, 2003). Some of these attributes are experienced directly on a personal level, whereas other outcomes are more ambiguous and on an aggregate level. Whereas the direct outcomes usually are dominating the habitual behaviour in a behaviouristic manner (see e.g., Jager, 2003), the environmental outcomes typically refer to the attitudinal level, having little influence on the performance of the habit. Solitary informational strategies aimed at increasing environmental problem awareness related to food will have a limited effect on consumers buying behaviour. It may result in an attitude change, and thus form a precondition for changing behaviour. Often it is more effective to target other direct outcomes in order to break the habit. Hence, in stimulating consumers to buy eco-approved food products it may be an effective strategy to focus on non-environmental related direct outcomes such as taste and health.

A number of strategies can be distinguished in changing food habits (see, e.g., Jager, 2003). The most effective way to change a habit is to make it (physically) impossible. For example, one could remove foods with negative environmental impacts from store shelves. Obviously, such an approach would interfere with people's freedom of choice and may elicit strong resistance in both consumers and suppliers (supermarkets, producers). However, this strategy can be applied in a gradual manner (along with changes in demand) by decreasing the (favourable) shelf space for traditional products, and increasing the (favourable) shelf space for eco-food. Such an approach would also fit into the second strategy to break habits, which involves changing the situation (stimulus) in a way that the script is not automatically being activated. If traditional products are harder to find because they are not positioned at the most favourable shelves in the shop, it might be possible to decrease the use of scripts that use product location as an important cue. This would create a situation where people have to invest more cognitive effort in buying a product, and henceforth create more favourable conditions for pro-environmental attitudes to come into play. Many of us may recollect such situations where e.g., the coffee shelf in our

supermarket has been reorganised, causing us to invest more effort in finding our usual brand. Whereas such a change does not automatically changes our buying behaviour, the situation may be more favourable for a change to happen. A next strategy is aimed at changing the direct experienced outcomes in case the habit is being performed. For example, to stop people from driving too fast in an urban area, traversal ripples are being made in the tarmac, making a too high speed into an unpleasant bumpy and noisy experience. However, concerning food consumption the most relevant outcomes such as taste, nutritional value, and ease of preparation are becoming manifest at a more distant time. Moreover, such outcomes are hard if not impossible to change in a negative direction for traditional products. Whereas it is hard to make the 'bad habit' less rewarding in this context, there may be some possibilities to make the 'good habit' more rewarding. First of all, the core aspects of the product may be improved. This relates to aspects such as taste, appearance, ease of preparation and the like. This constitutes a major challenge for product developers, and requires a good insight in the (future) preferences of consumers. Next, the 'augmented product' exceeds the core aspects by also including price, promotion and place (together with 'product these constitute the 4 P's of marketing, e.g., Kotler, 1980). In the case of eco-food this would involve lowering the prices, increase the promotion of these products (e.g., on the positive product outcomes) and make them widely available at prominent shelf locations. Finally, the total product refers to the previous outcomes extended with associations consumer have with the product. These outcomes relate to additional benefits from using or owning certain products (see, e.g., Leeflang, 1995). In the context of food, both traditional and eco-foods may provide outcomes relating to belongingness to groups, status, and identity. Experiencing (directly) positive outcomes when buying or consuming eco-food would contribute to the changing of existing food habits. A limitation for the marketer is that much of these outcomes emerge without deliberate marketing strategies having an effect on them. For example, the experience of status as a result of consuming certain foods (e.g., caviar, truffles) may be experienced through the reactions of other people on one's consumptive behaviour. A campaign promoting the high status of consuming eco-foods will only affect behaviour if it succeeds in developing an injunctive norm in the consumer.

Summarising we come to the conclusion that informational strategies aimed at environmental problem-awareness are not likely to have a significant effect on consumers buying behaviour. Rather, we suggest changing short-term outcomes in favour of eco-food stimulating people to reconsider their habit. During this reconsideration informational strategies stressing both the multiple advantages of the ecological alternative and the disadvantages of the traditional food may help in switching behaviour. If the eco food is tried and yields better or equal outcomes concerning key attributes such as taste, price, ease of preparation, availability and the like, people are likely to develop a new habit of buying eco food.

### **Reasoned choice behaviour: the case of solar power systems**

In contrast to many environmental habits, the buying of a photovoltaic system is typically a high involvement decision that people usually make once in their life. The decision context thus strongly differs from the previous case in which habitual behaviour was being discussed. The decision to install a photovoltaic system on the roof of your house may touch upon the satisfaction of various needs. Direct needs that may be involved in this decision may relate to subsistence (very abstract, relating to environmental conditions of mankind in the long run) belongingness (if friends, neighbours also have such a system), participation (collaborating with other people in installing such a system), creation (improving your house, but one may also dislike the appearance of such a system), identity (being an environmentally sensitive person) and freedom (creating a relative independency of power companies). Moreover, the money that potentially can be saved using such a

system could be spent on other consumptive behaviours, satisfying other needs. Whereas it may be obvious for a consumer on a superficial way that a photovoltaic system may contribute to his/her living conditions, the operational choice confronts one with a very complex situation. Different providers offer various systems, varying with respect to size, price and returns. One has to collect information on the suitability of one's house for mounting different systems, which involves an analysis of the construction. Also, one has to analyse if the existing electrical installation allows for connecting such a system, and if the electricity meter registers occasional surpluses of electricity being delivered to the power company. This requires a level of knowledge most consumers do not have, and which is hard to acquire at short-term. Often a construction firm will have to be consulted. Next, in many situations approval of the municipal planning and construction departments should be acquired, involving an administrative procedure. Also the financial consequences are complex. First of all, the direct price of a photovoltaic system is quite high considering the returns. A single photovoltaic panel of about 120 kWh/year comes at a cost of about €1250 and save about €40 a year, leading towards a break-even in 30 years provided that energy prices remain at the current level. This break-even point depends on the price the energy company pays for the surplus of energy that is delivered to the network. The estimated lifetime of such a system is about 30 years. Obviously, in promoting the installation of such systems governments and lower-level institutions provided various types of supportive grants to shorten the break-even point, making the installation of such systems financially more attractive. For example, during 2003 in The Netherlands a number of subsidy arrangements was available at state, province, and municipal level, which summed to about €1100 per panel decreasing the break-even point to about 2,5 years. However, the application for these grants requires quite some administrative skills. Obviously, mainly people that are highly involved because they perceive a photovoltaic system as important in satisfying (some of) the previously mentioned needs, and have sufficient time, cognitive capacity and knowledge will overcome the complexities of this decision problem and consider buying such a system. However, due to the complexity of the decision, people are not likely to have all required information at hand immediately, and the decision process may take considerable time and effort. In the early stages people will have far from complete information, and will experience that the negative outcomes in terms of financial investment, administrative procedures and construction work are manifest in the here and now, whereas the positive outcomes bear a more abstract character, and partly become manifest on the long run. The effect of the temporal distance of outcomes on intertemporal choice has extensively been studied (see e.g., Loewenstein and Elster (1992), Roelofsma (1996), and Chapman (1998)). Basically, people tend to devalue or discount delayed outcomes. As a consequence, people want to obtain positive outcomes sooner rather than later, while they prefer to postpone negative consequences. The buying of a photovoltaic system typically yields negative outcomes in the here and now, whereas the positive outcomes are delayed. Hence a dilemma situation emerges, involving a conflict between direct outcomes and delayed outcomes, which may give rise to cognitive dissonance reaction. Here, people are tempted to discount the long-term positive outcomes by mentioning arguments like 'too expensive', 'too much paperwork', 'it hardly contributes to the environment' or 'not overseeing the construction process'. As a consequence, initially interested consumers may decide not to invest in such a system.

Stimulating consumers to install a photovoltaic system requires an approach that reduces the complexity of the decision and reduces the time discounting framing of the decision-problem. To reduce the complexity consumers would benefit from expert support in the decision-making stage. People that already installed such a system may function as advisor with regard to the installation of such a system and the administrative procedures

involved. When a consumer has a direct contact with e.g., a neighbour or friend who successfully installed such a system, social comparison processes may facilitate the exchange of information, both on the satisfaction they derive from owning such a system as on the technical and administrative procedures. This would reduce the complexity of the decision making context, and make the situation more favourable for adoption. Especially in such complex decision situations such network effects may play a crucial role in people's decision to adopt. The more people in one's social network already adopted such a system, the more information will be available. Moreover, the adoption of people in one's network may also increase the involvement of people who were initially not interested or aware of the possibility to install such a system. Next, also stakeholders involved in the supply of these systems may contribute to the simplification of the decision situation. The approach in The Netherlands where a local municipality collaborated with an energy supplier and supplier of these systems proved to be successful, as they provided technical support in information meetings, and provided a clear procedure for the administrative process, including the necessary forms.

The support offered by acquaintances and/or stakeholders does simplify the decision task, but does not change the time-discounting structure of the decision-problem. Primarily the financial outcomes are prone to a structural change. Basically, the investment costs should be allocated over time in such a way that the financial yields of the system outweigh the costs of the system. Such would be possible by including the costs of a system in the mortgage. Especially when consumers buy a new house they make long-term calculations concerning the mortgage and their financial development. Providing information on the additional mortgage costs attached to the mounting of such a system, and providing information in the financial yields given probable scenarios of energy price developments would create a situation where installing such a system would contribute to a decrease in costs (mortgage + energy bill), given that the system would have a break-even point of less than about 20 years.

Summarising we come to the conclusion that the complexity of a decision problem may give rise to non-adoption of photo-voltaic systems and cognitive dissonance reducing processes, even if the financial situation is favourable. Hence it is important to reduce this complexity by offering aid, simplifying bureaucratic procedures and possibly arranging networks of people who have (positive) experiences and are willing to assist in their neighbourhood.

### **Conclusions on the marketing of environmental sustainable behaviour**

The marketing of environmental sustainable consumption implies the development of strategies stimulating people to change their consumptive behaviour in a more environmentally benign direction. A number of critical points emerged from our two cases that appear to be very relevant concerning the effectiveness of 'environmental marketing'. Our first observation is that people's behaviour is driven by a multitude of needs, and so consumer goods are bought and used for a variety of reasons. Environmental outcomes may play a minor role in the evaluation of products. Yet, the environmental outcomes are often placed central in promotions of environmentally benign alternative products. Obviously, when consumers do not care too much about environmental issues, such an approach is not likely to be successful. In our view, it would be more effective focussing your marketing efforts on attributes that really matter to the consumer. For example, automatic light switches could be promoted as a luxurious product instead of an environmental technology. Here we create circumstances where people may behave 'environmentally good' for the 'wrong' reasons. Not-environmental related needs may also inspire the design of the core product. Household appliances can be designed combining beauty, durability and reparability, the first factor making it attractive to the consumers, the

last ones addressing environmental performance. Of course one may expect such products to be more expensive, but this may also have a positive effect, as these technologies will be conceived as high status, which favours the trickling down of these technologies through society. Hence, the environmental marketer not only has to study the basic drivers of consumer behaviour in a particular setting, (s)he also has to translate these findings into the product development process. Basically, the marketer interested in stimulating environmentally sustainable consumption has to realise that the most effective strategies often rely on drivers other than environmentally related ones. Hence (s)he has also to focus on strategies that stimulate consumers to perform the 'good' behaviour for the 'wrong' reasons. Obviously, caution is required. When a government starts promoting certain behaviour with environmental protection as the obscured goal, the process may backfire and instigate resistance against the promoted behaviour.

Secondly, we observe large differences between environmental relevant behaviours concerning type of behaviour and decision processes involved. For example, consumers may behave habitually, deliberate about what product to buy, or are strongly influenced by the behaviour of other people. Drivers that are crucial here are the frequency of behaviour, the (perceived) complexity of the decision context and the relevance for one's multiple need satisfaction. These drivers affect the decision-making process via consumers' involvement and tendency to look at other people's behaviour. A highly involved person is expected to invest cognitive effort in the decision-making process, and may include long-term outcomes (e.g., environmental) in evaluating alternatives. Here, theories of reasoned choice behaviour apply (e.g., Ajzen, 1991). On the contrary, a low-involved person is more likely to decide on one or just a few outcomes, most likely the short-term ones. Here, theories of classical and operant conditioning apply (Pavlov, 1927; Skinner, 1953). Important is to realise that much habitual behaviour is rooted in more deliberate choice behaviour. When a highly involved person performs behaviour on a regular basis in a relative stable situation, chances are high that a habit emerges. Whereas the outcomes of the behaviour remain important for one's need satisfaction, during habitual behaviour a consumer will not be highly involved concerning the decision-process, and information on new (environmental friendly) opportunities will not be taken into consideration.

Our final conclusion is that environmental relevant behaviour does not constitute a separate category of behaviour. Rather, in stimulating consumers to behave in a more environmental sustainable manner, a multi-theoretical behavioural diagnosis is required, and an intervention should focus on those drivers and processes that are relevant in the context. Realising that consumers are often low involved, marketers should focus more often on how to improve the short-term benefits of the environmental friendly alternative instead of focussing on communicating the long-term environmental outcomes. Stimulating people to behave environmentally 'good' for non-environmental or 'wrong' reasons may often provide a basis for effective marketing of environmental sustainable consumption.

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# **Understanding individual decision-making for sustainable consumption**

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## **Abstract**

This is a conceptual paper which examines and then extends the notion of ‘voluntary simplifiers’. Voluntary simplifiers (VS) are individuals who have freely chosen a frugal, anti-consumerist lifestyle which features low resource use and lower environmental impact. We begin the paper by outlining the historical roots of this movement. We then present a review of the various academic studies of voluntary simplifiers and their mainstream counterparts, non voluntary simplifiers (NVS). In the final section of this paper we set out arguments for the study of a third group: Beginner voluntary simplifiers (BVS). This group may support some of the aspects of sustainability (such as buying fair trade coffee or recycling domestic waste) without either embracing a complete lifestyle change like the voluntary simplifiers, or completely dismissing ethical or environmental features of the products and services they consume, like the non voluntary simplifiers. We believe that understanding the complex decision making processes of beginner voluntary simplifiers is crucial for the understanding and advancement of sustainable consumption

## **Introduction**

We cannot overestimate the role of the consumer, either in creating pull for products and services or resisting push from marketers. Not enough is known about how individuals make decisions in their sustainable consumption. It is our contention that in order to develop marketing strategies that can improve sustainable consumption, researchers must understand real decision-making processes in all their complexity. This study seeks to explore decision-making at a micro level with the aim of understanding the driving forces and barriers to sustainable consumption for individual members of the public.

To uncover this decision-making process, this paper will discuss our development of Craig-Lees and Hill’s (2002) theory of voluntary simplifiers and non voluntary simplifiers. Voluntary simplifiers are people who choose, “out of free will – rather than by being coerced by poverty, government austerity programs, or being imprisoned – to limit expenditures on consumer goods and services, and to cultivate non-materialistic sources of satisfaction and meaning” (Etzioni, 1998).

Craig-Lees & Hill (2002: 190) define voluntary simplicity as a lifestyle that involves the practice of austerity and frugality, and is concerned with individual mental and spiritual well-being and the environment. Researchers emphasise different aspects of voluntary simplicity, such as environmental values (Moisander and Pesonen, 2002), reduced consumption (Cherrier and Murray, 2002) and ethical principles (Shaw and Newholm, 2002). However, like the notion of sustainable consumption, voluntary simplicity will contain all of these elements. Andrews and Holst (1998) describe voluntary simplicity as an “examined life” in which people are motivated to get their lives back in control and

attempt to regain those things that are important. Craig-Lees and Hill examine various perspectives of voluntary simplicity, and have identified the following six elements:

- free choice to lead a simple life.
- reduced material consumption (without poverty).
- access to resources such as wealth, education, and unique skills that could be traded for high income.
- control and personal fulfillment.
- driven by values such as humanism, self-determination, environmentalism,
- spirituality, and self-development.

In other words, voluntary simplicity is based on free choice distinguishing it from the poor or near poor who are forced to take a simpler life. In fact, some researchers have found that the socio-economic features of voluntary simplifiers are highly educated, rather wealthy, and have professional skills (e.g. Craig-Lees and Hill, 2002, Etzioni, 1998, and Zavestoski, 2002), although this is not an uncontested view (see for example Hamilton and Mail, 2003).

The voluntary simplicity movement began in the US, inspired by publications such as Elgin's (1981) 'Voluntary Simplicity'. There has been growth in this, and associated lifestyles such as downshifters (Hamilton, 2003; Hamilton and Mail, 2003) and cultural creatives (Ray, 1997). In recent years, voluntary simplicity has also been taken up by people in Western Europe (Etzioni, 1998).

We are particularly interested in the decision making process of those who are currently undertaking some features of a voluntary simplifier lifestyle, but have not fully committed or converted to it. We wish to extend the voluntary simplifier/non voluntary simplifier categorisation and propose a new group of individuals, who are between these lifestyles. We call these individuals beginner voluntary simplifiers (BVS). It is possible to see the beginner voluntary simplifiers as a vanguard group, leading the way for the general population. In terms of promoting sustainable consumption, they are an important target group themselves and if we contrast their behaviours with the non voluntary simplifiers group it can help us to understand the process of moving towards sustainable consumption. Investigating beginner voluntary simplifiers and voluntary simplifiers will also allow us access to people who are currently or recently involved in these decision-making processes.

### **Historical background**

Although the first formal statement on the topic of voluntary simplicity did not appear until 1936, the austerity and frugality that characterises the anti-consumerism lifestyles of modern voluntary simplifiers can be traced back to a number of different religious traditions (Zavestoski, 2002). Richard Gregg traced the lineage of simple living to Jesus, Buddha, Lao Tse, Moses, Mohammed, and to more recent saints and leaders such as Francis of Assisi, Hindu rishis, Hebrew prophets, Moslem Sufis, and even to Lenin and Gandhi (Zavestoski, 2002: 150). Elgin (1981) also suggests that the tenets of voluntary simplicity originate from the traditions of the Quakers, the Puritans, transcendentalists such as Emerson and Thoreau, and various world religions that provide philosophical underpinnings to living a simple life (cited in Etzioni, 1998: 626).

Zavestoski (2002) believes that voluntary simplicity, although it shares a number of the outward features of the 1960s and 1970s nature-centered, anti-corporate and counterculture movements, lacks their overt spiritual content and is more likely to be part of an anti-consumer stance. Zavestoski (2002) believes that the popularity of voluntary simplicity

may reflect the existential crisis, and the limitations of consumerism in offering people mental satisfactions and self-actualization. He states that, “one explanation for the recent flurry of interest in the ideas of voluntary simplicity is that people experiencing unhappiness and discontent are linking these feelings to the media- and culture-driven messages to consume increasing amounts of goods and at greater rates” (Zavestoski, 2002: 151). His study (Zavestoski, 2002) uncovered crucial differences between the voluntary simplicity books published in 1995-1998 and those published in the earlier period of 1973-1994. Using content analysis, he discovered that spiritual/religious and virtues-of-simplicity categories dominated what was written before 1995 (Zavestoski, 2002: 152). Compared to this, the simplicity books published between 1995 and 1998 seem to focus on overwhelming stress and desires to find meaning in their consumption-driven, hectic lives as well as strategies for simpler lifestyles (Zavestoski, 2002: 153). Additionally, according to Zavestoski’s data, books of voluntary simplicity are being published by large publishers from 1995, suggesting that voluntary simplicity literature has come to appeal to the wider general public.

### **Studying Voluntary Simplifiers**

Much of the scant academic work on voluntary simplicity lifestyles is found in the Marketing literature. Early empirical work on voluntary simplifiers centres on the quantitative measurement of various aspects of their belief structures and behaviours (Shama, 1981; Leonard-Barton, 1981). This has been done with a view to market segmentation (Shama, 1981) or more general demographic identification of voluntary simplifiers (Leonard-Barton, 1981). Craig-Leeds and Hill (2002: 192) point out that voluntary-simplicity scales used by Leonard-Barton (1981), and Shama and Wisenblit (1984) are heavily biased towards environmental values.

As part of a course on consumer behaviour, Moisander and Pesonen (2002) solicited 84 written accounts of green consumerism from their students. When they analysed these, they found that the green consumer was viewed variously as a marginal, and to some extent deviant, person who values a simple, unhurried, nature-oriented life and who takes particular interest in personal growth. Voluntary simplifiers were regarded as unrealistic and abnormal and as attempting to go back in time.

Craig-Leeds and Hill’s (2002) study of voluntary simplifiers and non voluntary simplifiers in Australia took a qualitative approach, interviewing both groups about their possessions, lifestyles and purchasing habits. They discovered three underlying motives for adopting simplified lifestyles: environmental, spiritual and self-oriented.

The emphasis of Shaw and Newholm’s (2002) studies of voluntary simplifiers was on ethical rather than eco-friendly consumption. They worked only with ethical consumers in focus groups and in in-depth interviews. They found that ethical consumers exercised constraint in their consumption practices and that this was driven by strong internal values. Importantly, they also uncovered a great deal of diversity in the different forms of ethical simplicity displayed by the consumers they studied.

Zavestoski (2002) observed, interviewed and surveyed participants in voluntary simplicity courses offered in the workplace. The findings were contrasted with a survey of university students in the same region. They found that the people learning about how to adopt voluntary simplifier lifestyles were highly educated and well paid individuals, often working in the service sector. Their motivations for choosing voluntary simplicity were

both positive (e.g. to increase life satisfaction) and negative (e.g. being tired of the pressure to consume, environmental concerns).

As can be seen from the discussion above, a number of the empirical studies to date have contrasted elements of a voluntary simplifier lifestyle with a non voluntary simplifier lifestyle (Zavestoski, 2002; Craig-Lees and Hill, 2002). We believe that understanding both of these groups and the process of moving between them can be further enhanced by studying a third group: Beginner voluntary simplifiers. This idea does have resonance with issues raised by previous authors. For example, Moisander and Pesonen (2002) refer to a category of 'socially acceptable green consumers' which are not 'radical' in their approach to sustainable consumption but do embrace some green ideals and try to 'make a difference'. Etzioni (1998) has also raised the issue of the 'level of intensity' of voluntary simplicity. He outlines three groups, "moderate levels (in which people downshift their consumptive rich lifestyle, but not necessarily into a low gear)...strong simplification (in which they significantly restructure their lives), [and] holistic simplification" (which is a philosophical rejection of consumer society). Similarly, Shaw and Newholm (2002) discuss individuals who have 'maintained levels of consumption' and sit between the voluntary simplifiers and non voluntary simplifiers. Jensen (2002) comes to a similar set of categories by studying the resource use of households in Denmark. The idea of beginner voluntary simplifiers also has echoes in the green consumer literature, where Ottman (1993), for example identifies different types of green consumerism underpinned by different kinds of motives. What is different about our perspective is that we believe that studying the beginner voluntary simplifier group directly will be crucial for understanding the decision making processes that lead individuals into both of the other groups.

This tendency to define a middle ground is not surprising when the two other concepts are considered empirically. Non voluntary simplifiers are people who have adopted little or no sustainable consumption practices. No recycling; no organic or fair trade produce, no energy saving devices, no journeys on foot or public transport to work or shop. As time goes on, and products and services increase in their quality and availability these individuals must be harder to find. At the other extreme, voluntary simplifiers are individuals who lead an anticonsumer life underpinned by a philosophical (or perhaps spiritual) rejection of the social norms of a capitalist society. This too, is an extreme position unlikely to be held by a large proportion of people in the UK. Looked at in these terms, the beginner voluntary simplifier begins to seem like the norm. In fact, if we described non voluntary simplifiers and voluntary simplifiers in this absolute way, almost everyone would fit in our third category.

What we suggest instead is that this should be conceptualised as a continuum which is peopled by the extreme voluntary simplifier and non voluntary simplifier and everyone in between. When we try to address this continuum empirically, we will need to establish criteria which will allow us to distinguish these groups. For example, someone who takes part in a kerbside recycling scheme provided by their local council and makes no other sustainable consumption choices would not be considered to be a beginner voluntary simplifier. There will be no clear cut off points between the groups, but, using Etzioni's (1998) criteria as a starting point, we aim to develop some identifying features of the beginner voluntary simplifier as part of our study.

There is a number of reasons why beginner voluntary simplifiers are both theoretically and empirically important. There is a variety of different kinds of people who might fit in this category, as suggested by Shaw and Newholm's (2002) work with ethical consumers. One

possibility is that beginner voluntary simplifiers are voluntary simplifiers in the making. In other words, they have been non voluntary simplifiers and are currently in the midst of a lifestyle change or reconsideration which will go through various iterations and eventually become voluntary simplifiers. If this is the case, then in sociological terms, they represent the 'stranger' (Schutz, 1969) and are more able to articulate a process which may have become rehearsed and implicit in more established voluntary simplifiers. In marketing terms, all these decisions are still 'high involvement' for the beginner voluntary simplifiers and require extended problem solving strategies because of unfamiliarity with the alternatives. We also believe that the networks of information available to an individual may make a difference to their decision making processes and believe that within this group we are more likely to be able to find a heterogeneity of contacts and patterns of behaviour and trust than in either of the other two groups. Studying individuals in this situation will help us to understand the process of adopting voluntary simplifiers lifestyles. It will provide a running commentary of issues and challenges associated with sustainable consumption which are both first hand and contemporary.

Equally, beginner voluntary simplifiers may have adopted some features of a voluntary simplifier lifestyle but do not to take part in others. They may walk to school with their children, use local shops, purchase low energy light bulbs and use their local bottle banks, but at the same time, use a dishwasher daily and commute 30 miles to work by car each weekday. This is a fragmented approach to sustainable consumption, full of paradoxes and decisions which seem to sit uneasily together. Uncovering their decision processes in detail will help us to understand and compare the adoption and non-adoption of sustainable consumption practices and how these are prioritised and reconciled.

Either of these groups may be regarded as a vanguard group for non voluntary simplifiers, as they have adopted some features of sustainable consumption. They are more likely to be seen as a relevant reference group for the general public than the more extreme voluntary simplifiers.

If non voluntary simplifiers are the mainstream consumer and voluntary simplifiers are a small, radical group (for example, the 'eco-communards' described in Moisander and Pesonen's (2002) work) then beginner voluntary simplifiers can be seen as the 'socially acceptable green consumer' (Moisander and Pesonen, 2002). They will represent a far higher proportion of the UK population than the voluntary simplifiers, making them an important group to study in their own right.

Uncovering the decision making processes of any of these groups will not be an easy task. Some of the decisions will be made sub-consciously, and will be very hard for individuals to articulate. Other decisions may be made using heuristics, such as brand loyalty which neither include nor accommodate the inclusion of ethical or environmental considerations. Careful questioning will be required in order to obtain full and candid explanations of purchase decisions (Steg, Vlek and Slotegraaf, 2001). The decisions that we discuss with consumers may be incoherent when viewed as a whole as they have not been made using the same criteria, time frames, sets of priorities or sources of information. Neither will any one decision process be located at a particular point in time. Rather they will be emergent and perhaps revisited in a number of different contexts by the individual concerned. These issues present significant difficulties for the empirical process which we hope to address with a qualitative interview approach which incorporates cognitive mapping. This research design will be able to both illustrate and explore the fluid, inconsistent and problematic nature of the decision making process.

## Conclusions

Voluntary simplicity is a belief system and a practice of an alternative culture to conspicuous consumerism. Voluntary simplifiers' life styles and practices centre on the reduction of consumption. They pursue non-material satisfactions and value nature, people, and self-growth above material possession. Thus, although voluntary simplifiers can be a useful sustainable consumer group for a real world research into sustainable consumption, it is our contention that they should be studied along with non voluntary simplifiers and, importantly beginner voluntary simplifiers. The understanding of the different decision making processes of these three groups can help us to understand both rudimentary and sophisticated patterns of implementation of sustainable consumption philosophies and practices.

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# **From habitual to value-guided environmental behaviour, and back again<sup>i</sup>**

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Many behaviours with environmental consequences may be well-practised activities of the habitual kind. This is true for consumption behaviour, recycling and travel mode choice. For many people these behaviours were established many years ago when environmental consequences was not an issue. Several years later they are asked to perform new kinds of behaviour such as to purchase eco-labelled products, to recycle into more and new fractions or to commute by public transport rather than by car. How could this come about? A value that was not part of the original goal formulation should now influence the behaviour. Environmental considerations need to be taken into account when behavioural alternatives are evaluated. To what extent this will be the case is partly determined by value strength. Given that a person holds environmental values to be central, he or she is more likely to attach importance to environmental information than a person who's environmental values are more peripheral and, as a consequence, also more likely to act in a pro-environmental manner.

## *From habitual to value-guided consumer behaviour*

The purchase of many everyday products has an habitual character. It is performed in a stable context, often executed with high frequency and without much reflection. A familiar brand label or product look may serve as a cue initiating an automatic response or habit. During recent years consumers have been asked to show environmental concern. The automatic process should compete with a new behavioural intention: to make an environmentally benign choice. A frequent and successful implementation of this new intention will, it is hoped, result in a new habit that replaces the old one.

This process of habitual change has been investigated in several survey studies (Biel & Dahlstrand, 1999; Dahlstrand & Biel, 1997; Grankvist & Biel, 2001). A model that traces this process of changing an old habit into a new one was initially presented in terms of seven steps (Dahlstrand & Biel, 1997). The broad outline of this model can be described in three phases. General factors such as environmental values and a sense of personal responsibility for contributing to environmental damages are influential in an early phase of transition. This environmental awareness is paralleled with a positive general attitude toward ecological behaviour and an impetus to attend to your present behaviour. In a second phase people take a new behaviour into consideration and examine alternative ways to perform this new behaviour. Such considerations affect specific attitudes and beliefs. Specific beliefs are beliefs about performing a behaviour with regard to the object; e.g., to purchase an ecological product. As an example, you may have to pay more for an ecological than an "ordinary" product or it may be more

difficult to find in your shop. Thus, specific beliefs are here assumed to influence the propensity to try out and to buy a particular product. Once the new behaviour is tested it is also assumed to be evaluated, the third phase. Since many values may affect this evaluation, it is considered to be of special importance that environmental values guide further purchase behaviour.

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Figure 1 about here

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Dahlstrand and Biel (1997) found that environmental values were important in a first phase of transition. By contrasting a group of individuals who never bought eco-labelled washing and washing-up detergents with a group that had given it serious thoughts, they showed that individuals in the second group rated environmental values as more important than individuals in the first group. In a follow-up study with a wider range of products, the importance of environmental values in an initiating phase of changing habits was confirmed (Grankvist & Biel, 2001).

The second phase of behavioural change implies that people consider alternative behaviours. They are also more attentive to specific information about these new behaviours. In our studies of purchase of eco-labelled products (Dahlstrand & Biel, 1997; Grankvist & Biel, 2001) specific beliefs about eco-labelled products affected whether people would form a more positive attitude towards testing such products. For example, those respondents who believed that they didn't have to pay more for eco-labelled products than ordinary products, or that labelled products were better for their personal health, were more likely to try them out. In the third phase the new behaviour is practised and evaluated. Evidently, a more positive evaluation will have a more positive effect on the future likelihood of practising the new behaviour and vice versa. Importance attached to environmental values as well as a general positive attitude towards eco-labelled products was shown to increase the likelihood that respondents continued to purchase organic food products rather than non-organic alternatives (Grankvist & Biel, 2001).

#### *Value-guided decisions in organizations*

The importance of environmental values in shaping evaluations and attitudes was also investigated in a survey of acceptance of policy measures addressing climate change issues (Nilsson, von Borgstede, & Biel, 2003). Decision makers representing both the public and the private sectors, and working in companies which have a significant impact on global climate change in terms of greenhouse gas emissions (energy, transportation, building and construction, and oil companies), participated in the study. The survey was designed to test the relationships between values, norms, and acceptance of policy instruments. Twenty-two items, representing four kinds of instruments were included in the survey: legal measures, subsidies, information, and taxes and charges.

To the extent that environmental values are important within an organization, we expected that these values contribute to the establishment of pro-environmental norms (e.g., in our organization we ought to put more effort on behalf of climate change issues), resulting in an acceptance of policy instruments (see also Stern et al., 1999). Environmental values were furthermore assumed to be contradicted by values emphasizing the pursuit of the company's relative success and dominance over others, values such as power and achievement. Figure 2 summarizes the expected relationships.

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Figure 2 about here

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Moreover, environmental values were expected to be more pronounced in decision making in the public than in the private sphere. Hence, the upper route in Figure 2 was expected to be more salient for those employed in the public sector, while the lower route would primarily characterize those employed in the private sector. Results partly supported these assumptions. The results showed that for decision makers in the public sector, but not in the private sector, environmental values were important determinants of willingness to accept climate change policy measures. Also as hypothesized, these effects were mediated by moral norms. This was true for all four kinds of instruments. The hypothesized negative effect between self-enhancement values and acceptance (see Figure 2) was not confirmed.

One could argue that those employed in the private sector are different in kind to those employed in the public sector rather than attribute the difference to the organizational setting and role. To control for this possibility, a new sample of decision makers in the private sector, employees in the same types of companies and occupying the same positions were approached, but this time in their private capacity (Biel & Nilsson, 2004). Thus, participants were asked to rate their private value system and their private norms, together with their acceptance of the same policy instruments as in the former study. Results were analogous to results for those employed in the public sector. Environmental values determined acceptance of policy instruments. Furthermore, norms mediated this effect.

We see a clear parallel between consumption behaviour and acceptance of policy measures. In both domains, the activation of new values, i.e. environmental, are called for in the decision making process and when people choose their course of action. This has partly been achieved among consumers when purchasing every-day goods and among decision makers in the public sector. However, in the private sector, at least in this sample, environmental values had no effect on attitudes toward policy instruments.

#### *Effects of information on value-guided consumer behaviour*

Since the activation of environmental values does not occur spontaneously for all, people sometimes have to be reminded about the importance of the environment. Eco-labels are intended to serve this function. When the consumer recognizes a labelled product on the shelf, he or she is reminded that I ought to consider this variant rather than an alternative product. The eco-label signals that one should choose this product as it is better for the environment than the average, non-labelled, product. However, some consumer may be more attuned to eco-labels than others. Based on Higgins's (1987) self-discrepancy theory, we (Grankvist, Dahlstrand, & Biel, in press) predicted that people with strong environmental values, but not people with weaker environmental values will be guided by this information. The latter group will be more responsive to negative information.

Higgins's self-discrepancy theory states that people have mental representations of two types of selves: ideal and ought. Ideal selves embrace a representation of one's hopes, wishes, and aspirations, while ought selves include a representation of one's sense of obligations, responsibilities, and duty. When guided by an ideal self, people are more sensitive to the absence and presence of positive outcomes, a promotion focus. When people are guided by an ought self, they are more sensitive to the presence and absence of negative outcomes, a prevention focus. Based on this theory, we predicted that when environmental values are important in life, people tend to have a promotion focus with regard to environmentally relevant behaviour. People who

value the environment less tend to have a prevention focus in the environmental domain.

To test this idea a three-level eco-labelling system was designed and applied in a computer-based experiment. A green label indicated that the environmental consequences of a particular product was much better than for the average product in that category, a yellow label was described as average, while a red label signified that the environmental consequences of this product is much worse than average. In the experiment, participants had to choose between pairs of products (to render clarity details are left out). Two version of each pair were presented. In one condition (control), each alternative carried a yellow label. In the other condition (experimental), for half of the pairs one of the alternatives was depicted with a yellow label while the other carried a green label. For the other half, one alternative was marked with a yellow label while the other was labelled red. The crucial test was the difference in preference rating between the control (both alternatives labelled yellow) and the experimental condition (one yellow and the other either green or red).

Results showed that individuals with a stronger environmental concern were more affected by both positive and negative environmental information than were individuals with an intermediate concern. Individuals lacking environmental concern were not affected at all. Furthermore, individuals with an intermediate environmental concern were more affected by negative than by positive information, while those with a stronger environmental concern were affected equally much by both kinds of information. While the latter group strives to contribute to a better environment, the former group seems more concerned about not contributing to worsening conditions.

Behaviour may be more or less guided by deliberate processes. In a deliberate phase, people are more attentive to, and influenced by information in their choice of products. When in a less deliberate phase consumers may fall back on habits and choose in a routine manner. This prediction was tested in another computer-based experiment, where participants purchased products in a simulated shop (Dahlstrand, 2004). Their task was to buy one product each from four different categories of products, displayed on separate shelves in the shop. They were informed to act as they do when in their regular shop. Participants had a specified budget that would cover their costs for all four products. Unknown to the participants, they always had enough money to buy any combination of products and variants. As they approached a shelf, they could request information (price, date, eco-labelled or not, etc.) about each product before they made their choice. This was done by using the mouse as a pointer. Once they had chosen a product, they placed it in their shopping basket and walked to the next shelf. When they had bought all four products, the shopping session was over and they filled in a questionnaire. The questionnaire contained ratings of their value priorities, to what extent their choice of the four products in their regular shop was done in a habitual way or not, and the proportion of times they chose an eco-labelled variant of each product.

Participants were randomly assigned to one of two groups, one with and one without time restriction. The time restriction was predicted to result in less deliberate processing, i.e. less information about the products would be asked for, and also in a more habitual behavior. Results confirmed these predictions. When under time pressure, respondents required less information before they made their choice than in the condition of no time pressure. Furthermore, those with stronger environmental values more often chose an eco-labelled product under time pressure than with no time restrictions, while those with weaker environmental values more often chose a non-labelled product in the time pressure condition. This effect was mediated by habit strength. Evidently, when people are distracted or have less time to make deliberate

choices they fall back on habits. Hence, people with strong environmental values who also have developed a pro-environmental habit will act accordingly. Others will stick to a less environmentally friendly habit, guided by some other criterion such as low price.

#### *Final remarks*

Habitual behaviour is here used in a broad sense. It both refers to the behaviour as such, but also to the criteria that guide evaluation and choice of product or course of action. Hence, people may habitually choose a certain product that is more or less environmentally benign. People may also, in a routine manner, apply environmental values to guide their evaluations. We argue that the latter is the road to the former. Our knowledge of how to bring this about is still limited.

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Figure 1. A model for changing old into new habits. Depicted below the arrow are psychological factors assumed to “drive” the process.

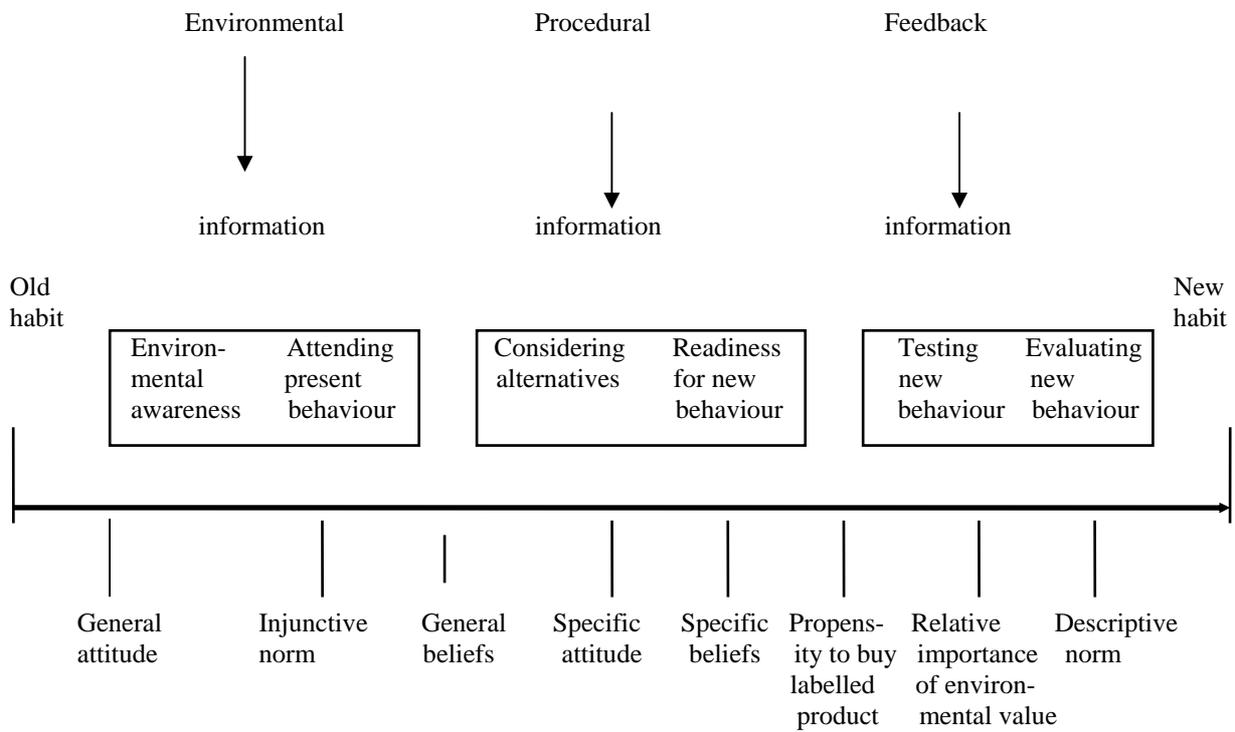
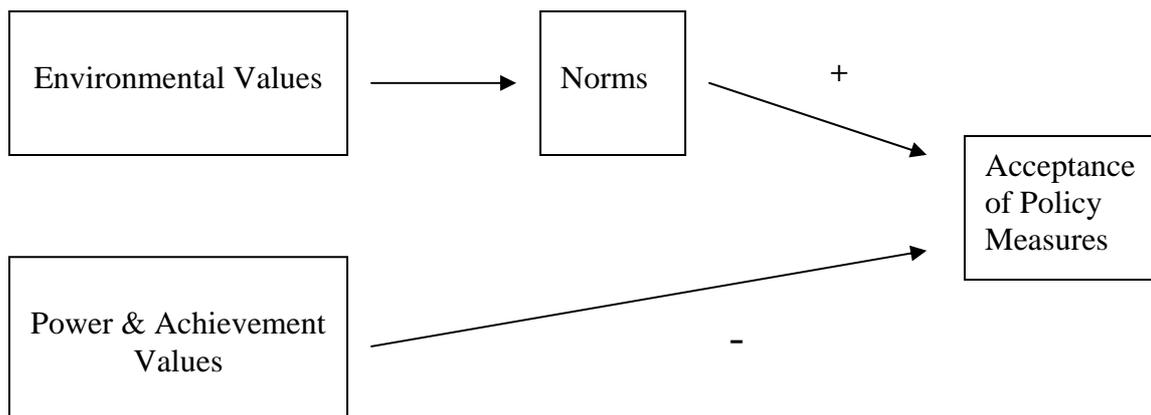


Figure 2. Hypothesized relationships between values, norms, and acceptance of policy measures.



# Use of Longitudinal Panel Data to Estimate the Effects of Adopting New Activities to Household Consumption Patterns and Happiness

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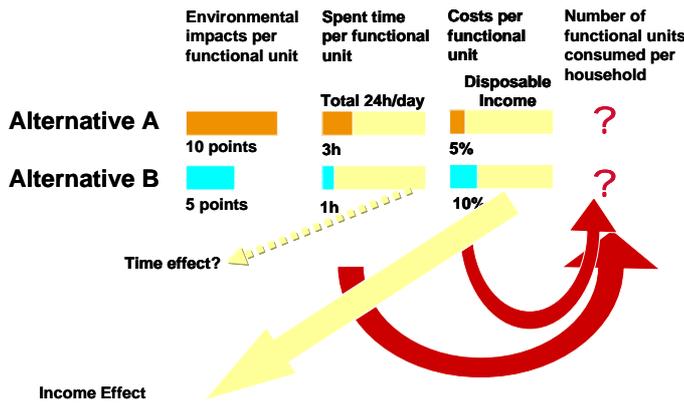
## Abstract

Attempts to reduce CO<sub>2</sub> emissions per capita have shown limited success – if at all. Approaches relying primarily on technological progress that increase the energy efficiency of technologies and services have often failed to materialize expected reductions in fossil fuel consumption. Such concepts need to be extended by considering two additional mechanisms: (1) existing products or services are not replaced by new and more efficient alternatives on one-on-one basis; and (2) consumers have no intrinsic motivation to reduce energy consumption but to maximize ultimate utility. Therefore, we suggest developing a model that identifies both changes in consumption patterns and ultimate utility in order to predict CO<sub>2</sub> emission changes due to the introduction of new technologies or products. Using longitudinal panel data on household activities, this allows us to derive consumption elasticities. These elasticities will be useful in predicting changes in consumption patterns. Changes in happiness or life satisfaction can be derived from the same data sample. Combining the activity-based calculation of life cycle CO<sub>2</sub> emissions with a hybrid approach in information on change in consumption patterns and happiness allows the identification of activities with lowest CO<sub>2</sub> emissions per unit of happiness. These activities are likely to escape the rebound effect and actually deliver lasting reduction in CO<sub>2</sub> emissions per capita. Moreover, this suggested model will help us learn what factors must be considered when we think about new technologies and services that have potential leading to sustainable consumption. Statistical analysis was performed to derive consumption elasticities when introducing new activities, such as cloths dryer use, personal computer use, and mobile phone use.

## Introduction

It is well known that the energy efficiencies of household appliances, cars, housing per square meter, producing steel, etc. have improved dramatically within the last 50 years. However, during the same period, energy consumption and CO<sub>2</sub> emissions per capita increased continuously and never decreased. Sustainable consumption requires drastic reduction of CO<sub>2</sub> emissions per capita in industrialized countries. Strategies are needed to achieve this reduction. Energy economics literature suggests that the mentioned efficiency gains are lost due to rebound effects (see Greene et al. 1999, Greening et al. 2000, and Binswanger 2001 for recent reviews).

Hofstetter and Madjar (2003) illustrated an example mechanism of a rebound effect (Figure 1). When two hypothetical products A and B are being compared to fulfil the same objective service, but cause different amount of environmental burden per service unit, they still differ in the amount of time for consumption and costs. Alternative A shall be



**Figure 1.** Example for time rebound and income effect if consumers shift from alternative A to B.

environmental effects by switching from alternative A to alternative B in this example because they also depend on the ratio between time and income constraints of consumers. In this example, three limiting factors, such as costs, energy use and time use were described as sources for rebound effects. In principle, all limiting consumption factors may cause rebound effects, for example, space, skills and talents, all type of information, and other resources.

Hofstetter and Madjar (2003) further provided an analysis of the related phenomena on rebound effects and ultimate utility and suggested a new method to deal with both obstacles. This proposed method addresses two shortcomings:

1. Consumers rarely substitute one old consumption activity by only one new consumption activity. This yields to rebound effects that may turn the introduction of a new sustainable consumption activity into the reverse. Such behavioural changes in consumption are usually neglected.
2. LCA practitioner measure the utility of products and services often in physical/engineering units such as kg, m, m<sup>2</sup>, or piece, and economists often use willingness to pay. However, consumers strive for ultimate utility that can be approximated with measures of quality of life and subjective well-being. The acceptability of changes towards sustainable consumption patterns can be improved when ultimate utility increases. This would also avoid compensational consumption addressed in point 1 above.

For this reason, a new method, which is a micro level equilibrium model, has been suggested. The method is descriptive in the sense that observed behaviour is used to derive causal relationships between activities. These are called elasticities, because of their similarity to economic elasticities used in general equilibrium models. More details are available elsewhere (Hofstetter and Madjar, 2003; Hofstetter and Ozawa, 2003).

### Development of the Model

In order to develop the suggested model, three modules must be carried out as discussed below:

**Module CP (Consumption Pattern):** The purpose of this module is to estimate the effects of adopting a new activity to household consumption patterns using longitudinal panel data. By comparing the changes of consumption patterns of adopters and non-adopters of a new activity, one can also calculate what other activities may also be increase or decrease. It

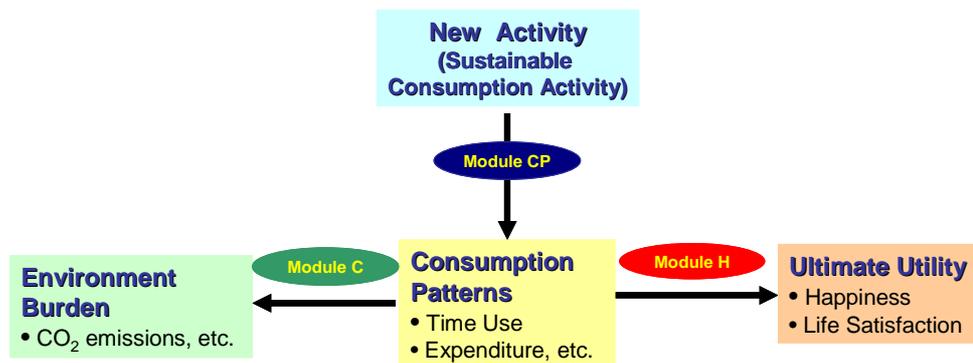
replaced by less polluting alternative B that also reduces the needed amount of time but comes at higher costs. The higher costs of alternative B will cause a reduction in consumption of alternative B itself and other products. Therefore, the total pollution would be reduced even more. However, alternative B also uses less time. Therefore, additional time becomes available for consumption that causes additional pollution. One cannot determine the net balance of

uses similar approach that Gershuny (2002) undertook to analyze the Web-users' behavior on time-use data.

Module C (CO<sub>2</sub>): The purpose of this module is to calculate the CO<sub>2</sub> emissions directly caused by each new activity and those activities that are affected by the lifestyle change through a hybrid approach developed within the field of life cycle assessment.

Module H (Happiness): Happiness is selected as acceptability indicator or ultimate utility indicator because happiness is a relevant driver in people's consumption behaviour. This module measures the changes in life satisfaction and happiness due to the shift in the consumption pattern. The data can be derived as well from longitudinal panel data.

A schematic diagram of the links among relevant system parameters in sustainable consumption, causal relationships between them (arrows), and three modules are shown in Figure 2. Module CP, which is the consumption elasticity analysis, is the central element of this new approach. The combination of the results of all three modules will reveal net effects on CO<sub>2</sub> emissions and happiness due to the adoption of a new activity expressed by ( $\Delta\text{CO}_2$  emission /  $\Delta\text{Happiness}$ ). This equation will indicate: (1) which activities have potential in yielding net CO<sub>2</sub> reduction; and (2) which of these activities will improve consumer happiness and therefore be likely to cause no other rebound effects.



**Figure 2** Schematic diagram of the links among relevant system parameters in sustainable consumption, causal relationships between them, and three modules.

This paper presents the results or the initial set of statistical analysis from Module CP and a part of Module H. A more comprehensive results and discussions will be available when this research project is completed.

### Methods

Used Data and Variables: The Japanese Panel Survey of Consumers (JPSC) dataset was provided by the Institute for Research on Household Economics (IRHE) of Japan. Although the panel data have been collected for different purposes, it is comprehensive and are sufficient to find out the way consumption activities change and how such changes affect subjective ultimate utility. The JPSC longitudinal panel data include the variables of time-use data, consumption data, and happiness and life satisfaction, necessary for our study. The characteristics of the used data are shown in Table 1. The panel cohort consists of at least 1,500 women who are geographically distributed throughout the nation. The latest dataset available is from the survey in 1999. The data consist of Cohort A (in the age range of 28-38 as of 1997), which has been covered since the first year's research in 1993, and Cohort B (in the age range of 24-27 as of 1997), which IRHE has covered since the fifth year's research in 1997. We decided to use the most recent available panel datasets

(1997, 1998 and 1999), married and single samples combined, as well as Cohort A and B combined, for this study.

**Table 1** Characteristics of data used for this study.

Panel Number	Survey Year	Number of Samples			Actual sample size used for this study	Age range at the time of survey
		Married	Single	Total		
Panel 5A*	1997	980	275	1,255	1,749	28-38
Panel 5B*	1997	201	299	500		24-27
Panel 6A	1998	952	244	1,196	1,628	29-39
Panel 6B	1998	211	231	442		25-28
Panel 7A	1999	931	206	1,137	1,537	30-40
Panel 7B	1999	215	197	412		26-29

\* A and B represents Cohort A and Cohort B, respectively.

A summary of the variables used for this study are listed in Table 2. The values and measures are dependent on the type of question in the survey. It is important to keep in mind the type of value measure of the variables when choosing a statistical tool for analyses. For this study, Toshisuke Ozawa, approved user of the JPSC data, performed statistical analysis using SPSS v.12.0J.

**Table 2** Variables used for this study

Summary of Used Variable	Value or Unit	Measure
<b>Three New Activities</b>		
• Possession of Cloth dryer	0 = Non-user, 1 = User	Nominal
• Possession of Personal Computer	0 = Non-user, 1 = User	Nominal
• Possession of Mobile Phone	0 = Non-user, 1 = User	Nominal
<b>Happiness and Life Satisfaction</b>		
Happiness	1 = Very Happy, 2 = Rather happy, 3 = Average, 4 = Rather unhappy, 5 = Unhappy	Ordinal
Satisfaction on life in general	1 = Satisfied, 2 = Rather satisfied, 3 = Average, 4 = Rather dissatisfied, 5 = Dissatisfied	Ordinal
<b>Consumption Patterns</b>		
Household expenditure per person for the month of September	1,000 Yen	Numerical
Household spending allocation for the month of September	1,000 Yen	Numerical
Time Use in working days and holidays	minute	Numerical
Household possession of durable consumer good	piece	Numerical
<b>Possible Limiting Factor to Alter Consumption Pattern</b>		
Household income from the previous year and household savings and stocks possession	10,000 Yen	Numerical

The Approach and Procedure: The purpose of Module CP is to estimate the effects of adopting a new activity to household consumption patterns. Three cases of new activities chosen for this study are:

- (1) adopting cloths dryer,
- (2) adopting personal computer, and
- (3) adopting mobile phone.

These three technologies were chosen for the following reasons:

- (1) the JPSC data cover the variables on these items;
- (2) personal computer and mobile phone have a potential that leads to sustainable consumption due to the reduction of CO<sub>2</sub> emission;
- (3) cloth dryer could be one of the good representatives of un-sustainable consumption due to its high energy intensity; and
- (4) possession of these items may affect happiness or life satisfaction due to their high frequency of use.

The Analysis: We performed statistical analyses on variables between adopters and non-adopters of the new activities but not between users and non-users of the new activities. Estimating the effects of the above new activities by simply comparing the mean values of variables of users and non-users demonstrated by a single “cross-sectional” data may involve a logical error. Any differences found between users and non-users of a new activity may be a consequence of the activity itself or it may reflect some other prior differences between people that relates to their choice to adopt the new activity. It was expected that the results from the comparisons between adopters and non-adopters would help us evaluate the genuine impact of adopting a new activity in one’s consumption patterns and happiness/life satisfaction.

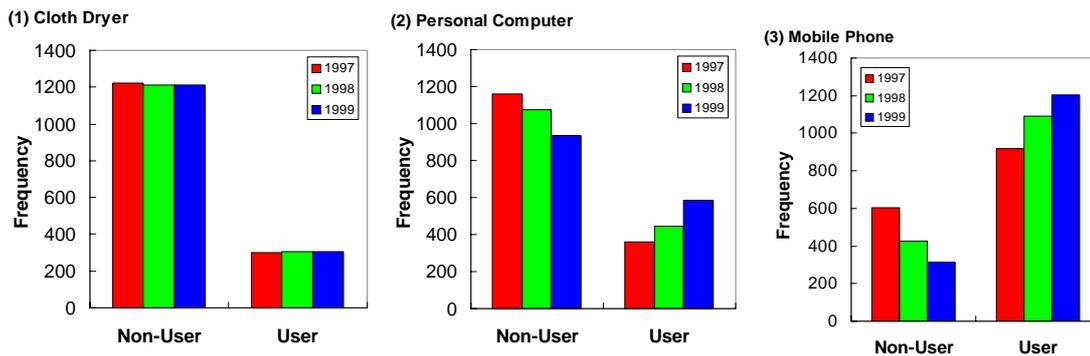
Before the analysis, the samples were divided into four groups:

- Group NN - those that have access to the new activity in neither year (non-adopters);
  - Group NY, those that started the new activity in later year but not in the first year (adopters);
  - Group YY, those that have access in both years (continuous users); and
  - Group YN, those that had access in the early year but not in later year (disposers).
- (“Y” stands of “Yes”, and “N” stands for “No”, reflecting whether they possess the good)

Using the specific feature of longitudinal panel data, all the values of previous year (y-1) were subtracted from that of later year (y) on an individual basis. This process allowed us to yield the mean values of the “differences” or “changes” based on the individuals. Then the mean values of the variables on household expenditure, possession of durable consumer goods, time use, as well as happiness and life satisfaction were compared among the four groups (NN, NY, YY and YN). Matched-pair t-tests were performed on the mean values to check the significant difference at  $p < 0.05$  among the groups. The results from the analysis are expected to help us calculate the consumption elasticities to evaluate the genuine impact of adopting the new activity in one’s life.

## **Results**

Some snapshots of the results of this on-going research are shown in Figure 3 to 8. Among the three examples of goods, cloth dryer is the least diffused product (20 %) among the households of young Japanese women. Almost no increase in diffusion was observed between 1997 and 1999. Personal computers came into in wide use recently from 24 percent in 1997 to 38 percent of diffusion rate in 1999. Mobile phones are the most popular among the households of Japanese young women. The diffusion rate in 1999 is close to 80 percent and expected to increase.

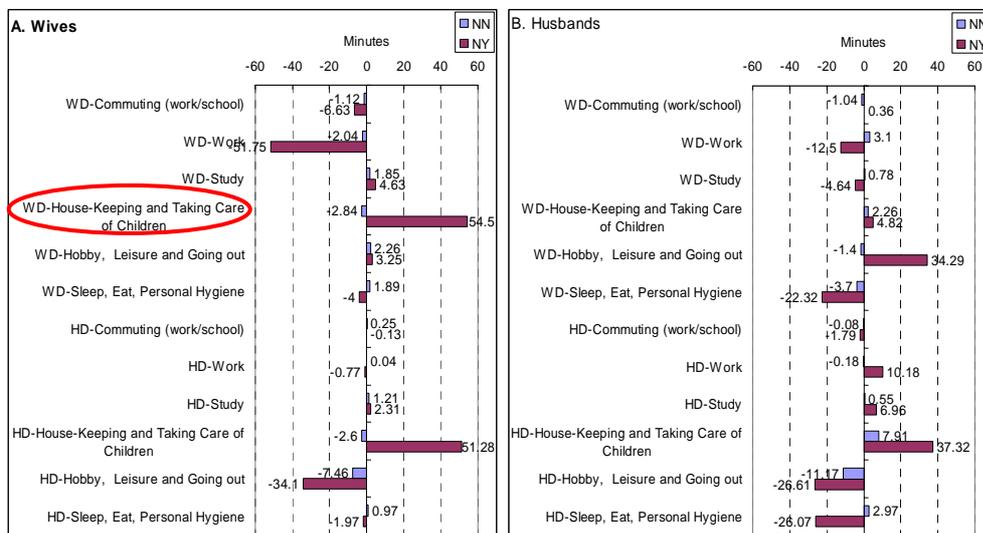


**Figure 3** Users and non-users of three new technologies

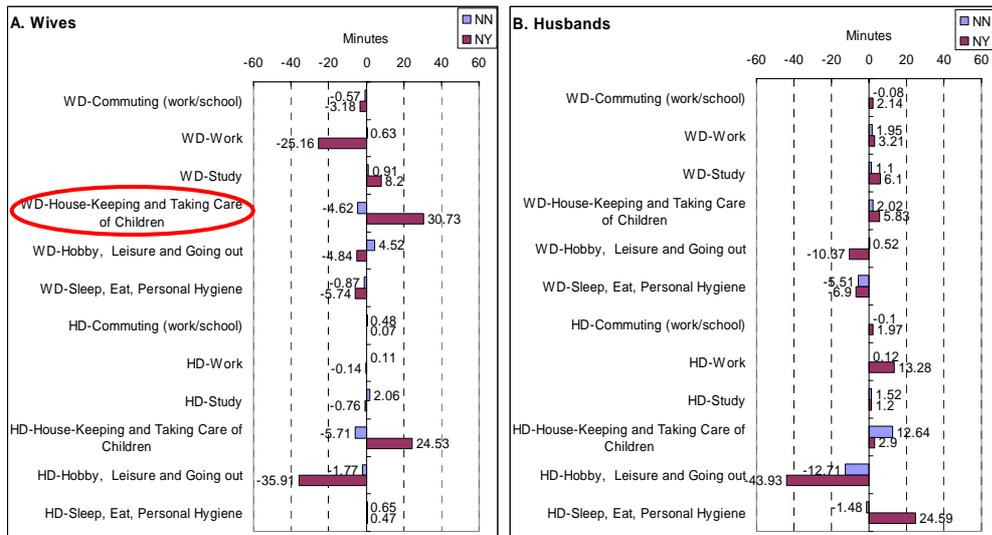
The time use changes affected by the adoption of three new activities are shown in Figures 4 to 6. The blue/light bars represent the changes of non-adopters of the new technologies, and purple/dark bars represent that of adopters. In the figures, “WD” stands for weekdays, and “HD” stands for holidays / weekends. The red circles indicate significant difference at  $P < 0.05$ . In the case of adopting a cloth dryer, wives increase house-keeping and taking care of children in both weekdays and weekends. They work less during the weekdays and cut the time for hobby, leisure and going out in weekends. Husbands spend more time on leisure and going out, and spend less for sleep, eat, personal hygiene, during the weekdays, but in weekends, they give up the time for sleep and leisure, and allocate more hours for house keeping and taking care of children.

In the case of adopting personal computer, the tendency of wives is similar to that of cloth dryer adopters: less work during the weekdays and less hobby, leisure and going out in weekends, and more house keeping and taking care of children in both cases. Husbands do not get affected a great deal: only less in hobby, leisure and going out and more work and sleep, eat and personal hygiene.

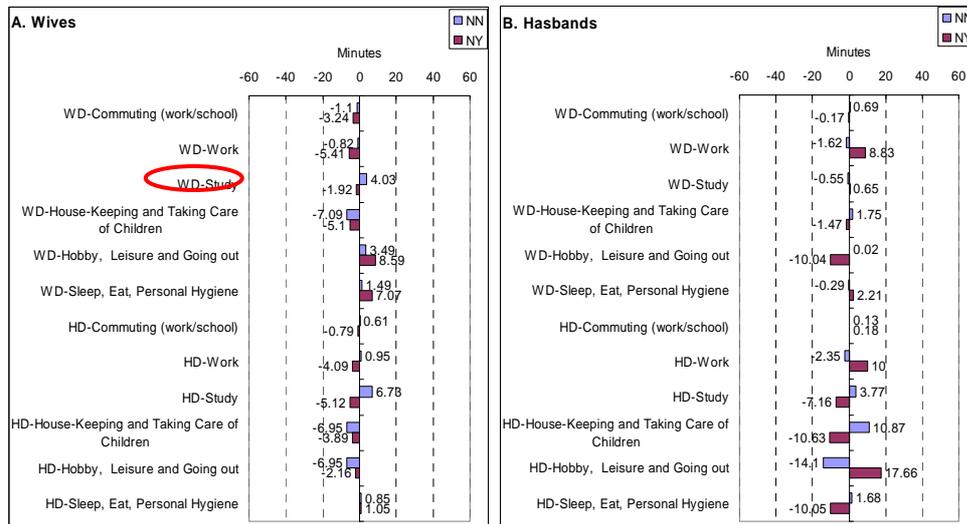
In the case of adopting mobile phones, the impacts on both wives and husbands are subtle. One reason may be that it is not clear from the data who got the mobile phone (wife, husband or other family members).



**Figure 4** Changes in time-use patterns – Cloth dryer



**Figure 5** Changes in time-use patterns – Personal Computer

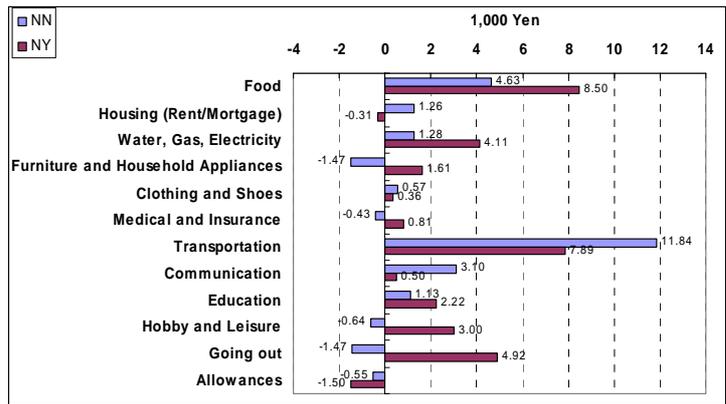


**Figure 6** Changes in time-use patterns – Mobile Phone

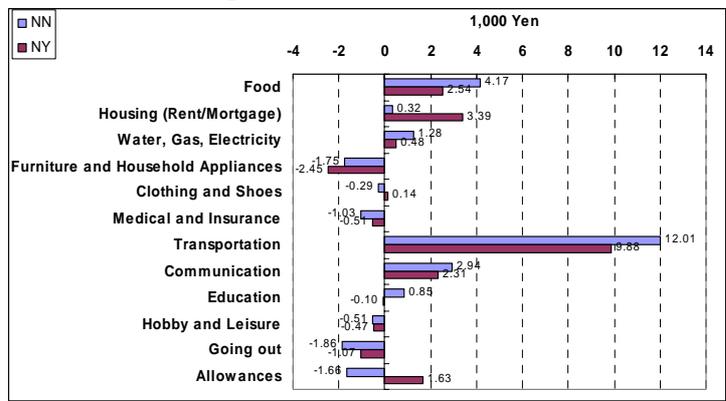
Changes in household spending allocation for the month of September in 1,000 Yen (7.35 approximately Euros) in 1998-1999 comparison are shown in Figure 7. Again, the blue/light bars represent the changes of non-adopters of the new technologies, and purple/dark bars represent that of adopters.

The observations that apply to all the groups are: (1) transportation is the largest monthly household expenditure; and (2) a large decrease of transportation is observed due to adoption of a new activity. The main characteristics of cloth dryer adopters are major increase in the expenditure for food, water, gas and electricity, education, hobby and leisure, and going out. The main characteristics of personal computer adopters are low spending for food compared with other cases, increase in housing and allowance, and decrease in furniture. This feature may be due to moving to a new house or apartment. The main feature for the mobile phone adopters are: a major decrease in housing and going out; and increase in clothing and shoes, medical and insurance, communication and education. The increase of communication is self explanatory for mobile phone users.

(1) Cloth dryer



(2) Personal Computer



(3) Mobile Phone

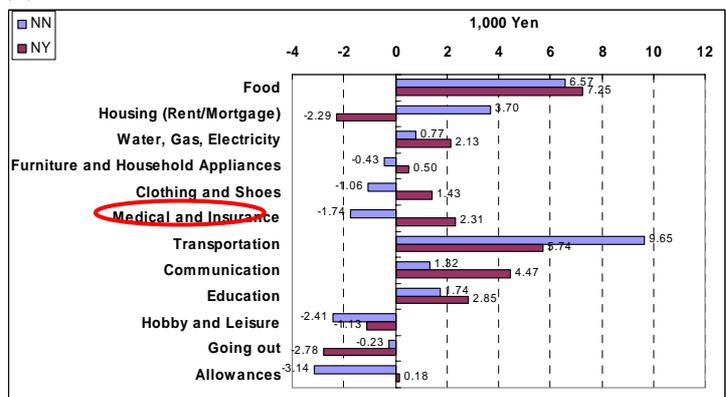


Figure 7 Changes in household spending allocation for the month of September (1,000 Yen) (1998-1999)

Changes in happiness and life satisfaction between 1998 and 1999 are shown in Figure 8. The happiness and life satisfaction results exhibit negative values for adopters. The measure of the happiness variables are in a scale from 1 to 5, and the happiness value of 1 stands for “very happy” and 5 for “unhappy.” Therefore, the decrease in happiness value actually means the increase of actual happiness. This suggests that the adopters of the three new activities are happier than non-adopters, and more satisfied with life, except for the case of personal computer (no change). However, no significant differences in happiness and life satisfaction were found in any of the adopters.

The different patterns of happiness and life satisfaction elasticities suggest that these two measures are different aspects of ultimate utility although they seem to be quite similar variables.

Largest happiness elasticities and life satisfaction elasticities are observed for the case of cloth dryer, then mobile phone. It may suggest a scenario that the adoption of a cloth dryer effected the household consumption patterns in the way that increase the ultimate utility

Not many significant differences were found between the changes of variables throughout this study. This result was attributed to the large variability of the data, which is more than initially anticipated. Although the sample size is large (>1000) and concentrates on a sub-group (young Japanese women), the individual behaviour of this group is too diverse to easily find statistically significant impacts. However, non-significant coefficients do not mean that there is no relationship or that the sign is necessarily opposite. Non-significant coefficients may well serve to gain insights.

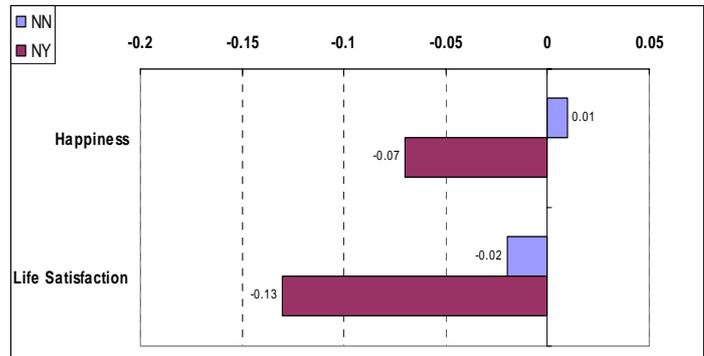
In this paper, results in changes of consumption patterns, such as time use and household expenditure allocation, and that of happiness and life satisfaction, between adopters and non-adopters were introduced. These elasticities will be used in Module C to calculate the consequences of CO<sub>2</sub> emissions.

**Findings of Module CP**

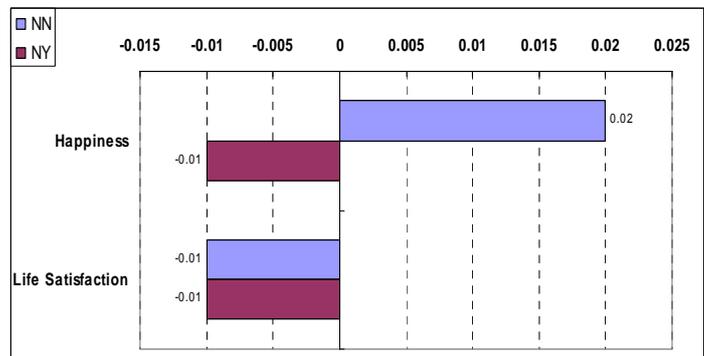
Although this research is only half-completed, our initial findings of this on-going project are as follows:

- The JPSC panel dataset obtained for this study was comprehensive and detailed, and basically useful for our analysis;

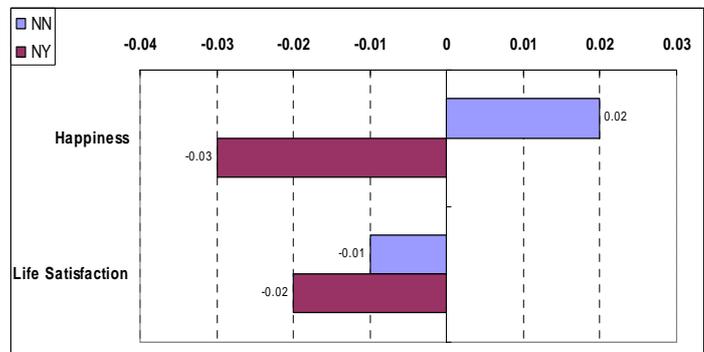
(1) Cloth dryer



(2) Personal Computer



(3) Mobile Phone



**Figure 8** Changes Happiness and Life satisfaction (1998-1999)

- The data on time use are not detailed enough and we focused more on elasticities on consumption activities;
- This module produced data that allows empirical calculation of the average direct and indirect rebound effect for the three case studies. This information is highly significant because the rebound effects need to be considered not just for target groups but for all consumers of a service or good.
- The data contain a great variability even though the selected sample for this study belonged to a similar demographic attributes. Due to this great variability, we could not observe significant differences among the variables in targeted groups. As a result, our discussions were based on the mean values of the data. In order to make our discussions more concrete, it may be helpful if the variances are minimized further by classifying the sample into distinguished target groups (certain attributes, such as demographic, social, economical, geographical, psychological, behavioural attributes, etc.).

### **Acknowledgements**

This paper is based on results of the project “CHap: CO<sub>2</sub> emissions per unit of happiness: a new indicator for sustainable consumption that considers and minimizes rebound effects” which is part of the program “Life Cycle approaches for Sustainable Consumption”, launched by SNTT, sponsored by METI, and proposed by Dr. A. Inaba, AIST. We would like to thank these organizations and Dr. Inaba for their support.

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# **TOPIC THREE**

*-Products and Markets -*

# Towards Sustainable Mass Markets

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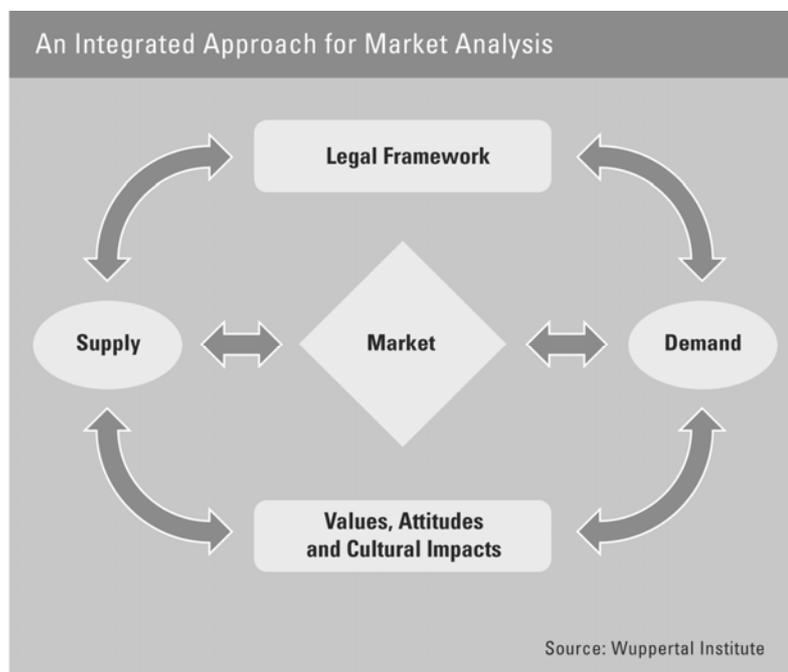
## 1. An integrated approach for sustainability market analysis

In most of the consumption areas there are tendencies to optimise products and services towards ecological or social sustainability. Unfortunately in nearly every consumption cluster these products still stay in a niche market – from organic food via low-emission cars to passive houses. In all areas, still considerable efforts have to be made to overcome the barriers around a mass market, even if most of these products (eco-cars and food and energy-saving appliances, etc.) have additional advantages such as cost reduction during their use phase or health aspects that make them attractive enough for consumers to opt for them also for non-ecological reasons.

The presentation is based on a study which explored how far market structures of ecologically produced goods and services fit into the demand-side necessities and lifestyle attitudes of private consumers. It focuses on how consumers can be active in their **purchase** decisions.<sup>1</sup>

This is done within the analysis of intermediate connections and influences of values/attitudes/cultural impact and legal framework on the demand side and the supply side of the market.

Figure 1: An integrated analysis of sustainable market(s)



Source: Lorek, Lucas 2003

<sup>1</sup> The ecological aspects of the use phase and final disposal are only taken into account as far as they are influenced by the buying decision.

## 2 Results from the Market Based Survey

### 2.1 Eco-Textiles / Clothing

#### 2.1.1 Market details

Starting in the 1970s the market for eco-textiles in Germany exists for more than a quarter of a century now. It was then when a textile catalogue explicitly offered healthy baby wear and underwear made of natural material only.

Over the years the health aspect of clothes developed further in textile supply and demand but parallel did the insight that greening the textile chain not only means minimising the toxic burden for the consumers but also reducing or avoiding toxic substances and other environmental harm along the textile production chain.

So the main development during the 1990s on the eco textile market was the significant distinction between actors focusing on health aspects only and those taking broader environmental aspects into account. This created two very different kinds of criteria and related labels, both of which are a basis for products called eco-textiles. One philosophy took the ecological burden along the production process as the main element with textiles from organically grown cotton as a special issue. It is called production ecology. The other focused on the toxic residuum on the cloth as the most important aspect and so concentrates on what is called human ecology.

Fortunately human ecology criteria got broad acceptance in the retail chain. As a result the market for textiles with reduced or minimised toxic residuum in the product quickly developed into a strong mass market. Unfortunately in the marketing and communication of textile retailers, clothes accomplishing criteria of human ecology as well as those fulfilling the much more elaborate criteria of production ecology are both called “eco-textiles”. And they are recognised by consumers as part of a diffuse cluster of eco-textiles. So the doors to confusion among customers are wide open and reduce their ability to make further ecologically responsible decisions.

This might be one, but certainly not the only, reason why the more ambitious textiles which are oriented to the criteria of production ecology, still remain in a niche market.

##### 2.1.1.1 Supply Side

In the very beginning pioneers of the production ecology textile market started with lofty ambitions to produce clothes as naturally and environmentally friendly as possible. 100 percent natural materials was the target. These technical goals were combined with the idea of comfortable wearing and a long-lasting look. As a result eco-textiles quickly had the image of ‘non-fashion’ clothes. Up to now, the branch has been fighting against this image.

During the 1990s the market for production optimised eco-textiles was significantly influenced by two different kinds of players. One important group are small and medium-sized enterprises with mostly a 100 percent supply of natural textiles organised in the *International Natural Textile Association (IVN)*. The other is the huge mail-order traders.

Members of the *IVN* had a turnover of about 500 million EUR in 2002. That was not even 1 percent of the estimated volume of the textile market with about 60 billion EUR. From the beginning up to the middle of the nineties the market grew partly by over 10 percent a year. Most of the turnover was made by eco-mail-order trading a smaller share by small retail shops. (IVN 2003)

In the beginning of the nineties several mail-order traders started to use their market force to implement ecological criteria in the product chain. They developed eco-lines for their catalogues presented in a “shop concept”. Special pages with the eco-wear were inserted into the regular catalogue. The success of this concept varies. While some extended their eco-collection from fashion for women only to men’s wear and children’s wear as well others continuously reduced the articles in their *eco* programme from 1996 on and dropped the concept with the spring/summer 2002 catalogue. Instead, they integrated eco-textiles into their regular pages. (OTTO Versand 2001)

#### 2.1.1.2 Demand Side

On the consumer side, the ecological criteria of clothing had a promising significance in the beginning of the nineties. (Weller 2000) It was triggered by studies and articles about harmful substances in textiles causing allergic diseases. At the height of environmental awareness among consumers eco-fashion was “en vogue” with cloth from ecologically produced natural fibres, natural colours and comfortable cuts. Unfortunately this movement changed quite soon and consumer interest moved towards other aspects of clothing again. (Grundmeier 2001)

The ambitions and benefits of production optimised eco-textiles failed to reach higher levels of attention. As most fashion is produced outside Germany, consumers step into the gap of problem awareness. They confine their attention to the aspect of how they are affected by hazardous, toxic or allergic substances in their clothing and neglect that they are causing environmental problems elsewhere via their consumption decision. The same holds for social aspects. As both are mostly not visible or perceptible for the individual consumers, they are not interested in paying the higher prices for the same personal benefit. (Balzer 2000)

Market analyses about relevant criteria for cloth demand show quality, price, and skin friendliness to be the most important aspects. The attributes 100 percent natural fibre or environmentally friendly productions were only mentioned half as often. (GfK - Textilmarktforschung 1999)

#### 2.1.1.3 Attitudes and Cultural Impacts

Fashion is an important aspect of everyday life that has been analysed from the social, psychological, cultural and several other points of view. It is omnipresent not only in shop windows and magazines but as an issue of interest at parties or other societal meetings, and even as a relevant subject for the main news when the “Haute Couture” has its fashion shows in the Italian or French centres of fashion.

The world of fashion is full of positive emotions. Beautiful people in a good mood dominate the catalogue pages. Compared to that information about environmental

relevance of product decisions is not even boring: it merely distracts consumers' attention. Fischer/Meyer compares it with the interruption of a romantic love story by the latest divorce rates. Information appealing to the rationality of consumers does not increase the attention and activity of customers but increases prejudice and even aversions to eco-textiles. (Fischer 2002)

Questions about spontaneous association with the term "eco-textiles" showed quite clearly that eco-textiles were not viewed positively by the majority of consumers. A higher price, a lack of credibility and lack of fashion were the main points of disapproval. (Götz 1999)

#### 2.1.1.4 Legal Framework

Due to the global intertwinement of the textile chain, the options for national policy to induce sustainable development in the textile industry are rather limited in general.

In 1997 a proposal was submitted to the German parliament to pass a law on eco-textiles but failed. It aimed to harmonise the eco-label flood, to formulate strong and provable criteria and to design labels in a way that would give consumers understandable and easily comparable information. Since this time political debates to strengthen the market position of eco-textiles have tailed off. It was argued that the most important reason was the worldwide competition between countries and economic regions which undermines national co-operation models towards better resource management. (Lucas, 1996)

#### 2.1.2. Eco textile market summary

Like many new ecological market initiatives for individual consumer goods the initiating push on the textile and clothing sector came first of all from critical consumers who informed the general public about health risks and fair trade aspects. These first initiatives were important for posing new questions about producers' accountability. These ethical discussions did not lead directly to relevant market volumes, but some small enterprises started to offer eco and fair-trade textiles. For about one decade those green suppliers played an active role by adding the aspect of human ecology to the general criteria of textile production. Textiles with reduced or minimised toxic residuum in the product quickly became a standard. However, the much more ambitious approach of production ecology failed to reach sufficient interests.

The strongest position of textiles according to the production ecology criteria has been in mail-order trade. Here some of the well established companies pushed the development. But, in reaction to the low reputation of eco-textiles, the trend is now towards selling eco-textiles without active marketing campaigns. Consumers are informed about the ecological features after the purchasing decision. It seems that eco-labels are actually less important as commercial and marketing tools than in the past. If environmental matters are to play an important role in the future development, it seems necessary to foster an integrated sustainable label which take environmental issues, labour conditions und fair-trade aspects into account.

## **2.2 Green Power**

### 2.2.1 Market details

To fulfil their energy demand, households have to deal on different markets. The most common markets are the ones for heating oil, natural gas and finally the electricity market. Additionally, in recent years, and increasingly in the future, there is a fourth market for renewable energy. While the only option for environmentally friendly behaviour in the traditional three markets is to reduce the consumption of the energy carrier, the new market offers another option to reduce environmental pollution, e.g. CO<sub>2</sub> emissions. Households can decide to buy renewable energy<sup>2</sup>. This way they can shift demand from the fossil energy carriers and push the market for renewables.

#### 2.2.1.1 Supply Side

Green power has been part of the electricity power supply for the last few years. Since the liberalisation of the German electricity market in March 1998, more and more regional and municipal utilities selling power have established green tariffs. Also, a growing number of new companies specialised in green energy are offering electricity from renewable energy sources. (Federal Ministry of the Environment (BMU) 1999). In 2002 electricity markets offered more than 200 possibilities to buy green energy. (ZSW 2003) But this way the market of local and regional suppliers is quite confusing.

Compared to the average prices the production of green power is more expensive. How much does depend on the production mix. It differs from a very low margin for electricity from hydropower up to 1 EUR per kWh for solar energy. So providers of green energy either offer energy produced from an adequate mix of renewable energy sources to avoid unacceptable prices or they cover only a part of their electricity supply with green power. (Staiß 2000)

Suppliers of green energy are not forced to verify their offers of green power with an independent label. Indeed there are no binding criteria for what is called green power so far. Different labels exist on the German market. The most important of them are developed and controlled by independent environmental NGO's, consumer associations and independent institutes. The criteria of these certificates are sometimes adjusted to the rapid changes in the dynamic market and depend on the energy-political intentions of the certifying bodies.

#### 2.2.1.2 Demand Side

Since 1998, the electricity market has been open for households. They can now decide whether they will stay with their former, local supplier or take another one. While some households use this opportunity to buy electricity from the cheapest sources, others opt for companies with special offers for renewable energy.

Green power is demanded by energy clients for two reasons. One group wants to make sure the energy they consume is from renewable sources without further interest in a development of the green energy market. The other group wants to push renewable energy supply with their financial support. (Kuckartz 2000; Staiß 2000)

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<sup>2</sup> In fact households have a further possibility: they can produce energy from renewable sources themselves. This option is neglected in this paper but can be found in the original study.

<http://www.wupperinst.org/Publikationen/WP/WP130.pdf>

A summary of several European studies discovered that 60 to 80 percent of the customers are in favour of green power in general. And 50 to 70 percent even declare that they are willing to pay a higher price. (Staiß 2000) This demonstrates that the general idea of green power is well-accepted and has a positive image. But private consumers have taken advantage of their new role only to a small extent so far. As one reason consumer organisations criticise that important conditions for real competition are not fulfilled (confusing contract modality, un-clarified conditions for change, etc.) and recommend regulatory administration. (Meinel 2001)

In 2003 changes towards cheaper suppliers were expected to be 3 percent. Changes towards green energy suppliers or tariffs were even less, about 1 percent.

But it is for sure that the market potential is larger than the realised 1 percent. (Villinger et al 2000)

#### 2.2.1.3 Attitudes and Cultural Impacts

Beside declarations in surveys the fact cannot be concealed that energy and, especially, electricity has always been a product of low interest in Germany. That has not changed up to date. German households (former Republic) spent a lower share of their income on energy in 1995 than in 1970. So any willingness of private consumers to change suppliers has only been developed very weakly so far. (Meinel 2001)

On the other hand attributes of social standard are narrowly related to high energy consumption. They are mainly connected to big houses and/or the available square metres of living space. (Lorek, Spangenberg 2000)

#### 2.2.1.4 Legal Framework

Until recently, it was mainly government support that pushed the development of renewable energies. (Federal Environmental Ministry (BMU) 1999) The political conditions which are still required to promote the expansion and efficiency of renewable energies were significantly expanded in 2000. The most important was the *Renewable Energies Source Act* (Erneuerbare-Energien-Gesetz, EEG), which entered into force in April 2000, guarantees a minimum premium to operators of renewable energy-charged power plants for each kilowatt hour of electricity input into the public grid. This makes investment in renewable energy systems more attractive even without explicit consumer decisions for green energy is needed. The costs of these premiums are divided among electricity customers by a special calculation system.

#### 2.2.2. Green power market summary

The green energy market is mainly dominated by political interests and decisions, as a result of current debate focuses on climate change, and the Kyoto Protocol. not by the interactions of demand and supply in an independent market. The demand for green electricity was formulated by consumer interest groups (mainly environmental NGOs) not really from a broad majority of consumers. Unfortunately these NGOs failed to give common advice to the interested consumers on how to change towards eco tariffs whether they come from ecological newcomers or established energy suppliers.

So the important push towards green energy is due to the legal framework. It allows the suppliers to divide the costs of the premiums they have to pay for renewable energy fed into their grid among all electricity customers. Attitudes and cultural impacts are widely negligible as energy is not an aspect of great importance for German consumers.

### 2.3 Conclusion from the case studies

The results of the two case studies show that the markets of products and services produced or provided in a sustainable way are too different for a general road map. The conditions and structures of supply and demand, the legal framework and cultural settings vary remarkably between different product markets.

Figure 2: Structural settings in different German eco markets

	<i>Eco-textile market</i>	<i>Green power market</i>
Legal framework	XX	XXXXX
Values, attitudes and cultural impacts	XXXXX	XX
Supply side	XXXX	XXX
Demand side	XXXX	XX

Very important: xxxxx    important: xxxx    average: xxx    less important: xx    unimportant: x

Source: Lorek, Lucas, Wilts 2003

The presented cases of emerging green markets depend on a broad but different range of market actors. The growth in the renewable energy market is an example showing how conscious choice and overcoming economic as well as political barriers enable a new market segment for green power. It shows the high importance of creating an economic and institutional context for adoption.

The influence of the legislation framework played a less important role in the field of green textiles. In this case we see that changes mostly require the channelling of new lifestyles and cultural impacts by commercial institutions. One reason might be that textiles have always been private consumer goods. In contrast, the production of electricity has always been related to infrastructure development and therefore connected with policy-making.

However, the two case studies emphasise the persistence of change along different pathways for new ecological markets. Innovation and eco-quality are seen as a result of regulatory assumptions and institutional and cultural settings which are linked in an interactive frame with producers and consumers. Hence future research has to draw

attention to the interfaces between regulatory incentives, market activities and attitudes and behaviour.

### **3 Outlook – How to deal with different developing factors?**

In the mainstream of economic science and political debates, consumption patterns are understood as a result of rational choices that individuals make. Also the existence of different lifestyles and cultural impacts on consumption are seen as a result of individual acting and decision-making.

But in order to reach a sustainable consumption level in the long run, sustainable consumption strategies cannot rely only on market-based activities. Consumers' decisions are biased if alternatives supporting sustainability are not – or less – available, as a result of adverse information or attitudes or structures. This unavailability often has its origin in marketing or policy actions favouring unsustainable production/consumption patterns. Therefore, it seems necessary to extend the view on markets by examining the allocation process as an interactive system.

The integrative analytic view presented here shows that both supply and demand are influenced by the same setting of legal framework and values/cultural influences. So far these aspects are often seen as the background to sectoral policies, likewise:

- Legal framework is seen mostly connected with the supply side only (production)
- Values, attitudes and cultural impact are mostly seen as relevant to consumers' policies (consumption)

To overcome these barriers it seems necessary to draw attention to the synergetic potentials in the interlinked areas. The influences of the market on the legal framework and values/attitudes and the mutual relationship between the legal framework and values/attitudes were not addressed in the study but quickly emerged as an interesting topics for further research. Mainly the deeper need for empirical insights came up at the end of the project, e.g. on:

- how institutional settings and image-building along brands and companies influence individual behaviour.
- how values and cultural debates influence decision makers on the supply side to develop and present ecological/sustainable products in an innovative and attractive way to the consumers and what is needed to support them effectively.
- how civil society – mainly NGO's – identify and highlight sustainable consumption alternatives and act to push (1) their availability on the market as well as (2) the demand for them.

- how can legislation and regulatory framework setting be prepared to (re)act in an adequate way to come into force when windows of opportunities open ( e.g. at times of high societal awareness due to a scandal)

This research could help to locate the specific characteristics of different markets and point out necessary tools of intervention.

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# **What is behind meagre attempts to sustainable consumption? Institutional and product-service system perspective**

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## **1 Abstract**

Sustainable consumption has been on the agenda of many prominent international and national organizations for a decade now. However, if we compare the results in this area with the outcomes of strategies developed for sustainable production field, we realise that sustainable consumption is greatly overlooked. It is wrong to say that no research has been done in this area, but there is a clear lack of political and business will to practically address consumption-related environmental problems. Despite that, there are specific examples of initiatives undertaken in different countries that deal with unsustainable patterns of consumption in business-to-consumer domain. In order to provide a more elaborated argument for ways of addressing unsustainable consumption levels and patterns, it is useful to analyse the existing alternatives to traditional consumption based on ownership. This paper investigates three cases of car sharing, communal washing centres and electric tool sharing schemes from institutional and product-service system perspective. Special attention is paid to factors that may assist or hamper broader acceptance of these consumption alternatives. The study suggests that embodiment of alternative consumption patterns depends on institutional arrangements (regulations and norms) and on how the product-service systems are designed and implemented in practice.

## **2 Introduction**

The global market and the purchasing power of an increasingly wealthy population in industrialised countries are setting examples of consumption and lifestyles for the entire world. These are characterised by a growing emphasis on the individualism, personal material accumulation, and a desire for comfort (Jernelöv 1997). What is clear, in this respect, is that these patterns of consumption require large quantities of energy and resources per capita and generate wastes that create further environmental problems when they are disposed of and released to the environment.

In order to combat environmental problems, it is necessary to consider production- and consumption-related problems in a systems perspective. Eco-efficiency strategy has addressed the production-related environmental problems, while consumption side of the equations had barely been touched upon. This is despite the fact that increasing consumption outweighed the resulting efficiency improvements of processes and products. Consumption problems have been mostly addressed by green procurement and green consumerism approaches, which obviously represent the mindset of “more is better”. Such half measures can hardly significantly influence the outcome of the battle with environmental problems.

It is often heard, that consumption levels and patterns are a matter of individual or

organisational choice. True, but the decisions are bounded by existing institutional settings in society. The institutional settings emerge in market systems based on maximising profits in an ever-expanding economy, in the spreading tendency to define social status through material acquisition and ownership, and in the understanding of the world and people by individuals through the prism of material artefacts. It is thus impossible to change individual choices without changing the governing and established forces in our society. The issue of sustainable consumption has been a subject for policy debate since at least early 1990's. There are examples of individuals or communities devising their own ways of consuming, drastically reducing environmental impacts of households. Some initiatives aim at substituting products with services in order to increase the intensity of product use and reduce the material intensity of each use occurrence. Many of these grass-root attempts are temporary and inefficient from customers' and environmental points of view. We can also observe that although various environmentally sound alternatives exist, people either are not always aware about them or do not readily accept them. It is therefore clear that although the problem of consumption is being recognised and some measures suggested, practical ways of addressing unsustainable patterns and levels of consumption have not yet been devised.

The goal of this study is to identify critical factors that influence success and institutionalisation of existing alternatives to unsustainable patterns and levels of consumption. Three areas in the business-to-consumer (B2C) markets: car sharing, washing services and collective use of electric tools are analysed. It is proposed here that institutionalisation of alternative consumption practices depends on both institutional settings and on how the alternative systems are developed. Therefore, the institutional perspective is complemented with the product-service system perspective and the resulting framework is used for the analysis of the focus areas.

The study builds on a number of projects with Swedish companies and non-commercial organisations conducted in 2001-2003 by the International Institute for Industrial Environmental Economics at Lund University. These projects were funded by the Swedish EPA, the Swedish National Board for Industrial and Technical Development and by Nordic Council of Ministers.

The study intends to assist in further efforts of developing product-service systems in consumer markets.

### **3 Institutionalisation of patterns of consumption**

New institutionalism recognises that individual behaviour is shaped by social institutions and investigates how certain practices become institutionalised (Powell and DiMaggio 1991). Two pillars of institutions that shape social behaviour are regulative and normative. Regulative pillar comprises regulative behaviour and institutional constraints, while normative includes values and norms in society. The institutional pillars are being shaped by the entire history of industrial development, and therefore attempts to address the unsustainable patterns of consumption work counterproductive to the existing institutions.

Prevalent *regulatory frameworks* promote economic growth through material consumption, environmental costs are externalised and, at best, policies that encourage improvements of environmental features of products are developed. A meagre attempt to address product related environmental problems from a more systematic perspective by an Integrated Product Policy, does not explicitly address levels of consumption (Commission of European Communities 2003). Sufficiency concept and shared use of goods are sneaking

into the list of potential solutions propagated in few policy documents.<sup>1</sup> Policy efforts need to directly address levels of consumption.

At the *normative level*, the two norms that are deeply embedded into our life and have profound influence on the outcomes of consumption are materialism and ownership. Several causes of materialism were put forward throughout years:

- The number and quality of accumulated possessions serve as a measure of success in life and right-mindedness (Du Bois 1955).
- Hacker suggests that people's pursuit of the same brands and lifestyles substitutes for a lost sense of community (Hacker 1967).
- Douglas and Isherwood see ownership as a means of conveying power and control over one's world (Douglas and Isherwood 1979).
- Acquisition of material products is linked by materialists to satisfaction with life and well-being.

Emerging values related to the environment influence people in many countries to a deferent extent. According to some surveys, especially in early 1990-ies, people valued clean environment and were ready to buy eco-labelled products, sort and reduce amount of waste. Latest polls show that environmental issues moved down on the list of the most emergent issues of many individuals, due to economic recession or other hot topics on the world's agenda. However, some practices such as waste sorting became legitimate part of our lives in many European countries, supported by regulatory efforts. To some extent eco-efficiency practices, e.g. demand for environmentally sound products, turned out to be only a half measure that did not affect the total impact of our economy. Therefore, sufficiency strategies that would include "revision of use patterns and new models of well-being" were called for (Haake and Jolivet 2001). Sufficiency strategies seem to be more dependent on the choices of final consumers than eco-efficiency strategies and usually include sharing and pooling of products. However, as Behrendt, et al. conclude, consumers are hesitant towards alternatives of consumption without ownership, such as sharing and renting (Behrendt et al. 2003). The authors regard psychological and social factors related to ownership at least as important as price, quality and product design. They have suggested that consumption without ownership may only take place if "organisational and social conditions for a broader acceptance in society are developed and introduced into the market". It is clear that until more sustainable lifestyles become a more prestigious way of life in our society, no environmental campaign will be truly successful.

#### **4 Analysis of B2C cases**

The following framework is used in analysing existing examples of services that have a potential to become a more environmentally sound alternative than traditional ways of delivering products and services to households. In this chapter we consider three cases of such services: car sharing, washing services and collective use of power tools. The choice of the cases was determined by the areas in which primary research was conducted and by the availability of secondary sources about these cases.

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<sup>1</sup> For example, first draft of the report Britton, E. (2000). Carsharing 2000. Sustainable transport's missing link. Paris, World Carshare Associates. was used as a background material for the OECD meeting on sustainable transportation innovations that took place in Berlin in September 1999.

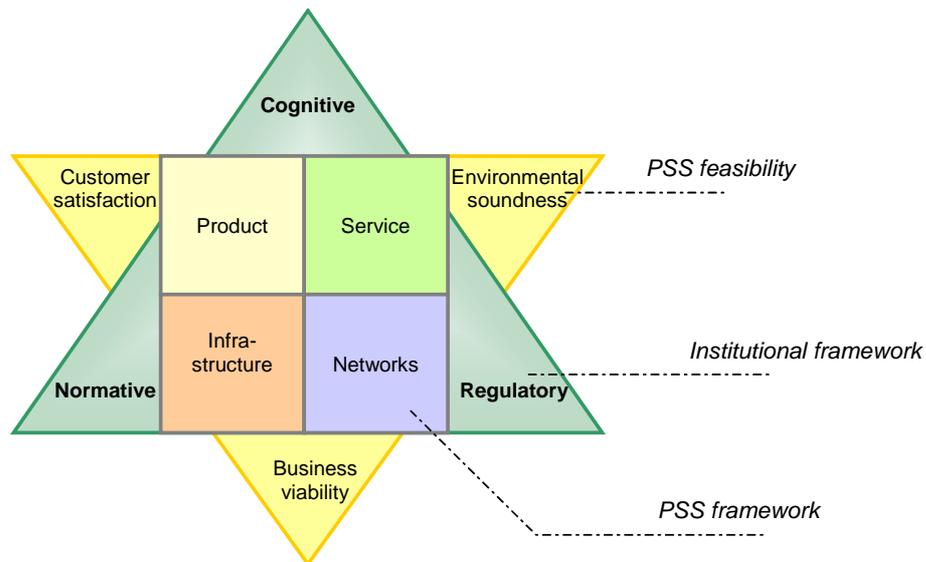


Figure 1 Framework for analysing product-service systems

*Institutional arrangements* for each example will be considered, including regulatory and normative levels. As individual cognitive processes are very group-oriented and dependent on the normative institutions they are not addressed in this analysis.

A *product-service system* by definition consists of products, services, networks of actors and supporting infrastructure that are designed to be competitive, accepted by customers and be more environmentally sound than traditional business models (Mont 2001). The PSS concept has been presented in other studies (Mont 2000) and therefore it is not outlined here.

#### 4.1 Car sharing

This section investigates how car sharing concept has been institutionalised in modern society. Two types of car sharing organisations are in focus: commercial organisations and communal cooperatives that provide similar function but through different organisational arrangements. The data this part is based on come from secondary literature sources mainly about European car sharing organisations, but also from interviews with Swedish car sharing cooperatives and business companies.

##### 4.1.1 Institutionalisation

Institutionalisation of car sharing is slowly taking place in some countries with the growing number of car sharing organisations and with the expansion of existing car sharing organisation.

##### Regulatory

Relatively recently car sharing has paved its way into the list of possible solutions to transportation-related problems. It became a part of the Dutch Policy Plan on the Environment and the Economy (Meijkamp 1999). The European Commission Directorate for Transport that envisioned an important role for car sharing in the Green Paper “Citizens’ Networks” (Glotz-Richter 2001). A number of European projects supporting car sharing development were funded by the European Commission (Harms and Truffer 1998). The Swedish National Road Administration promotes car sharing by supporting research in this area (Schillander 2003). In Germany, authorities support creation of parking places for CSO Stattauto (Petersen 1998), and in Finland, the Helsinki municipality has awarded a number of parking spaces for the company City Car Sharing (Heiskanen et al. 2001).

## **Normative**

It is more problematic to say that car sharing is becoming a norm in society. To help normalise car sharing as a transportation alternative some CSOs introduce new practices as part of existing ones, just as an extended service, not as totally new services. For example, StadtAuto in Bremen offers full mobility service by combining public transport and car sharing in a single Bremer Karte plus AutoCard (Glotz-Richter 2001). The card serves as a symbol that connects all alternatives for transportation in people's eyes. Another initiative taken by Stattauto is to extend car sharing membership with food delivery services. The reason for this is that some potential members of CSO cannot abandon their cars, because of weekly shopping in supermarkets that are often situated at the city outskirts (European Commission 1998). If this function would be fulfilled in another way, they would prefer to join CSO.

### *4.1.2 PSS framework*

#### **Product**

Usually the design of cars in CSOs is not affected, i.e. producers do not produce special cars for car sharing. Shared cars are not adapted to multiple-user use and are not designed to sustain intensive use and different patterns of driving. Each driver also needs a special setting on the chair, wheel, mirrors, etc. So each next user needs to adjust all these parts of the car, which leads to fast wear out. There are few examples when cars of special designs are used in car sharing. The reason for the use of this car in CSO is simply that these new designs are not affordable to people, or too innovative for people to easily accept them, e.g. electric cars. For example, Honda Motor Co. has designed an electric vehicle (EV) sharing system in Tokyo, Japan that uses four types of EVs suited for use by multiple drivers (Honda 1999), while Nissan developed a Hypermini EV and a sharing system for them in Yokohama. Beside the choice of vehicles, cars in car sharing organisations are usually more modern, and thus safer and more environmentally sound than private cars. They often run on bio-fuel or electricity, which is typically a more expensive option that is not affordable by individuals. For example, SunFleet has Volvo S70 Bi-fuel and Toyota Prius, while Wohnmobil in Hamburg, Germany uses only electric cars. According to Meijkamp, car sharing cars are approximately 22% lighter and 24% more fuel efficient than average car in the Netherlands (Meijkamp 2000).

#### **Service**

The very basic car sharing service provides access to one or more cars, a telephone booking system or a key box, and the monthly bill. This range of services is typical for a car sharing that is run on non-commercial basis, often by cooperative or by private individuals. The more elaborated system may include: 24-hour dispatcher, access to a wide variety of vehicles, car placement in diverse locations, providing access to food deliveries, travel agency services, bicycle rentals, and offering child-safety seats, bike racks and roof carriers. Many CSOs provide users with the opportunity to choose a vehicle optimally suited to the needs of the customers: a small car, a family car, a 7-seat van, a lorry or a convertible. A number of CSOs extend the range of services that fulfil mobility function. For example, ZVV Kombiabo in Zürich provides all the members with a chip card that allows using different forms of transportation, from car sharing, car hire, and public transport to taxis. Besides, not only the member may use the card, but also the accompanying person. Most of the existing commercial car sharing companies use ICT solutions in their services: car sharing cars can be booked and paid for on-line, information about long distance travel can be obtained from electronic bill-boards, some schemes can

trace the location of their cars, visually display kilometres under way and directly report kilometres, while others can book journeys on other forms for transport. Liftshare provides the option of registering the journeys and finding matches for journeys via Internet (Liftshare 2003).

### **Infrastructure**

Car sharing uses the infrastructure that is well established for public and private transportation. No major infrastructural changes are needed for car sharing organisations to operate. Roads, gasoline stations, maintenance stations, automobiles and associated services are used in the same way by CSOs as by private owners. A car sharing organisation can operate without major investments of capital into new technology, infrastructure, or organisational know-how (Attali and Wilhite 2001). The biggest problem that car sharing organisation may face is inadequate parking space in many cities. Many car sharing companies are working together with public authorities on allocating parking spaces specifically for car sharing cars. Besides simply being available to the car sharing members, car parks need to be allocated close to where customers need them (Glotz-Richter 2001).

### **Network**

In order to be economically sustainable, car sharing organisations need to seek cooperation with other organisations that provide services within and around mobility. So far, public transportation systems and car rental organisations have been closely cooperating with car sharing companies. Mobility CarSharing launched cooperation with RailLink and DaimlerChrysler and provides car sharing cars at 55 largest train stations in Switzerland. Some studies show that cooperation not only extends the range of services provided to car sharing members, but also stimulates the enrolment of new members (Muheim 1998). Cooperation with car rental organisations are of utmost importance as they are the way for car sharing organisations to alleviate weekend peaks in demand for cars. Network among car sharing organisations may provide a cutting edge advantage to the members in comparison to private car ownership. Thanks to the European CarSharing Network, members of CSOs that participate in it can use vehicles in over 80 cities throughout Europe.

#### *4.1.3 PSS feasibility*

##### **Customer acceptance**

Customer acceptance of car sharing have been studied in a number of comprehensive studies (Meijkamp 2000), (Schrader 1999). They identified the main factors that affect customer acceptance. These are: cost savings and lack of initial capital investment, availability of various car models and flexibility in car use, lack of maintenance responsibilities and provision of free parking places, all-included insurance and environmental sound image (Meijkamp 1999). The profile of car sharing members is slowly changing with the development of the CSO. For example, StattAuto reports changing market segment with time from young environmentally aware people to more ordinary people who see mostly personal benefits in the car sharing service (Janes and Bryant 1998). Some companies, such as Mobility, Switzerland sees the younger generations as a potentially attractive market for car sharing. The company took initiative to subsidise driving lessons for younger drivers in order to create loyalty to car sharing of these potential members (Jussiant 2002). It seems that members of car sharing organisations are usually satisfied with the services (Muheim 1998). A challenge is to attract the new members and in this respect, judging by the total number of car sharing

members in Europe, acceptance of car sharing schemes has had only a relative success.

### **Business viability**

Non-commercial cooperatives are usually small and operate in neighbourhoods. Some of these cooperatives are rather successful as they survived on the market for more than a decade. Majority of them fulfil the needs of their members and do not aim to grow in the future. It is possible that once a cooperative reaches a certain size, it becomes more rational to run it on commercial basis. The cooperatives may therefore be seen as potential commercial CSO's. All of the largest car sharing organisations operate on commercial basis, although many of them started as grassroots organisations, e.g. CambioCar and Mobility. However, later they opted for more business-oriented models and for expansion of their services. The fact that some car sharing schemes has survived for more than a decade indicates their business sustainability.

The idea of car sharing becomes appealing to other players than CSOs. For example, public transportation companies decided to extend their services and launch their own car sharing systems in e.g. Munich, Wuppertal, Dresden and Bologna. German railways have recently launched a combined system of car sharing and railway called DBCarsharing. There is also growing interest of car manufacturer in car sharing idea. Daimler Benz, Volkswagen, and Honda see car sharing having a significant growth potential. According to a market survey conducted by Volkswagen, car sharing will grow at a rate of 50% per year (Britton 1999). Having car manufacturers on board may provide better opportunities for environmental improvements of cars.

### **Environmental soundness**

The car sharing may contribute to the reduced environmental potential in a number of ways. Car sharing reduces the number of cars on the roads by 44% (Meijkamp 2000). A shared car substitutes between 5 and 10 privately owned cars (Jussiant 2002). According to some studies, members of car sharing organisations decrease distances driven by 30-60% (Markör AB 1999). This improvement comes from more selective use of the cars since they need to be reserved in advance and from transparency about the costs of driving versus cost of owning the car. The incentive structure is the opposite from car ownership, in which car ownership is expensive and driving is not. In the case of car sharing driving is expensive and car ownership is cheap, so the incentive is created for people to drive less. Some CSOs exclude any promotion involving free mileage. Less cars on the roads leads to less public space occupied by parking lots. Mobility CarSharing reports that up to 57% energy is saved and less strain is put on the infrastructure if people use the CarSharing system (Mont 2000).

## **4.2 Washing services**

This section presents the situation with communal washing centres in Sweden as this is the most common and old alternative to washing at home in Sweden. Communal washing centres have been operating for a long time, since 1920-ies, and therefore historical data are available, which will provide possibility to track evolution of these services at regulatory and normative levels. In other countries, majority of the laundry is washed in laundromats or by professional washing service companies (Rosén 1993), (Cronberg 1987). No community-based washing centres are usually available.

#### 4.2.1 Institutionalisation

##### **Regulatory**

The development of washing services is an example of a social development that was greatly affected by ideological and political influences. In the first half of the 19<sup>th</sup> century, a clear trend in household work was towards buying external services. From the middle of the century, the opposite trend could be seen – towards so-called self-service economy (Cronberg and Sangregorio 1978). The issue about washing has been first given attention during 1930-40-ies by the Swedish Housewives' Association and other women organisations (Hagberg 1986). Rosén (1993) discusses that this issue was both of political and socio-economic nature – whether to promote women as workforce or as housewives (Rosén 1993). Following the chosen course towards integrating women into the work market, the question of assisting the washing activities got regulatory support. Hagberg suggests that it was also an ethical issue – to help women with the most strenuous household activity of the first half of the 20<sup>th</sup> century (Hagberg 1986). In 1947, an official report “Collective washing” advocated collective way of doing laundry (SOU 1947:1 1947). A new official report from 1955 preferred self-service washing centres and external washing services to washing at home. At the beginning of 60-ies, the countryside households started using private washing machines and in cities communal washing centres were spreading, while commercial washing facilities became more and more marginalised (Henriksson 1999). Later, a number of Swedish authorities provided a number of recommendations on how these centres should be equipped, how they should be designed so that households would be satisfied and similar. Currently, energy authority and other organisations provide guidelines and advocate instalment of energy-efficient equipment in communal washing centres.

##### **Normative**

In the last three decades of the 20<sup>th</sup> century, majority of people wash themselves either with own washing machines or at the communal washing facilities situated close to households. Henriksson suggests that we wash more often and less amount of laundry per time, but the total amount of laundry is constantly increasing (Henriksson 1999). The degree of cleanliness and consequent washing temperatures and frequency of washing are affected by societal standards of cleanliness (Chappells et al. 2000). Each of us has own understanding about how clean we want our cloth to be. These standards however are not only set by individual preferences; they are shared and shaped by people. Media and role models affect these standards. For example, a visit of the Swedish Queen Sylvia to a communal washing centre in Rinkeby, Stockholm clearly increased prestige of this particular and all other communal washing centres (Carlsson 1999).

#### 4.2.2 PSS framework

##### **Product**

A clear trend in communal washing centres is towards using smaller models of washing machines, but more to suit the many fractions of household laundry. People tend to separate their laundry by colour, by type of cloth, etc. Depending on this, different temperatures, centrifuge regimes and rinsing programmes should be available. There are usually a certain variety of models in communal washing centres – for small amounts and small pieces of cloth and for big objects like carpets. The washing machines are semi-professional in a way that they have the same or only slightly higher capacity than washing machines for private use, but often have state of the art choice of functions and options.

They are usually more energy and water efficient than the washing machines for private use. These machines are built for easy management, fast washing cycles, and provide a variety of different programmes. The driers are also semi-professional with requirement for short dry cycles and easy use.

### **Service**

Whether the washing centre is situated in a staircase or in a separate from flats building, defines its opening hours. According to Swedish norms, each washing centre should serve 15 flats. As many flats install their own washing equipment, each commune decides how many machines should be installed to fulfil the need of households. It is usually calculated so that 25-30 flats could use one washing room (Rosén 1993). Various types of booking systems exist: by writing down time slots, using a special key system, telephone booking and Internet booking. Tenants can often use washing centre without additional costs, but sometimes a system is developed where people pay per every wash.

### **Infrastructure**

The washing schemes need to be situated close to the households, either inside the same house or outside, but in the close vicinity. The community-based washing centres are required to be situated within 50 meters distance to all flats. Communal washing centres therefore are integral part of the building plans, including construction of the facility, installation of electricity lines, water pipes and ventilation. Because washing machines comes with powerful centrifuges they often need to be installed on a special base. The design of the common communal facilities including washing centres should be also adjusted for handicapped and for old people.

### **Network**

It might be difficult for one company to establish a local system of provision. Therefore many companies look for potential partners or facilitate the establishment of such local partners. For example, Electrolux Professional appliances division assists initiators in starting a new launderette equipped with Electrolux modern equipment. Beside equipment, the company offers installation, training, suggests layout of equipment location, supports with environmental permits, market surveys, contracts for maintenance and repair, guarantees, and financial schemes. The financial assistance is made through Electrolux's internal bank that offers more attractive loans to entrepreneurs than a regular bank.

#### **4.2.3 PSS feasibility**

##### **Customer acceptance**

In the case of communal washing centres there are two main customers, which are housing company that installs and owns the washing centre and the final users – households that use the washing machines. Housing companies are usually satisfied with the service provided by producers or service companies, which install the machines, provide maintenance and replace the machines once they are old and need to be replaced. Caretakers of the housing communities usually check the cleanliness of washing centres, but entire service is bought as a part of the washing solution from the producer or a service company.

Households are satisfied with the distance to the washing centre (70%), with the availability of washing time (50%), with the quality of equipment (76%), and with the cleanliness of the centre (40%). Some concerns are raised that sometimes there might be a double booking of the washing time (SIFO 2000).

### **Business viability**

For housing community installation of the washing centre should of course be profitable. Therefore, communities usually install various types of machines not only to address customers' needs, but also to keep economic parameters satisfactory. For example, combination of 3,4 kg and 4,6 kg machines is made to keep quality, environmental parameters and economic efficiency in control. The 4,6 kg machine has a special construction that allows it to use less energy and water than 3,4 kg machine. The price of the smaller machine is almost half the price of the 4,6 kg machine and it is up to each community to find a balance between the quantity of these machines (Rosén 1993).

### **Environmental soundness**

Environmental impact of washing cloth depends to a large extent on both societal rules of cleanliness and on individual patters of machine use. In general the total amount of laundry has drastically increased since middle of 20<sup>th</sup> century. The demand on the cleanliness of cloth has also increased. For example, in Sweden the amount of laundry for one household per year increased from approximately 290 kg in 1930-ies to 700 kg in 1980-ies. The actual amount of different cloth can even be higher than indicated by kilograms because textiles are becoming lighter (Henriksson 1999). Increased amount of laundry gives some indication about potential consumption of energy, water and detergent and associated increasing environmental impact.

Quite a few studies show the positive environmental potential of washing in a washing centre compared to washing at home, if drying process is not taken into account. A life cycle assessment, which compared environmental impact of washing at home with washing in a launderette, shows that latter has a larger burden on the environment than washing at home (Vrhunc 2000). The result stems from the drying in a tumble drier in launderette versus home washing.

## **4.3 Collective use of power tools**

This section investigates whether and to what extent collective use of power tools is being institutionalised in our society, in what form, and what were the main factors for the current design of schemes for collective use. The analysis is based on the secondary literature, on the survey of 20 power tool rental companies, interviews with 10 care takers in communities, and on the survey of households regarding ownership, use and renting of power tools. Where possible, the focus is on the Swedish situation, with some additional insights, mainly from European legislation and from available additional cases.

### **4.3.1 Institutionalisation**

#### **Regulatory**

The WEEE directive that allocated the responsibility for end-of-life stage of energy-driven tools to producers may indirectly create the incentive to improve products quality and extend their lifetime (European Commission 2001). Increased quality of tools makes them less affordable for private customers and alternatives to the ownership-based use of tools might be developed. It has been shown that indirectly, the sharing and lending ideas may be triggered by the end-of-life regulations (Fishbein et al. 2000). The EU-financed European project "Eco-services for Sustainable Development in the European Community" addressed the joint system for power tools (Behrendt et al. 2003). Beside these initiatives the area is still rather untouched.

## **Normative**

Three types of the joint use of tools in modern society can be found. The first one is using rental services for seldom-used tools and machinery, especially by house owners. Another type is borrowing tools from a social network, which may include family members, friends, or neighbours. The third type is represented by community-based tool sharing/lending services. They are often developed as a grass-route initiative of neighbours or run as not-for-profit organisations. If a housing company establishes the system, caretakers can then manage the renting and/or sharing of tools, or even can do some jobs. In some neighbourhoods there are established special workshops for performing various tasks as building furniture, pottery workshops, etc. Often eco-villages and collective houses have systems for joint use of power tools. These initiatives unfortunately embrace only a tiny part of modern society.

### *4.3.2 PSS framework*

#### **Product**

In rental places majority of tools are semi-professional or professional, while in community-based schemes more tools are still non-professional. Professional tools are usually of better quality, with better ergonomic features, more silent, durable and robust, and with better amortisation. Rental places usually provide greater variety of tools than community-based schemes, and tools are usually well maintained (e.g. cleaned, oiled, charged). Many not-for-profit tool-sharing schemes cannot afford to buy professional equipment.

#### **Service**

Rental companies often both rent and sell tools and machinery. Usually contracts include a diversity of services, such as insurance, education, various assistance in operating the machinery, etc. Customers can book the equipment, which helps the companies to predict the level of demand for a specific product. Tool-Matic has also developed a video with use instructions for a number of popular tools and machines. Many companies provide information on-line about the range of their products and the prices for rent. In case a tool is broken, the companies need to repair them. Some companies have their own workshops, where the equipment is fixed. Depending on the extent of damage, the equipment can also be sent back to the retailer or the producer of the equipment.

Community-based tool sharing/lending schemes are usually small service organisations with few people working part-time or as volunteers responsible for the maintenance and provision of the service. Tenants may pay a membership fee or for each renting occasion. The level of service in some of the studied tool sharing/lending schemes is quite low. In some cases, such schemes started with collective decision about what tools were needed and collection of money to start up the pool. Later, once the tools become disappear, the schemes ceased to exist. In other cases the discontinuance of the scheme was caused by the moving away of the initiator of the scheme.

#### **Infrastructure**

Any business requires facilities, transport and other elements of infrastructure such as electricity, water pipes and waste collection systems. However, for tool sharing schemes no specific or new infrastructure is required. The companies often build own premises or buy/rent existing ones. Community-based schemes often utilise available in the community space, such as various auxiliary premises, cellar spaces or facilities for common use. The community in this case often needs to re-equip them for the required purposes.

## **Network**

Network of partners of rental companies is usually rather limited and comprises retailers, with whom rental companies create partnerships for take back systems. The community-based tool sharing schemes often establish relations with retailers or rental companies. Caretakers often also become part of the system. In order to dispose off old and discarded tools, communal take back system is usually used.

### **4.3.3 PSS feasibility**

#### **Customer acceptance**

In many rental companies, private people represent only 5 to 10% of all the customers. Out of 20 interviewed rental companies, only Tool-Matic has developed a feedback form, which is given out to customers together with the price list. Many of community-based tool sharing/lending schemes are really small with up to 50 or 100 potential customers, out of which maybe a small percent is using the service. In these cases, the service providers usually know everyone who is using the system. According to our household survey, (Mont 2002), households show that they would like to have access to tool rental system (30%), workroom (20%) where simple repair and construction jobs could be done, and have a possibility to get help with small renovations and repair jobs (23%). Majority of people considered that drill should be owned, while many other tools could be borrowed or rented. People rent only for special occasions (24.5%), because they seldom need tools (20.5%), because tools are expensive (19%), and because they do not have storage place at home (10%). Fifteen percent of respondents showed that it is very important for them (10 out of 10) to have big choice of tools, 23.5% indicated that it is very important to be able to rent at times that suit them, 32% said it is very important that tools are well maintained, 23.1% pointed out that it is very important to have access to professional tools. For 28.7% it is very important that the rental service is reasonably priced, and 23.6% showed that assistance of personnel is very important.

#### **Business viability**

Long tradition of rental companies proves their business viability. The trend of manufacturing companies to shift towards selling more service-based solutions and functions can be also traced in rental companies. For example, CRAMO markets itself as a company that shifted from renting tools and machinery to a company that delivers complete functional and outsourcing solutions. To be financially viable, companies sign contracts with customers, which specify prices and conditions of rent. Many companies use differentiated prices for the first and the following days of rent. The price for renting services depends on the purchasing price of the tool or machinery, on the price of accessories, fuel and on how often the tool is used. Most often, the price per day is used and may comprise additional fee for servicing and maintaining the equipment, deposition fee, and a cleaning fee in case the not cleaned machine or equipment is returned. In cases when the equipment is broken, if it is normal wear and tear then the customer does not have to pay. If the breakage is due to customer fault and is not a normal wearing out then customer has to cover the cost of repair or replacement.

In not-for-profit tool-sharing schemes, simple contracts, and often even oral agreements exist, which usually comprise description of conditions, such as cleaning of the tool, and payment. Usual fees are per hour and per day. Unknown users have to pay deposit fee.

#### **Environmental soundness**

Both rental services and sharing schemes have a potential to reduce environmental impact

by reducing the number of manufactured tools for fulfilling the needs of users. The tools are used more intensively and they are usually of higher quality, more robust and durable. Some studies show that sharing schemes can reach factor 10 improvement in material intensity per drilled hole (BMBF 1999), while others demonstrate almost no improvement from renting tools as the aforementioned effect is annulled by the environmental impact from transportation of users to rent and leave the tools after use (Behrendt et al. 2003). These studies therefore suggest that community-based tool-sharing systems have better environmental potential than rental companies, which are often situated at the city outskirts.

The following table summarises the examples discussed in the previous sections.

Table 1 Overview of the evaluation of the Swedish and European examples

Fields of action	Regulatory framework exists	Normative acceptance	Products designed	Services designed	Infrastructure	Network is established	Environmentally sound	Consumer accepted	Business viable
Car sharing	Some support	Niche	Chosen	Yes	Small changes	Often	Mostly	Somewhat	Yes
Washing services	Yes	Quite spread	Yes	Yes	Done	Always	Mostly	Mostly	Yes
Collective use of power tools	No	Niche	Chosen & no	To some extent	Small changes	Rarely	When shared	Rarely	Rental

## 5 Critical factors for institutionalisation of business-to-consumer PSS

In this section critical factors for institutionalisation of PSS in business-to-consumer domain are discussed.

### Regulatory

Existence of regulatory or legislative frameworks that directly or indirectly stimulate the development of sharing or rental systems is important for institutionalisation of more sustainable practices in our society. These frameworks may legitimise and even give the priority to these areas by stimulating research and investment into their establishment, leading to further dissemination and embodiment into society and everyday life. Several studies that analysed examples of sustainable consumption practices concluded that soft policies, such as awareness campaigns, are crucial for success (Mont and Lindhqvist 2003). Informative policy instruments and certification schemes, such as eco-labelling, may also help legitimise these alternative consumption schemes, as e.g. Blue Angel's label for car sharing organisations. In Sweden development of guidelines for establishment of community-based washing centres triggered their integration into community planning. Lack of regulatory involvement in the case of tool sharing schemes may partially explain their rather shady existence. There also exist regulatory and economic frameworks that prevent customers from sharing products, a good example of it being Napster problem. So there might be a potential conflict between existing frameworks and the ones we are trying to propagate, which may lead to provision of contradictory signals to the public.

### Normative

The normative institutions for alternative systems of consumption are not yet well established. Ownership-based consumption is difficult to move away from, as the entire economic system is based on the notion of possession of material goods. For many people

renting and especially sharing are associated with low-income part of population, low quality service, personal sacrifice in freedom and excessive costs of organising private life. It is therefore important to investigate the nature of normative and cognitive processes that form people's perception about renting and sharing modes.

### **Product features**

Whether the PSS is accepted in society or not depends to some degree on the type of product, use pattern, its price and life cycle cost, environmental potential of PSS and how well the PSS is actually developed and managed. Example of car sharing organisations confirms that it is possible to share even emotional products with which people get very involved. A number of studies further indicate that it should be easier to develop sharing and renting systems for products that are comparatively expensive, are not used often, require considerable storage space, and have high insurance and maintenance cost (Mont 2000), (Behrendt et al. 2003).

### **Service design and delivery**

Judging by experiences of car sharing organisations, professionalism in service design and delivery is the utmost factor that affects whether the system will be successful or not. Professional attitude to managing the system should be practiced, both when it comes to management routines, customer relations, or marketing. Even in car sharing cooperatives, community-based washing centres or tool-sharing systems, high service quality, efficient reservation system, financial management and upgrading, to name just a few, play decisive role. In the end it is a balance between the level of service quality and the price that wins the customer.

### **Infrastructure**

Existence of infrastructure facilitates dissemination of PSS. However, it in itself does not lead to the success: compare car sharing systems and tool-sharing system, both of which require small investments in infrastructure in form of designated parking spaces and special rooms for hosting tools sharing services. In case of car sharing, we see that these investments are being made, while in the second case no investments were made by communities. In the case of washing, absence of installed washing machines in each household and close proximity of a neat and functional washing centre may tip customer preferences towards using communal facilities, while installation of washing machines to each flat may totally divert households from using more efficient and better equipped washing centre.

### **Networks**

Analysing all three cases, it becomes clear that in order to provide high quality service and be economically viable, service providers must seek cooperation with other stakeholders so that together build a system. In the case of car sharing, it is often public transport and car rental organisations; in the case of washing centres there are usually coalitions between producers, service providers and housing companies; and in the case of tool-sharing services it is a partnership between housing company, entrepreneur, community or even retailer, depending on how the system is organised. We saw in several cases that lack of collaboration may lead to excessive investments into products, underinvestment in repair services and upgrading, and unsound final disposal. All three systems may benefit from establishing collaborative relationships with organisations responsible for public and community planning, building companies and developers of housing areas. Future development plans define whether these systems will be part of our society in the future

and whether they will be harmoniously integrated into the urban landscape at the design phase.

### **Business viability**

Fierce competition in markets of many products leads to shrinking margins. Trends towards customised solutions drive producers to finding new ways to generate profits beyond lowering production costs. Selling performance instead of goods can be seen as a possibility to generate money without increasing production capacities. Performance can be sold through systems of shared use. For producers systems of shared use might be interesting, because they can design more robust products and basically sell function of products, providing repair and maintenance services in order to prolong product lives in order to generate as many units of function as possible. Contrary to this argument, we see that often it is not the producers of cars or washing machines that initiate these systems, but rather service organisations. Producers often feel threatened by lower production volumes that sharing and renting may lead to. Some proactive manufacturers of durable customer goods such as Volkswagen, Electrolux and Husqvarna are starting to move into exploring the potential of these alternative consumption systems.

### **Customer satisfaction**

Customer satisfaction is a very delicate task. Household surveys provide a starting point to a broad range of features that sharing systems must have to provide the desired service. Product quality also affects customer satisfaction. Furthermore, provision of information about available alternatives and their benefits directly affects current and potential customers. If not immediate acceptance, at least interest and desire to try out a new option may be the outcome. Addressing young generation is crucial in the process of shaping consumption behaviour. Providers of alternative solutions are in the best position to nurture their future customers.

### **Environmental soundness**

Environmental potential of the three systems analysed in this research is utilised to a different extent. Car sharing systems show the potential to reduce the number of cars on the roads and mileage driven by factor 2 (Meijkamp 2000), (Sperling et al. 2000). Washing services may considerably reduce energy (more than 50%) and detergent use (Hertwich and Katzmayer 2003), but the results maybe negated by the use of tumble driers (Vrhunc 2000). The environmental impact of tool sharing can be reduced if some tools are shared and rented and not bought. Studies of power tools rentals indicate possible rebound effects due to people travelling to rental places. It could be concluded that the environmental improvement that is possible to achieve by shifting to sharing and renting to a very large degree depend on how the systems are developed, how far from the final user they are situated, what kind of technology is used there, and what kind of consumer behaviour they promote. Positive examples demonstrate that it is certainly feasible to develop these systems with smaller environmental impact.

## 6 Conclusions

One strategy to dealing with unsustainable patterns of consumption is by developing and disseminating PSS in business-to-consumer domain. This study identified critical factors that affect the level of embodiment of alternative consumption patterns in three areas of household consumption: car sharing, washing services and collective use of power tools. It was shown that regulatory framework and guidelines from authorities play an important role in stimulating investments into new systems and in this way shaping supply of more sustainable alternatives. Car sharing example demonstrates that even if alternative models exist on the market, their wider dissemination and legitimisation in society depends to a large degree on recognition from governments and authorities. They have the power to incorporate alternative ways of satisfying consumers into strategic plans and stimulate public debate on sustainable patterns of consumption.

The examples also indicate the very important role of normative settings in the society. It has been shown that norms of materialism and ownership are much deeper than emerging environment-related values. Alternative visions of more sustainable lifestyles must be created with attractive symbolism. The role of image-makers, marketing specialists and strategists is extremely important if we are to promote more reflective ways of living. The informative element of the extended producer responsibility becomes more and more important not only as a tool to stimulate supply chain information exchange, but also as an instrument to ensure the type of aspirations producers' marketing campaigns promote. Further we show that the way the system is designed affects the success of the system. The model developed in this study for evaluation of institutionalisation and embodiment of PSS proved to be useful and can be recommended for further efforts on developing product-service systems in consumer markets.

The main lesson from this study is that system changes require changes in many different elements of the system by various actors that can potentially be involved in system development and management. Over-investment into one element and lack of efforts in the other may adversely affect system acceptance and embodiment into everyday life. Visions of more sustainable lifestyles must be followed by investments into regulatory frameworks and structural changes, that would trigger companies to supply more sustainable consumption alternatives, and make it sensible and normal for consumers to change everyday routines and consumption patterns. The opportunities for solutions should therefore be carefully investigated as the consumption patterns and levels are embedded into the current spider web of economic, social and cultural norms and institutions.

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## **Integrated Product Policy and sustainable consumption: At the cross-road of environmental and consumer policies**

*International Workshop: Driving forces and barriers to sustainable consumption.*

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### **Abstract**

In the last decade the concepts of sustainable production and consumption have gained importance. Since early 1990's we are witnessing a significant progress in the eco-efficiency movement, which aims at improving the environmental profile of production processes and products. On the other hand, the sustainable consumption concept does not seem to have been translated into practical strategies and instruments to the same extent as sustainable production. New strategies in the area of environmental policy - e.g. Integrated Product Policy - pay more attention to the consumption side, but these efforts are still rather meagre. Furthermore, we observe little integration of environmental issues into consumption strategies and instruments. It is therefore important to investigate the situation with, and reasons for, such a lack of integration. This paper addresses the aforementioned problem by providing an overview of instruments and tools that are employed in the consumption domain with the goal of reducing environmental impact. The authors further investigate strategies, instruments and tools used by consumer-related organisations and environmental institutions to address consumption-related environmental problems. It is discussed whether these instruments yield expected outcomes and how the aims of sustainable consumption can be better addressed by bringing together efforts of consumer and environmental organisations. The paper analyses the causes of insufficient integration and highlights current trends that may potentially support future integrative efforts. Finally, the paper looks at the potential for IPP to become a strategy for addressing sustainable production and consumption issues.

## 1 Introduction

One of the main commitments made by world leaders at the Johannesburg Summit was to develop a 10-year framework of programmes for sustainable consumption and production. In order to fulfil that goal many nations will review their policies for sustainable consumption and production, as will the EU. We currently have a multitude of policies and instruments launched at national and international levels, and there is widespread confusion on how these strategies are connected. Hopefully, ongoing and future inventories of policies will clarify the situation.

There is a wide consensus that the move towards new systems for sustainable consumption and production requires an integrated approach to policymaking. There is an obvious danger that sustainable consumption policies and tools will be diluted and negated in the integrated approach. For instance the Cardiff Process, initiated by the EU with the aim to integrate environmental concerns in other policy areas, runs the risk of not devoting necessary attention to issues of final consumption. In this study we aim to illustrate that sustainable consumption policies are poorly developed when compared to production-oriented policies, and that current policy initiatives are not likely to stimulate any significant changes. However, the primary goal is not only to demonstrate the need to pay specific attention to consumption-related policies and tools, but also to show that a lot of improvement possibilities exist within the sustainable consumption domain. We discuss two options to strengthen sustainable consumption policies: an improved integration of environmental and consumption/consumer-related policies and tools, and further development of the Integrated Product Policy (IPP). The aim of the paper is thus to review existing policies for sustainable production and consumption, to discuss the potential for further integration of environment and consumer policy, and finally to assess the potential for the Integrated Product Policy to become an important contribution to sustainable production and consumption.

Integrated Product Policy is a new area, which adds a product dimension to environmental policy. Both the EU and many European states have an IPP strategy. IPP is very much under development, and the European Parliament will soon deliver its comments on the Commission's proposed IPP strategy for the EU. The IPP is very interesting in the sustainable consumption context. The focus on products puts it high on the agenda for both consumer and environmental agencies. IPP sets out to provide a holistic strategy to address products through integration of a number of instruments and tools for sustainable production and consumption. It also envisions a number of consumer-oriented measures. IPP clearly has the potential to become one of the main strategies for sustainable production and consumption. However, its current scope and direction limits its potential in this respect.

The paper focuses on EU<sup>1</sup> policies and instruments and analyses their contribution to sustainable consumption debate. When relevant, examples of national policies are given, mainly from Sweden. The paper looks primarily at the environmental dimension of sustainable development, and there is no discussion on e.g. distributional issues or the social aspects of consumption.

Section two deals with the concept of sustainable consumption. Section three outlines various strategies employed for reaching more sustainable consumption and production patterns. Section four discusses current state and the potential for further integration of

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<sup>1</sup> The term European Union (EU) will be used throughout this paper, since the differences between EU and the European Community will not have any practical implications for the analysis.

consumer and environmental policies. The fifth section evaluates the potential contribution of IPP to sustainable consumption debate, and outlines changes that may be required if this goal is to be realised. The paper ends with conclusions.

## **2 Sustainable consumption problematic**

‘Sustainable consumption’ is often used as an umbrella term that brings together key issues relating to human needs, quality of life, resource efficiency, waste minimisation, equity issues, life cycle thinking, consumer safety and sovereignty and so on. The various aims that can be identified are not easily compatible, which points to the complexity of the subject. The aim of this paper is not to investigate the meanings of sustainable consumption but rather to discuss what impact this concept has had on the policy agenda. This section outlines consumption problematic and identifies broad sets of approaches available for addressing consumption-related problems.

The industrial revolution has led to significant productivity increases through economies of scale and has solved the under-supply problem in developed countries. Increased production volumes resulted in overproduction of goods, which spurred strategies to increase consumption. All these developments took place in the name of economic growth and the commonly accepted belief that economic growth, beyond eliminating poverty, will ultimately increase well-being and happiness. There are several misjudgements in the historical course of actions presented above. First of all, it is commonly accepted that economic growth does not always lead to increased happiness. Secondly, economic growth can potentially be reached without an increase of material and energy consumption. Thirdly, the industrial revolution and economic growth generated side effects that put under threat the very goal of economic development – well-being. Unequal distribution of growth and rising levels of pollution and waste question our future and affect our current well-being. Once these problems were recognised, numerous approaches were developed to address them. However, the absolute majority of strategies were developed to increase the efficiency of existing production processes, and later products. Very few strategies actually addressed consumption issues. It has been hoped that technical solutions will allow us to solve environmental problems. Due to constantly increasing population levels and the affluence level in many countries, eco-efficiency improvements, although very important and quite successful for tackling specific problems, has failed to reduce impacts of aggregate consumption.

Sustainable consumption was proposed as a broad strategy to dealing with consumption-related environmental problems. The success of this strategy has been rather modest. Several reasons can be named. First of all there is still no consensus on the definition of sustainable consumption. Some treat consumption as part of production; others equate it to the ‘greening’ of markets. Secondly, the scope of sustainable consumption is defined differently. Thirdly, the lack of progress in the sustainable consumption domain can be ascribed to interests of different stakeholders that lobby against addressing certain issues – especially ‘consumption levels’. More consensual agreement exist in the discussion about the necessity to address ‘consumption patterns’ – consuming differently, which is in fact just greening the markets. Fourthly, sustainable consumption in its broadest sense may call for renegotiation of the major societal conventions and institutions, which is not the easiest thing to do. And the last point refers to the need for each and every one of us to take action in order for sustainable consumption to succeed. It means that sustainable consumption urges to change individual behaviour and routines, not only in terms of buying more environmentally sound products and services, but also by applying sufficiency principles.

Since eco-efficiency strategies and market-based instruments still praised by many actors

fail to address the problem of aggregate consumption and market distortions, such as environmental externalities, there is a clear role for governmental intervention. Two main sets of approaches that address consumption and consumers are consumption policies and consumer policies. Although no clear definition exists, differences between the two become clear when one looks at organisations that use these terms and the scope of issues the two policies have. The term “consumer policies” is often used by organisations promoting consumer interests. It mainly focuses on individuals and households, on improving health and safety features of products, on provision of information to consumers and on consumer protection. Consumption policies usually constitute a comprehensive set of approaches that aim at different actors in society. Consumption does not only relate to private consumers. Producers and distributors also transform materials and energy. Related to these actors is also the division of consumption into consumption of resources (appropriation of resources from nature) and final consumption (OECD 1997). Final consumption is performed at two distinct levels of customers: private (households and individuals) and institutional (businesses, organisations).

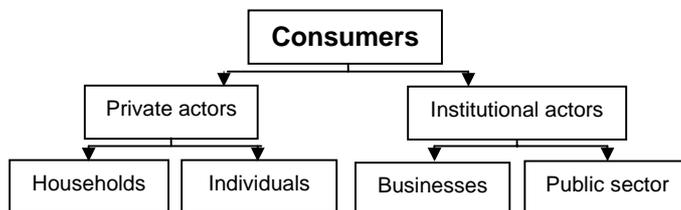


Figure 1 Consumer classification (Mont 2001b)

To address consumption related issues, different policies and instruments might be needed when dealing with institutional and private consumers.<sup>2</sup> Traditionally, governments have three sets of policy instruments at their disposal: administrative instruments that include bans, laws and policies that enforce specific requirements, but also market-based instruments and standards; economic instruments that provide economic incentive for changing consumption patterns and levels; and informative instruments that aim at increasing overall consumer awareness with regard to consumption choices by education, media channels and labelling. Conventional areas where policies are being developed in relation to consumption are requirements for information provision, taxing environmentally harmful activities and products and banning extremely dangerous substances. However, the current range of policy instruments for dealing with consumption issues is clearly insufficient. To support that statement, the next section will provide an overview of existing policy instruments to promote sustainable consumption and production practices. We illustrate that there is incontestable preponderance of production-related instruments over consumption-related strategies and policy tools. Further, we make the point that existing instruments and tools to promote sustainable consumption are not likely to trigger substantial changes.

### 3 Review of strategies to address sustainable consumption and production

In this section we will first briefly discuss some main trends in environmental policymaking that are relevant in the context of this paper. We then make a broad review of current policies and instruments for sustainable production and consumption. In the end we reflect on the nature of strategies for sustainable consumption.

<sup>2</sup> There are a number of studies that analyses the possible policy choices for sustainable consumption, see e.g. Jackson, T. and L. Michaelis (2003). Policies for Sustainable Consumption, Centre for Environmental Strategy, University of Surrey with Environmental Change Institute, Oxford University: 76.

### 3.1 Trends in environmental policymaking

There are a number of trends that can be discerned in environmental policymaking. One strong trend in environmental policy has been the increasing focus on *prevention*. The original focus on the end-of-pipe solutions has turned into a focus on preventive approaches, most notably the focus on Cleaner Production. The preventive theme can also be recognized in the new ways that governments are working. Instead of reacting to environmental problems, scenarios and targets for a sustainable future are set, and used as the basis for policymaking.<sup>3</sup>

Another discernable trend is the change of focus in policymaking: It may perhaps be described as a change of focus *from production processes to products, services and individual well-being*. Originally, the focus in environmental policy was on the production process and subsequent emission levels, which triggered the development of various legal instruments: Licenses, Best Available Techniques (BAT), emission limit values, environmental quality norms, waste regulations etc. These instruments still constitute the backbone of environmental policy, and their results have been significant.<sup>4</sup> Subsequent introduction of economic instruments have also aided this process.

In later years, *products* have come into the centre of attention in environmental policy. In the beginning, this was partly because the products contained dangerous chemicals that caused problems in various phases of the life cycle, and due to the increasing amounts of waste in society. Later however, the product focus has become more strategic: *Products are seen as control points for the externalities occurring in product chains in all life cycle phases, and as the interface between producers and consumers*. In this way, product policy (ideally) covers all life cycle phases in the entire product chain (including production processes). This thinking has evolved into a strategy that highlights importance of function or service of the product, rather than the product per se (functional sales). It is further elaborated into the concept of product-service systems (PSS) that suggests that in order to reduce life cycle environmental impact, systems of products and services need to be designed to satisfy customer needs, not just products (Mont 2000; Mont 2001a). PSS calls for system-wide changes, because sustainability requires new systems of production and consumption; incremental innovations are simply not enough. Many policy approaches have been criticised as promoting incremental changes, instead of taking a *systems perspective*.

To initiate system level changes, customer focus and customer-tailored policies are needed. Sustainable consumption strategies and the increased focus on service fulfilment and individual well-being, can be seen as the ultimate preventive strategy; *if it is said that "war begins in the minds of men", the same goes for environmental problems to the extent that consumption and use of resources are the outcomes of wants and preferences of individuals*. In this sense, the ultimate form of prevention is to focus on individual well-being and to design societal systems that may satisfy this well-being with the lowest possible environmental impact<sup>5</sup>. Obviously, this is easier said than done in practice. However, so far this is the only prospective way to solving system-wide problems.

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<sup>3</sup> A number of governments have made attempts to have more future-oriented and integrated strategies for sustainable development. Examples include the Dutch National Environmental Policy Plans and the 'Generation goal' in Sweden.

<sup>4</sup> For instance, the Swedish emission levels dropped with approximately 90 % between the end of the 60s and the end of the 90s, despite increased production levels.

<sup>5</sup> For a more thorough discussion on terms such as function, service, and functional end-needs, see e.g. OECD (2002). Policies to Promote Sustainable Consumption: an Overview. Paris: 36..

Although sustainable consumption has come into the centre of political attention in latter years,<sup>6</sup> the application area is still rather incremental, promoting “*greener*” consumption rather than addressing the problem of aggregate levels of consumption. Consequently, discussions on *rebound effects*<sup>7</sup> and limitations to consumption are not voiced.

### 3.2 Taxonomy of approaches

There are a large number of principles, strategies, policies and tools that have been developed to address problems related to current production and consumption levels and patterns. In order to provide an overview of these numerous instruments, it is useful to follow a structured approach. As we were unable to find a clear-cut classification, we have developed our own taxonomy<sup>8</sup> as a basis for our overview. We classify policy approaches into four levels: overarching principles; general policies, strategies and concepts; policy instruments; and tools. A distinction is made between instruments and tools. Instruments have a steering function and provide incentives, while tools can be used to achieve a specific purpose. Thus, a policy instrument implies some degree of governmental or political intervention, while tools involve practical means of support, promotion, etc., including e.g. manuals, CD-ROMs, books, and software.<sup>9</sup> Policy instruments are further divided into three categories: administrative, economic and informative, and each of these categories in its turn is split into mandatory and voluntary.

Some policies and measures can be classified as affecting mainly the production or consumption sides, while others will affect both production and consumption. In the following sections we will go through relevant EU initiatives and discuss how they relate to sustainable consumption.

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<sup>6</sup> See e.g. OECD (1997). Sustainable Consumption and Production. Clarifying the Concepts. OECD Proceedings. Paris, OECD. and UNEP (2002). UNEP contribution to framework on promoting sustainable consumption and production patterns. Industry Association’s Meeting, Paris.

<sup>7</sup> There are different definitions of the rebound effect. The term usually refers to the fact that even if we consume less materials or energy per service (or function) provided this will not lead to decreased consumption as efficiency gains are overcompensated by growth effects (as we become more efficient, products and services cost less, and we therefore consume more of them). For a more thorough discussion on the rebound effect see for instance Binswanger, M. (2001). "Technological progress and sustainable development: what about the rebound effect?" *Ecological Economics* 36 (1): 119–132..

<sup>8</sup> We would argue that there is as yet no complete model for classification of policy initiatives, despite the efforts made by some writers. A ‘complete’ model will probably never be developed due to the complexity of the subject.

<sup>9</sup> One example on the difference: Extended producer responsibility rules and eco-labels are instruments that can be used to provide incentives for eco-design, while LCA standards and eco-design manuals are tools that provide support for eco-design activities.

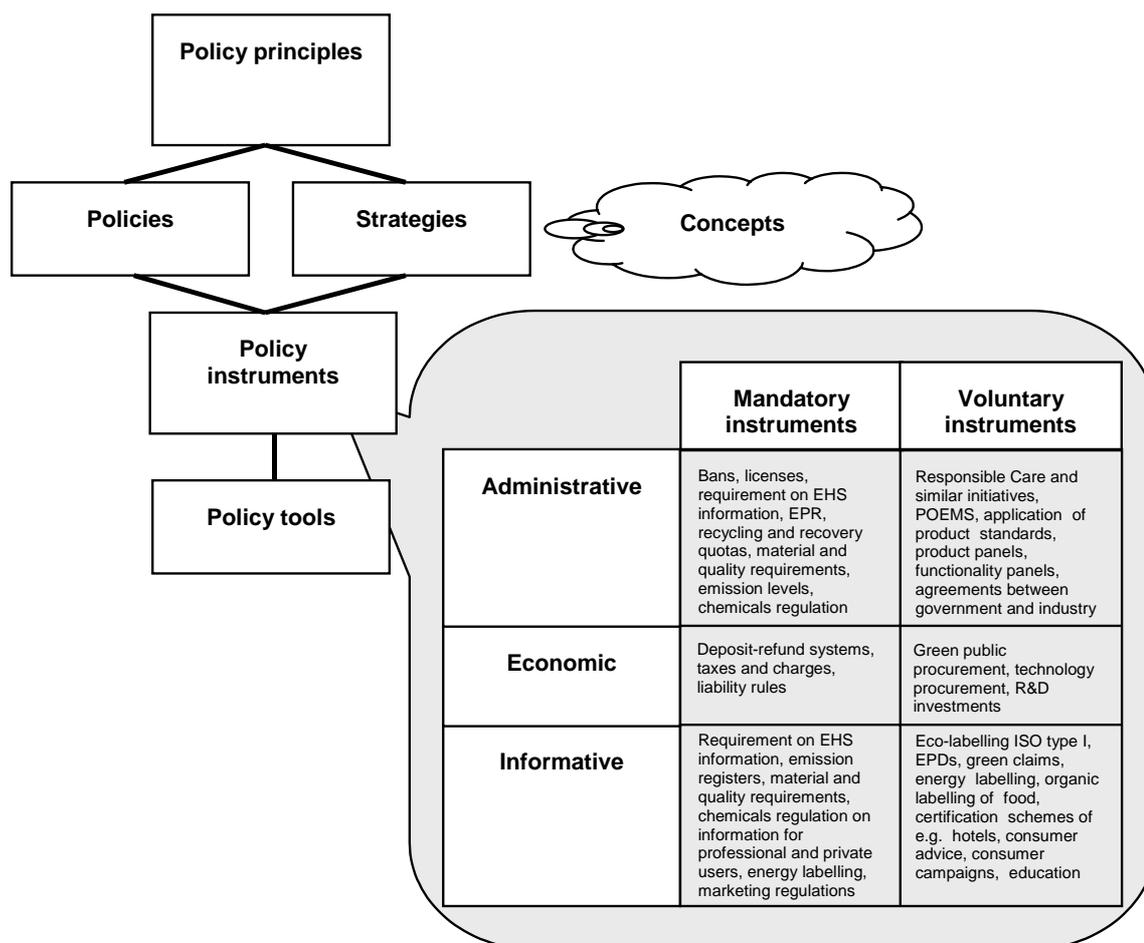


Figure 2 Categorisation of policy principles, strategies, instruments, and tools, based on (Mont and Lindhqvist 2003) and (Dalhammar 2002)

We do not intend to make a total overview of all relevant policies, but rather to provide a snapshot picture of relevant initiatives.

### 3.3 Principles

There are a number of principles for environmental protection acknowledged in national and international law. Some of the most well known examples include the precautionary principle, the prevention principle, the source principle and the principle that best available techniques shall be used.<sup>10</sup> In the context of this paper, some principles are of specific interest, as they are more directly linked to the consumption side:

- The *Polluter Pays Principle* can be considered as a powerful instrument to correct market failures by ensuring that the true environmental cost during the life cycle of products is integrated into the product price. By accomplishing this, it would be possible to make more environmentally apt products and services economically attractive to customers as well as to provide economic incentive to consumers to try alternative ways of satisfying their needs through functional arrangements, such as leasing, renting, sharing, pooling, etc.
- The *Extended Producer Responsibility Principle* can be defined as “a policy principle to promote total life cycle environmental improvements of product systems by

<sup>10</sup> There are a vast number of books and articles that discuss the different principles for sustainable development. For a review of instruments used in European environmental law see e.g. Jans, J. (2000). European Environmental law. Groningen, Europa Law Publishing.

extending the responsibilities of the manufacturer of the product to various parts of the entire life cycle of the product, and especially to the take-back, recycling and final disposal of the product” (Lindhqvist 2000). Types of responsibility that producers may bear can be categorised as liability, economic responsibility, physical responsibility, and informative responsibility. This shift of responsibility makes manufacturers of products aware of the issues related to end-of-life management of their products, including the costs involved. Namely, it provides manufacturers with incentives to incorporate the consideration of end-of-life management of their products into product design. The feedback loop between the downstream (waste management) and the upstream (design of products) is instrumental in improving the design of the product and product systems, so that the environmental impact of the entire lifecycle of a product is reduced (Mont 2001b).

- *The integration principle* states that environmental protection should be integrated into other policy areas, e.g. transport, energy, consumer, agriculture and trade policies. If progressively applied the principle has a high potential to promote sustainable production and consumption in all policy areas.
- *The Product Choice Principle* – sometimes referred to as *the Substitution Principle* – states a general obligation to avoid using or selling chemical products and GMOs that may pose a risk to human health or the environment, if they can be replaced by products that are likely to be less dangerous.<sup>11</sup> This includes all phases: manufacturing, upgrading, treatment, packaging, storage, transportation, use, final disposal, destruction, conversion, selling and transfer of chemicals/products. The principle is stated in law and enforced in some countries and is gaining increased recognition also on the international level.<sup>12</sup> In Sweden, anyone (including private citizens) who is handling or selling chemicals/products is obligated to apply the principle. Some actors have a special responsibility to apply the principle, e.g. manufacturers, sellers, importers and professional users. The Swedish authorities have been enforcing the principle through the use of bans, prohibitions, injunctions, environmental permits, education and information campaigns, and the development of special documents listing chemicals that should be substituted whenever possible. It has been more difficult to enforce the principle legally vis-à-vis private consumers, although they have a duty to apply it. Information campaigns towards consumers have however been launched by a number of municipalities and appear to have stimulated some changes in consumer behaviour.

### 3.4 Policies and strategies

We have identified a vast amount of policies and strategies for sustainable production and consumption. The table below lists the main EU initiatives.

Table 1 EU strategies and policies for sustainable production and consumption

General	Policy	Specific environmental policy areas
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<sup>11</sup> In some jurisdictions, goods that contain or have been treated with chemical products are within the scope of the principle.

<sup>12</sup> For instance, there is a lot of discussion on the use of the principle in the new chemicals policy in the EU (REACH). For an overview of how the principle has developed and been applied in Sweden, see Nilsson, A. (1997). Att byta ut skadliga kemikalier. Substitutionsprincipen – en miljörettslig analys. Göteborg, Nerenius & Santerus förlag, and Mont, O. (2001c). "The Swedish Product Choice Principle." *European Environmental Law Review* 10 (12): 351-363..

<p><b>Framework</b></p> <p>Lisbon Strategy of Economic and Social Renewal (2000)</p> <p>Sustainable Development Strategy (2001)</p> <p>European Commission's Social Policy Agenda for 2000-2005</p> <p>6<sup>th</sup> Community Environmental Action Programme (6EAP)</p> <p>The "Cardiff Process" (1998): Integrating environment in other sectors</p> <p>The Community guidelines on State aid for environmental protection (2001)</p> <p>6<sup>th</sup> EU Framework Programme for Research and Technological Development (2002-2006)</p>	<p>Thematic Strategy on the Sustainable Use of Natural Resources (planned for 2004)</p> <p>Thematic Strategy on Waste (planned for 2004)</p> <p>Integrated Product Policy</p> <p>EU Environment Technology Action Plan (ETAP)</p> <p>Commission Communication on Corporate Social Responsibility (2002)</p> <p>Commission Interpretative Communication on environmental considerations in public procurement (2001)</p> <p>Commission Interpretative Communication on social considerations in public procurement (2001)</p> <p>Communication on Member States' use of market-based instruments in environmental policy (foreseen to be finalised in 2004)</p> <p>EU Consumer policy strategy 2002-2006 (2002)</p> <p>REACH – New Chemicals Policy</p> <p>Commission Communication on integrating environment into standardisation (planned for 2004).</p> <p>Various events, e g Green Week and European Mobility Week</p>
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As can be seen, there are very few consumption strategies, and there is as yet no concrete programme, or umbrella policy, for sustainable consumption. Information and education campaigns to raise consumer awareness are planned in a number of strategies, but how to address consumers and what are the expected results is seldom discussed in detail.

A number of the strategies encourage the EU member states to remove environmentally harmful subsidies and increase the use of green taxes as a way to stimulate more sustainable consumption, but few concrete measures are suggested to make this happen.

The EU consumer policy is poorly developed concerning how consumer policy can help reduce the environmental burdens of consumption<sup>13</sup> (as will be discussed more in section 4). The REACH strategy will make it easier for consumers to obtain information on the chemicals they purchase (or chemicals in consumer goods), but the REACH is not as progressive in this respect as some member states have requested.

*Integrated Product Policy* aims to reduce the environmental impacts associated with product features and consumption. It does not strive to reduce the aggregate levels of consumption, rather to promote greening of markets within "the more the better" ideology. It calls for actions to address environmental problems of products with highest environmental impacts. The IPP envisions the use of both production and consumption side strategies and instruments, but fails to take a holistic approach to consumption (as will be discussed more in section 5). Both the EU and a number of European member states are

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<sup>13</sup> The consumer policy is poorly developed also regarding international trade/fair trade issues, but this is outside the scope of this paper as we mainly focus on the ecological dimension of sustainable consumption.

currently developing IPP strategies.<sup>14</sup>

The 6<sup>th</sup> EU Framework Programme for Research and Technological Development has funded 5 EU-wide projects that aim at addressing consumption-related problems.

The HOMESERVICE project investigates a wide variety of services that are currently provided to households and aims to estimate their dematerialisation potential. MOSES - mobility services for urban sustainability – is a project that looks at possibilities of replacing car ownership with car sharing. FESCOLA - Feasibility and Scope of Life-Cycle Approaches to Sustainable Consumption - aims to outline how life cycle assessment (LCA) and similar approaches, such as environmental input-output analysis, can be used to advance the sustainable consumption agenda. TOOLSUST is the project that evaluates the environmental situation in five European cities, and suggests ways for households' contribution to improving the current situation. It aims to develop tools for sustainable consumption in close collaboration with stakeholders. EMUDE: Emerging Users Demands for Sustainable Solutions is a project that aims to map out emerging sustainable users' demands and to develop a set of qualitative scenarios on how these demands and specific products and services may co-evolve.

### 3.5 Instruments

In this section, we will go through some of the administrative, economic and informative policy instruments developed and used for addressing production and consumption related environmental problems.

#### 3.5.1 Administrative instruments

The European Union has developed a substantial body of environmental law, with approximately 300 pieces of legislation. Environmental legislation in force covers basically all horizontal and vertical areas of environmental protection. In later years, the European Commission has made a number of agreements with industry, including an agreement with the car manufacturing industry to cut the CO<sub>2</sub> emissions.

In general, majority of legislation will affect the production side. However, we notice that current development of environmental regulation is geared towards increasing focus on products and their life cycle impacts. One of the first attempts in this field was the development of extended producer responsibility (EPR) legislation. The idea was that through the proper design, individual producers would have incentives to design products that have less environmental impacts in other life cycle phases, especially in the end-of-life phase (Lindhqvist 2000). Subsequent EPR legislation has become more sophisticated: legislation of take-back is often combined with design requirements, restrictions of hazardous materials, and the obligation to produce and make available information on the products that are useful in the end-of-life stages (for disassembly and recycling purposes). Upcoming legislation on energy intensive products aims to stimulate design changes that improve energy efficiency and other environmental parameters.<sup>15</sup>

The increased focus on product regulation has implications also for the consumption side. Take-back legislation has stimulated the development of recycling systems, which requires

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<sup>14</sup> See Rubik, F. and G. Scholl (2002). "Integrated Product Policy (IPP) in Europe - a development model and some impressions." *Journal of Cleaner Production* 10 (5): 507-515. and Rubik, F. (2003a). *Integrated Product Policy (IPP) and innovation. Towards Sustainable Product Design*, Stockholm. for an overview.

<sup>15</sup> European Commission (2003b). "Proposal for a Directive of the European Parliament and of the Council On establishing a framework for the setting of Eco-design requirements for Energy-Using Products (and amending Council Directive 92/42/EEC). COM/2003/0453 final - COD 2003/0172."

consumers to sort and recycle the waste, thus changing consumer behaviour and making the consumer more aware of the environmental implications of consumption. As product oriented legislation will affect the chemical content and energy efficiency of products it becomes very interesting from the consumer perspective. However, the regulations are directed towards the producers.

*Standards* play an important role of gatekeepers to prevent an influx of sub-quality products or hazardous products and substances to the market. They can hinder commercialisation of innovative solutions for which standards are not yet developed. Environmentally related standards may focus on improving both processes and products. For processes, there are EMS and EMAS standards, while for products there are eco-labelling standards and the ISO 14062 standard that concerns the product development phase.

Concerning administrative instruments of a voluntary nature, we mainly see developments on the national level. Examples include product panels in Denmark<sup>16</sup> and the promotion of Product Oriented Environmental Management Systems (POEMS) in e.g. Netherlands. Product panels can be considered a consumption side strategy, at least when consumer interests are well represented.

Retailers are the important link between producers and consumers, but are seldom addressed in policymaking. Some recent initiatives have however been directed towards retailers.<sup>17</sup>

### 3.5.2 Economic instruments

The 6<sup>th</sup> *Environment Action Programme (6EAP)* promotes market-based instruments and a tool to address sustainable production and consumption patterns, as does other policies. The EU has however limited possibilities to impose taxes and charges. The EU therefore often encourages member states to impose taxes and charges and to remove environmentally damaging subsidies at the national levels.

*Eco-taxes* on products, raw materials, materials and environmentally damaging activities can ensure that the price incorporates the environmental cost. Waste disposal charges can affect both producers and consumers, and eventually aim at extending the life span of products. The EC's *Framework directive to restructure and harmonise the Member States' national systems of energy taxation* increases the minimum tax rates on mineral oil products and includes other areas of competing sources of energy for taxation. It strives to reduce emissions and provide incentives for producers to design more energy-efficient products and for consumers to make informed decisions in regard to energy-efficiency.

The *Water Framework Directive* employs the Polluter Pays Principle and suggests member states to develop water-pricing policies by 2010 that would encourage efficient water use. What is interesting here is that different users, including producers and households, are to pay for water use. From 2005, EU plan to introduce *internal emissions trading system for CO<sub>2</sub> emissions* aiming at reaching reduction of aggregate levels of CO<sub>2</sub> in the most cost-efficient way for market players.

*Deposit-refund systems* are product charges that are refunded to the consumer and are

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<sup>16</sup> More information on product panels (in Danish and English) can be found at the homepage of the Danish Environmental Protection Agency: <http://www.mst.dk>

<sup>17</sup> One example is the recent initiative Framtida Handel, where the Swedish government has an agreement with a number of actors, including retailers, to green the production systems, through e.g. greener transports and the development of more environmentally friendly products. See <http://www.framtidahandel.se/>.

aimed at influencing consumer behaviour in relation to the end-of-life management of the products they use.

The draft *Directive on Environmental Liability* based on the Polluter Pays Principle obliges producers to take preventative and remedial actions when there is a threat of damage.

*Public procurement* legislation is important as it provides the framework for how and if environmental (and social) requirements can be incorporated in tenders. The EU legislation has widened the scope for such requirements although the most important progress has come through the development of case law. However, current EU legislation does not require that environmental or social criteria to be used. The EU promotes the use of green public procurement as a means to reaching a number of environmental objectives. Currently, various EU member states, and regions within member states, are using green public procurement in varying degrees. Apart from a supportive legal framework, effective green procurement requires that procurers have knowledge, support, and effective tools at their disposal.

On the *national level*, there are great differences regarding the use of environment-related taxes, e.g. taxes on raw materials. Some states have initiated a *green tax reform*, with the aim to (in the long run) substitute income related taxes with taxes on natural resources and energy. It currently appears as if the green tax reform has slowed down in many countries, perhaps due to the economic recession. Further, environmentally harmful subsidies are still common. In contrast to resource prices, labour costs are high in most industrialised countries and they are frequently the reason why firms shed labour and replace it with resource-intensive equipment. In the EU, in excess of 80% of all *taxes are income related* (Paleocrassas 1999). To a considerable extent, the high cost of labour (not salaries) is the consequence of deliberate policies. An attractive proposal is to shift the tax burden from labour to the environmental impact.<sup>18</sup> In Denmark, an essential part of a major tax reform passed in 1993 was the redistribution of taxes from labour to natural resources and pollution. The reform provided for marginal income taxes to be lowered by about 8-10% from 1994-1998, and for the phasing in of new green taxes. In the case of Swedish tax reform, the tax shift between the labour and energy accounted for 4%. The reason for the tax reform was mainly the need to lower high marginal tax rates on labour income (EEA 2000).

### 3.5.3 Informative instruments

There is a clear trend towards a wider use of informative instruments. There are few informative instruments of a *mandatory* nature. Recent initiatives include legislation that assures the public's *right to environmental information* (based on commitments in the Aarhus convention). *Energy labelling* is an example of legislation that will assure that consumers have access to relevant environmental information, which may affect the purchases. *Chemicals legislation* is interesting as it aims to provide more information to institutional and private consumers on chemicals and their properties. However, the current and planned EU legislation will not help to provide consumers with much information on chemicals in other goods. Therefore some EU member states are developing national strategies to supply this information to consumers.<sup>19</sup> *Advertising law* will regulate the use

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<sup>18</sup> However, it is often stressed that care should be taken not to increase the total tax (revenue neutrality) when introducing the shift from labour to resource tax.

<sup>19</sup> The Swedish government has asked the National Chemicals Inspectorate to investigate what information needs different actors – e.g. professional purchasers, private consumers and recyclers – in the product life cycle have, and how an effective information system can be set up that can deliver the information. See

of environmental claims.

There are a greater number of *voluntary informative instruments*. Most of these instruments are addressing private or institutional consumers and include: eco-labelling (ISO type I), environmental product declarations (EPDs, ISO type III), organic labelling of food, certification schemes of e.g. hotels, consumer advice, consumer campaigns, and consumer education.

However, there is reason to question the effectiveness of informative instruments. Many of the instruments got little response from industry and consumers, and some of the instruments may not be easy to use for the desired purpose. For instance, EPDs are hard to interpret even for the intended user group: professional purchasers. The high hopes that were put on eco-labelling have been tuned down in later years. The EU Eco-label seeks to improve the environmental profile of products from a life cycle perspective and to provide consumers with a simple indication of environmentally sound products. Despite updating the rules and scope of the EU Eco-label, the label is still awarded to too few products, is rarely visible in shops and criteria are developed for too few product groups. Some national eco-labelling schemes have been more successful.

The effectiveness of consumer campaigns is often not evaluated, as it is a difficult task to measure the effectiveness.<sup>20</sup> Studies have showed that information in itself is not sufficient to achieve change (Moisander 1998).

### *3.6 Conclusions on strategies for sustainable production and consumption*

Having provided a brief overview of major strategies and instruments that address production and consumption related problems, it is interesting to map them out along a product life cycle to identify more clearly areas that have not been sufficiently addressed by policy measures. The figure below is an attempt to depict how broad in their application area certain policies and instruments are.

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Swedish Ministry of Environment (2002). Uppdrag om ett system för hälso- och miljöinformation om varors innehåll av farliga ämnen. Decision 2002-12-18 M2003/3992/KnB.

<sup>20</sup> Usually, an evaluation would look at how various informative instruments have affected the consumers with regard to knowledge, attitudes and concrete action, which is quite difficult. In the latest Swedish evaluation of green consumer information, we can notice that it is often easier to measure how consumer information have triggered action from producers than from consumers. See Regeringens skrivelse (2002). Utvärdering av miljömålet i konsumentpolitiken. 2002/03:31.

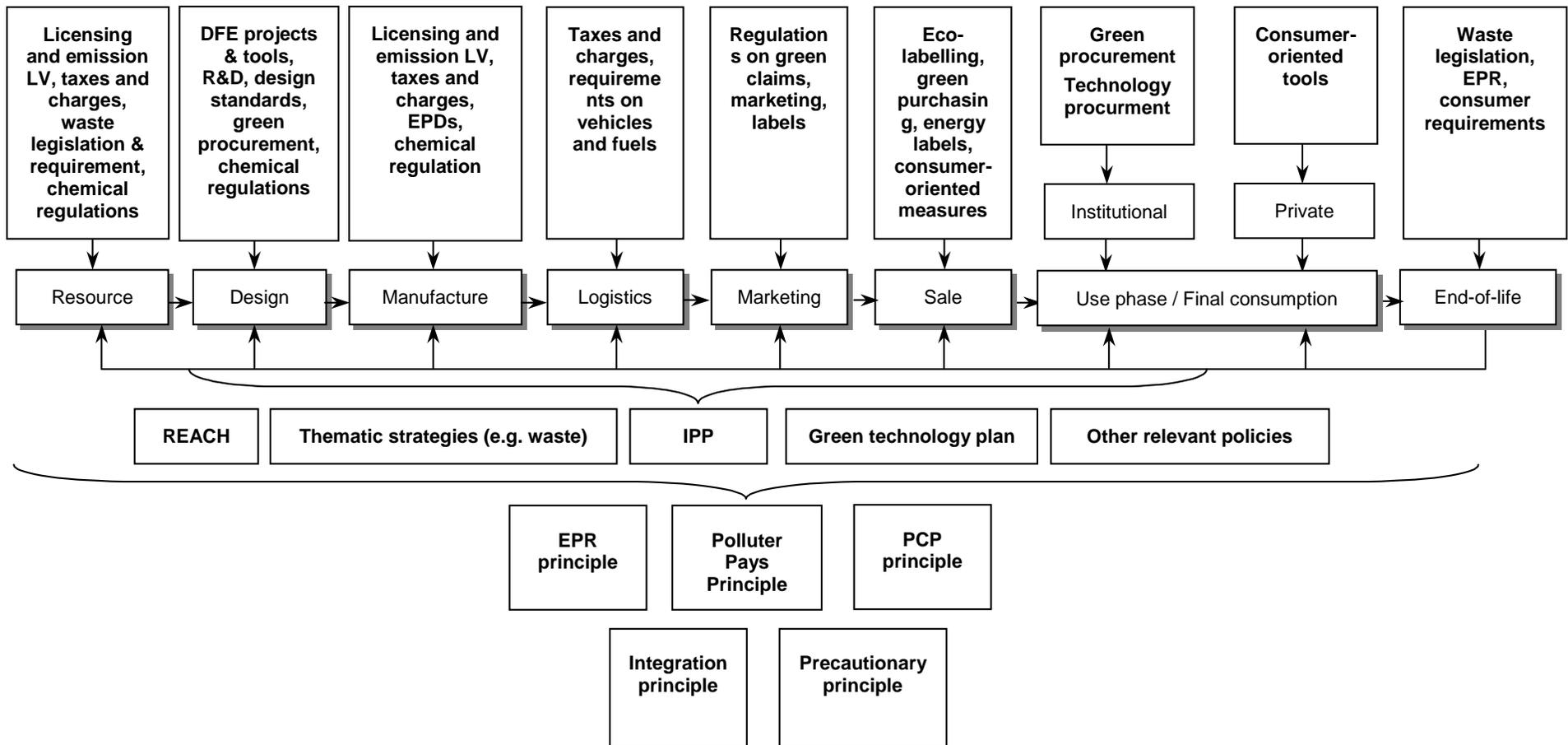


Figure 3 Strategies for addressing sustainable consumption and productions (Mont 2001b) and (Dalhammar 2002).

Two major conclusions can be made from the overview of policies and instruments. First of all, the EU has hitherto no concrete programme, or umbrella policy, for sustainable consumption. Few individual states appear to have a more developed strategy than the EU. Secondly, production-oriented policies and instruments are greater in number and life cycle extent than consumption-oriented tools. We of course have to acknowledge that the production and consumption sides are closely linked, but still policies on the production side are much more elaborated. Thirdly, the existing consumption-oriented tools are rather weak – they are not likely to have a great influence on consumption patterns. The green tax reforms are progressing slowly, as is the removal of harmful subsidies. Most consumer-oriented instruments rely on information, although studies show that information alone will not stimulate changes (Dembkowski 1998), (Suchard and Polonsky 1991). Eco-labelling schemes have had limited success, and the way these schemes are set up may limit their possibilities to green product groups even if their popularity may increase. Green public procurement strategies and technology procurement have great potential for stimulating improvements, but these instruments are voluntary in nature and their effective use will require political will, and support functions for procurers.

What we can see is that consumption has been identified as a key priority for sustainable development, but very little evidence suggests that concrete action has been taken. In their update on the Johannesburg achievements (European Commission 2003c), the European Commission's proposed measures for sustainable consumption are a big disappointment. They reflect a "business as usual approach" relying on old strategies, and praising the virtues of economic instruments although no strategy is presented to promote their greater uptake. Perhaps the most disappointing is the fact that there are no indications that EU will present a *structured approach* for sustainable consumption. Some nations might develop a more advanced agenda, but there is little reason to be hopeful.

#### **4 Environment and consumer policy: Need for integration and framework**

Having looked at various policy initiatives for sustainable production and consumption we now look at the possibilities to strengthen sustainable consumption policies. 'Policy integration' has become a very hot topic in latter years, as has 'environmental policy integration', triggering research on the virtues and practices of the phenomenon.<sup>21</sup> In the European Union (EU) this push for policy integration is very obvious not least in the so-called Cardiff process. No matter how we define sustainable consumption, it will require the integration of a number of policy areas, which will include energy, transport, research, education, etc. However, a starting point is to look at the two areas that are perhaps most tightly connected to the sustainable consumption concept: environmental and consumer policy. The main aim of environmental and consumer policy is, in principle, to protect the environment and to consumer interests. The same goal is set for sustainable consumption.

In this section we will first look at the idea of policy integration, and how policy integration can be brought about, and then reviews some areas of shared interest for environment and consumer policy. We then go on to assess the current state of integration of environment and consumer policy, and discuss trends that support future integration.

##### *4.1 Towards policy integration*

The political system is complex, and this complexity tends to increase over time. There is a

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<sup>21</sup> For an overview see Hertin, J. and F. Berkhout (2002). Practical experiences on policy integration and recommendations for future initiatives on EU and national level. 3rd Blueprint event "Instruments for Integrating Environmental and Innovation Policy", Brussels.

constant output of new policy developments, bringing in new strategies and instruments. The *need for policy integration* is explained by the fact that changes in one policy area will affect, and often contradict, the efforts made in other policy areas. Trade-offs even between different environmental objectives are often discussed in environmental policy. The problem aggravates when goals and intentions of different policies collide. In a recent article in one of Sweden's biggest newspaper, a journalist makes an ironic reflection on the statements of Ann-Kristin Nykvist, the Swedish minister of Agriculture, Food and Consumer Affairs (Jewert 2004). Acting as minister of Consumer Affairs, Nykvist would like to see cheap food in stores, which is then often imported. Acting as minister of Agriculture, Nykvist wants to promote Swedish agriculture products, and is keen to praise the stringent Swedish rules on animal protection and the strict environmental legislation. The article discusses how Nykvist's statements in different settings may make her popular in all camps in the short term, but can possibly undermine her credibility in the long term. As the example shows, even politicians on the top level may have problems in formulating a policy agenda that will allow for the simultaneous realisation of all political aims. The low-cost retailer chains that Nykvist is currently welcoming in Sweden (e.g. Lidl) may attract price-sensitive consumers, but has been heavily criticised by other groups due to the poor selection of organic food, and eco-labelled/fair trade-labelled goods.

So what does policy integration actually mean? The term *policy integration* usually refers to the process where policies with different (main) objectives or launched by various actors are integrated. There might be integration of objectives between different sectors (inter-sectoral integration), within one sector (intra-sectoral integration) or it can be *environmental policy integration*, referring to the inclusion of environmental concerns in areas of public policy dominated by other issues than environmental protection. Hertin and Berkhout (2002) discuss dimensions for integration of environmental issues in other policy areas, outlined in Table 2 (Hertin and Berkhout 2002).

The table refers to agenda setting, communication, capacity building and policy learning as functions of integration. However, other criteria for integration may be discussed, including:

- *Joint initiatives* launched by different policy areas (e.g. when the Ministry for Agriculture and the Ministry for Environment have a joint campaign to promote organic food).
- *Integrated departments*, for example, the UK have a joint department for environmental protection, food and rural affairs.
- Set-up of new *interdepartmental policy discussions* (e.g. a national forum on sustainable trade that involves people from ministries for trade, environment, finance etc.) or central strategy, such as Dutch National Environmental Policy Plans (Hertin and Berkhout 2002).
- *Sectoral integration policies*. This is a more de-centralized approach, where goals from one area of policy are incorporated into another one. EU's Cardiff Process is based on this strategy. It promotes learning and the development of new capacities within policy, but does not enhance cooperation.
- Making sure that new *policy instruments* (e.g. laws and taxes) are analysed properly with regards to their effect on the interests of various policy areas.

Table 2 Core functions of environmental policy integration (Hertin and Berkhout 2002)<sup>22</sup>.

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<sup>22</sup> Some language has been changed compared to the table given in Ibid.

Function of EPI	Examples of evidence of 'environment' being integrated in other policy areas
Sectoral <sup>23</sup> agenda setting	Environmental protection part of mission statement Assessment of environmental impacts of sector policies 'Environment' is a regular agenda item at high level meetings
Horizontal communication	Interdepartmental working groups / committees Early consultation on sectoral policies and projects Frequent ad hoc communication
Sectoral capacity building	Unit for environmental matters Environmental information services System of officials charged with 'environmental' duties
Policy learning	Environmental issues are framed in a 'positive' manner Constructive interdepartmental relationships

Thus, various parameters can be used to measure integration. Quantitative criteria may not always be useful as integration involves qualitative aspects that are not easy to evaluate.

As we see, integration can be very tricky and some authors are convinced that rather than full integration the aim should be – coordination (Rennings, Kemp et al. 2003). However, the fact that integration is challenging may hardly make it irrelevant as a strategy. The very fact that there are hard trade-offs to be made between various policy objectives highlights the need to discuss the various policy objectives in an integrated process, raise the awareness of policy makers about difficult choices, and to ensure that different policy areas are at least not pulling into opposite directions. Further, a better dialogue between different policy departments can indeed help to identify issues where the departments can agree and stimulate joint action. For example, in the late 1990's, a number of Swedish authorities were concerned about the increased use of antibacterial products. In the year 2000, five Swedish authorities <sup>24</sup> issued a joint press release, asking producers, retailers and consumers not to market or buy unnecessary antibacterial products. The press release got massive response and triggered a lot of actions, including the decision of majority of the retailers not to sell consumer products that were marketed as antibacterial or that contained triclosan. This example shows that a joint statement from a number of authorities receives much greater attention than information from single authorities (Kemikalieinspektionen 2001). Furthermore, it indicates that cooperation is important in understanding and handling complex issues that involve the competence of many authorities. This action also demonstrated that in the right circumstances information campaigns could be a timesaving, cheap and effective way to attain change, compared to the use of other instruments.

#### 4.2 *Is there a case for integration of environment and consumer policy?*

The integration of the two types of policies is not undisputed. It has been argued that the traditional consumer policy, which allows unlimited consumption, simply is not compatible with a "hard" environmental policy that puts limits to the era of total consumption (Tonner 2000). The relationship between consumer and environmental policy has been described as full of conflicts with incompatible aims, with the basic contradiction being that *consumer*

<sup>23</sup> The term 'sectoral' is used as a common word for non-environmental policy areas.

<sup>24</sup> The Chemicals Inspectorate, the Consumer Agency, the National Food Administration, the Medical Products Agency, and the Institute for Infectious Disease Control.

*law is an expression of the consumer society while environmental law seeks to combat the effect of consumer society* (Wilhelmsson 1998). Most authors seem to agree that the two policies must be more integrated, and that consumer policy must integrate environmental concerns since environmental policy alone cannot bring about the necessary changes required for sustainable consumption (Krämer 1997), (Wilhelmsson 1998). Further arguments for integration is given below:

1. The integration of the two fields seems inevitable due to the enhanced focus on products and services in environmental policy
2. There is also a trend in environmental policy to involve consumers in the debate on environmental issues, e.g. in the form of product panels.
3. It is also obvious that the environmental and consumer policies have common interests in for example food safety, genetically modified organisms (GMOs) and chemicals - although the reasons for their interest might be slightly different.
4. Another joint area of information concerns the *product standards*. It has been increasingly recognized that requirements set in product standards will strongly influence product safety, but also the products' environmental impact over the entire life cycle. Therefore, both consumer NGOs and Green NGOs have been active in trying to influence product standards.
5. Today, "green" claims are increasingly used in marketing campaigns. Both consumers and environmentalists have a common interest in making sure that these claims are correct.
6. Another area of joint interest is disclosure of information from manufacturers, especially data pertaining to products content and safe use.<sup>25</sup>

Let us now look closer for signs of integration of sustainable consumption issues in environmental and consumer policies.

#### 4.2.1 Integration of sustainable consumption in environmental policy

A number of tools exist that provide environmental information to consumers aiming at increasing consumer awareness and changing the demand structure. Examples of instruments used are eco-labelling, product declaration systems, green procurement, product panels and green information campaigns directed at households and other consumers. Green taxes and charges are also being used and discussed. Increased attention has been given to the power of the customers' demands, which can act as a driving force for greener products and services. The consumer has been seen as a major (potential) initiator of change, which will use the market mechanisms as instruments for sustainable products and services.

Recently, more comprehensive environmental strategies have been launched to coordinate supply and demand side instruments in order to get an optimal outcome, taking into account the cost-effectiveness and the implications for competition and trade. The most obvious examples of such strategies are the discussions on the Integrated Product Policy.

The growing interest in sustainable consumption from governments is not only reflected in policy documents, but there is examples of more formalised cooperation with consumer agencies. For instance, the Swedish Environmental Protection Agency (EPA) has started up a formal dialogue with the Swedish Consumer Agency within their work with IPP, and thereby assures that consumer concerns are integrated. The tendency to look more on

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<sup>25</sup> SOU (1999). Märk väl! Statens Offentliga utredningar [Swedish Government Communication]. SOU 1999:7.

consumption is sometimes also reflected in the organisational structures of environmental policy makers. For example, the Swedish EPA has a unit for addressing sustainable consumption issues. On the practical level, the environmental departments of most Swedish municipalities give information to consumers on how they should make more environmentally sound purchases and so do most environmental NGOs.

On the other hand, there are clear examples of a lack of integration of consumer concerns in environmental policy. Krämer has stated that environmental policy and consumer policy in the EC have developed in parallel rather than intertwined, and gives examples of a number of environmental regulations where “*more consumer input would have been valuable*” (Krämer 1997), and examples include regulation on quality of bathing and drinking water, marketing and labelling of chemicals and many other areas<sup>26</sup>. Consumer organisations have usually not been involved in the decision-making, and more curiously, have not been asked to participate.

#### 4.2.2 Integration of sustainable consumption in consumer policy

The focus on unsustainable consumption patterns has put consumer issues higher on the environmental agenda. The next question is how the sustainable consumption debate has influenced the consumer agenda. Some might argue that the two areas share many common goals and problems (Kye 1995), while others point out that environment is not one of the core issues of consumer policy and this may lead to conflicts of both basic goals and concrete rules (Wilhelmsson 1998). There might sometimes be a conflict between consumer health and environmental concerns, although these interests usually go well together. Clearly, in consumer policy the consumer interests are in focus.

On the *EU level*, the European Commission’s Directorate-General (DG) for Health and Consumer Protection is mainly concerned with protection of consumers’ health, safety and economic interests. The environment is of primary concern for consumer policy when pollution can be linked to human health impacts.<sup>27</sup> Another focus in consumer policy is “fairness”: fair prices, fair marketing, fair access to information and maximisation of the utility of the consumer. Sustainable consumption issues are not included in the DG’s main areas of interest, and it is only touched upon in the latest Consumer Policy Action Plan, with no suggested measures to promote it. Furthermore, there does not seem to be a clear policy on how environmental issues come into consumer education, and environmental affairs are not represented in the organisational structure of the DG for Health and Consumer Protection, unlike many other DGs, which have a department for environmental issues (European Commission 1999). Despite this, it is clear that many current issues on the DGs agenda are also high on the environmental agenda. These issues include food safety, GMOs, credible information on goods and labelling. Some EU member states have lobbied that a stronger weight should be given to environmental goals in EU consumer policy.<sup>28</sup>

Institutions paying special attention to consumer protection do not necessarily exist on *national state level*. Few European countries have a ministry for consumer affairs. Often,

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<sup>26</sup> Note that there sometimes seems to be difficult to differentiate consumers’ interests from citizens’ interests, and that these might often be similar.

<sup>27</sup> Pollution related diseases are one of the topics on the Directorate-General for Health and Consumer Protection’s agenda.

<sup>28</sup> For instance, Sweden has lobbied that EU consumer policy should have an ecological perspective that is reflected in the actual policy-making Regeringens skrivelse (2002). Utvärdering av miljömålet i konsumentpolitiken. 2002/03:31..

consumer concerns are integrated within other ministries, e.g. trade, health and agriculture ministries. They are regarded as a matter for all ministries to safeguard, or indeed for none of them, depending on the view taken (Krämer 1997). Some states have established consumer agencies. It is hard to establish how integrated environmental issues are in consumer policies on the national level, but the reports from EU member states and EU accession countries on the implementation of the EU consumer policy strategy may provide some indication.<sup>29</sup> The situation obviously varies between countries. The Swedish Consumer Agency has got sustainable consumption as a specific area of responsibility, and has initiated a number of measures to increase green consumption, including: consumer campaigns, consumer information, and the inclusion of environmental data in product testing.

The international consumer organisations seem to have taken up the issues of sustainable consumption on their agenda to a varying extent. For example, EUROCOOP has issued a number of position papers on proposed EC legislation, in some cases together with environmental NGOs.<sup>30</sup> It has been argued that consumer organisations lack a comprehensive strategy for incorporating sustainability concerns to their agenda, but that the situation varies a lot from country to country and from issue to issue (Grunert-Beckmann, Grønhøj et al. 1997), (Eurocoop 2000).

Swedish consumer organisations more and more incorporate environmental issues into their agendas. They claim that consumers nowadays consider not only the price and function of a product, but also increasingly its ethical, environmental and health aspects (SOU 1999). Numbers supports these claims: both the number of eco-labelled products and the money spent on eco-labelled products has risen significantly on the Swedish market during later years (SOU 1999).

To conclude, consumer policies are slowly integrating environmental concerns, however these efforts are rather marginalised. Quite often, consumer policy totally neglects environmental interests. Very few consumer policy documents address sustainable consumption, and the green efforts by consumer organisations often seem to be focussed on certain sectors while other sectors, e.g. tourism, are rather neglected. It appears as if the efforts are not well planned and coordinated, and not necessarily aimed at the sectors where the environmental impacts of consumption are the greatest. Further, consumer policy very seldom addresses how the total consumption may be decreased and mainly supports “greener” consumption.

The overall conclusion is that consumer and environmental policy has started to integrate, but that this integration is limited. The perhaps biggest problem for environmental policy is the scope: It has been hard to address the need to reduce overall consumption. Another limitation is that sometimes all consumer concerns (e.g. price, functionality, quality, health and safety) are not regarded as an integrated part of environmental policies. Consumer policy has started to integrate environmental concerns, but also lacks the dimension on how to decrease overall consumption. Further, environmental concerns are only one aspect of consumption and environment is still not regarded as one of the core areas of consumer policy. To some extent the function of consumer law is to promote the acceptance and growth of consumption and therefore will be in conflict with environmental goals.

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<sup>29</sup> The country reports are available at [http://europa.eu.int/comm/consumers/overview/cons\\_policy/review\\_rollingprog\\_2002-2006\\_en.htm](http://europa.eu.int/comm/consumers/overview/cons_policy/review_rollingprog_2002-2006_en.htm).

<sup>30</sup> The position papers can be found at the Eurocoop website, <http://www.eurocoop.org>.

### 4.3 *Reasons for the lack of integration*

As seen above, there have been an increased integration of environmental and consumer policies during later years, but there is definitely scope for a greater integration. In this section some possible reasons for the lack of integration are discussed.

One difference can be found in the *time perspective*. The Brundtland definition on sustainable development involves future generations, and this future time perspective is very important in environmental policy. This forward-looking attitude has no similarities in consumer policy, which focuses on present consumers, their right to consume, and on the economic aspects of the problem (Krämer 1997). This economic aspect is reflected in the conflict between consumer protection (fair *prices*) and promotion of environmentally apt products, which often are more expensive than their dirty alternatives. Another difference is in *scope*. By nature, most environmental problems are *global*, requiring global solutions. This international perspective can rarely be found among the actors that discuss consumption. Most consumer organisations have a more limited geographical scope and the consumption in other regions and states are usually not an issue (Krämer 1997). There is however an emerging trend to consider ethical dimensions of production in less developed countries, e.g. child labour. This trend does not seem to embrace environmental issues to the same extent. There is an *inherent conflict* between environmental and consumer policies. What in environmental policy is source of waste and problems (products and services), in consumer policy is the source of utility and well-being. Therefore, environmental improvements are welcome as long as they do not interfere with the functionality, and the total number of products on the market is a taboo.

Historically, environmental and consumer policies are been promoted by different actors (Tonner 2000), which undoubtedly affects the policy formation and implementation.

### 4.4 *Trends supporting further integration*

The weak but clear indications of consumer organisations increasingly considering environmental issues is the sign that the core consumer interests might in a long run also include the environment. The cooperation between environmental and consumer agencies initiated e.g. in Sweden may provide a better understanding of the similarities and differences in approaches and highlight the areas of conflict, which should be addressed. Another societal trend that might influence the integration is the slow, but evident trend that products are to some extent replaced by services. This can provide more environmentally sound solutions for consumer satisfaction, and thus economic growth and the right to consume might be decoupled from environmental degradation (Mont 2001b). The increasing number of eco-labels, but also other types of labels such as fair trade labels, might also aid in the development towards a socially aware consumer that includes the sustainable dimension in his purchasing decisions. This is supported by the general interest in ethical and social issues that we see today.

## **5 IPP as an integration policy: a lost opportunity?**

As was evident in section 3, there is currently no main strategy or umbrella policy that deals with sustainable consumption at the EU level. The situation appears to be similar in most nations. The EU and many countries are currently developing a ten-year framework of programs for sustainable production and consumption as a follow-up from the Johannesburg Summit. However, there is little hope that more comprehensive policies for sustainable consumption are going to be developed in a short run. Nor are we likely to see the enactment of instruments that have a potential to stimulate real change.

However, there is one recent policy initiative that is interesting in this context: the

Integrated Product Policy (IPP). It is presented as a *systematic strategy* to address products' environmental impacts over the entire life cycle. It is thus a rare attempt to create an umbrella policy for addressing consumption-related issues. It is based on a *multi-stakeholder approach* and the use of *stakeholder dialogues*; it envisions a *policy mix* using both supply and demand side instruments. *Integration, innovation and continuous improvements* are key words in IPP. Its focus on the environmental performance of products over the entire life cycle puts it high on the agenda for both consumer and environmental agencies. We would argue that many of the IPP elements are well in line with an agenda for sustainable consumption. The links between IPP and consumer interests are also strong. It is specifically stated by the Council of the European Union that the IPP shall raise the environmental awareness of consumers and their ability to choose environmentally apt products and use them in the environmentally sound manner. Furthermore, it is stated that the IPP initiative will strengthen consumer protection by reducing health impacts (Council of European Commission 2001).

So far, the IPP is the closest step made towards a comprehensive strategy for sustainable production and consumption. It has the potential to become one of the most important strategies for sustainable production and consumption, but its current scope is still limited. This section discusses how the IPP can be changed to become a more full-grown strategy for sustainable production and consumption, specifically focussing on *consumption* elements. Due to limitation of space, we do not discuss all aspects of IPP in this paper, but focus on the most relevant ones.

### 5.1 *The current IPP agenda*

In order to discuss how IPP can be improved, we first outline its content. First, it is important to point out that there is not only *one* IPP agenda. Both the European Union and a number of European countries<sup>31</sup> have their own IPP agenda.<sup>32</sup> When we discuss IPP here we refer to EU's IPP strategy, although the points raised will be relevant also for most (or all) national IPP programmes.

In the late 1990s a number of European countries started to address the environmental impacts from products in a more systematic way and developed governmental policies and official documents in this area. The European Union has now developed its own product strategy, named IPP, in a Green paper, a Communication and through a number of events and stakeholder dialogues.<sup>33</sup> The IPP has a number of main themes. It is founded on a *life cycle perspective* and thus it seeks to reduce the life cycle environmental impacts from products. Problems in one stage of the life cycle should not be shifted to another stage; an integrated approach should ensure this. The greening of product chains will require the involvement of *all actors* in society. Therefore a *multi-stakeholder approach* is required in policymaking. A number of *different instruments will be required* to green product chains. These may include economic instruments, consumer information, stakeholder dialogues, and legislation. Governments should stimulate the availability of *life cycle data* that can be

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<sup>31</sup> For an overview see Rubik, F. and G. Scholl (2002). "Integrated Product Policy (IPP) in Europe - a development model and some impressions." *Journal of Cleaner Production* 10 (5): 507-515. and Rubik, F. (2003b). *Integrated Product Policy: Practices in Europe*. IÖW Summer Academy "From Government to Governance: The Case of Integrated Product Policy", Wuerzburg.. Not all countries use the name IPP but instead use "product oriented environmental policy" or a similar name.

<sup>32</sup> The EU has not got the most advanced IPP strategy. For example, Sweden has invested more time and resources into the national IPP programme than EU has done, and has a wider scope than the EU: Services are included; there are more research on how different instruments can be used to reach the goals in IPP, more discussion on how legislation and other instruments can be used together etc.

<sup>33</sup> See more at DG Environment's IPP page: <http://europa.eu.int/comm/environment/ipp/home.htm>.

used by various actors. LCA data should be available to users, and systems for *conveying relevant data* along product chains should be established. Main target groups in need of data are designers, manufacturers, consumers, professional purchasers and recyclers. Markets for green products must be created through supply and demand side measures and governments should *stimulate the greening of both the supply and demand sides*. *Producers and consumers* are the key actors that must be involved in policymaking and be provided with incentives to change unsustainable routines. In the European Commission's latest Communication, IPP is presented as an integral part of the European Union's sustainable development strategy that will contribute to addressing the environmental challenges identified in both this document and the 6 Environmental Action Programme. It is emphasised that the chances of meeting these challenges will be smaller without an *explicit product dimension* in environmental policy. Specifically, the Communication notes that, IPP will be a key part of the implementing measures for the Thematic Strategy on Sustainable Use of Resources, and on Prevention and Recycling of Waste. IPP also has been positioned to complement the European Chemicals Strategy.

Thus, a product focused environmental policy is seen as a necessary supplement to other environmental policies. The European IPP initiative has three main goals:

1. Getting the prices right (the environmental impact of products and services should be reflected in the price e.g. by taxes that internalise the external effects);
2. Stimulating demand for greener products;
3. Strengthening green production.

The EU documents on IPP envision the use of a number of different instruments, as outlined in Table 3. So far, the focus has mainly been on economic and voluntary instruments, with less attention given to legislation.

Table 3 Policy instruments envisioned in the EU documents on IPP

Administrative instruments <sup>34</sup>	Bans, licenses, extended producer responsibility and recycling and recovery quotas, product panels, functionality panels, various types of agreements between government and industry, industry self-regulation, POEMS
Economic instruments	Contributions to R & D, deposit-refund systems, green public procurement, taxes and fees
Informative instruments	Consumer advice, consumer campaigns (e.g. on eco-labels), education, eco-labelling type I-III, energy labelling, organic labelling of food, mandatory product information

Much effort has been put into dialogue with the industry in order to find cost-efficient solutions. The main idea is to work with industry rather than to legislate, as is obvious from the concrete actions suggested in the communication:

- In 2003, the identification and launching of pilot projects on particular products on the basis of stakeholder suggestions to the Commission, which can be provided until the end of October 2003;
- In 2005, on the basis of stakeholder dialogue, the publication of a practical handbook on best practice with Life Cycle Assessment, LCA;

<sup>34</sup> This table follows the same logic as the one in section 3. Thus, the three categories of instruments include mandatory, semi-voluntary, and voluntary instruments.

- In 2005, a discussion document on the need for product design obligations on producers;
- In 2006, the development of a Commission action programme for greening its procurement;
- In 2007, the identification of a first set of products with the greatest potential for environmental improvement and the beginning of action to tackle them.

There have been several lines of critique brought forward against the IPP developments. It has been argued that IPP lacks the broader *systems perspective*. It seeks to green the life cycle of products within common societal systems, while we need to rethink whole systems of production and consumption.<sup>35</sup> Another critique is that the main IPP focus is on *environmental performance* of products, while other product dimensions are often neglected, such as functionality, health and safety aspects, and so on.<sup>36</sup> A fundamental line of critique is that the main interest is to *green consumption*, not to deal with the *total levels* of consumption. Therefore the IPP has a “business as usual” approach. As an example, the European Commission’s press statement for the latest IPP communication states that “*IPP is not attempting to reduce consumption; rather, it is seeking to reduce the environmental impact of increased consumption*” (European Commission 2003a). No IPP document launched by the EU has mentioned the different dimensions of sustainable consumption, and there has been no discussion on whether we need to change levels of consumption, patterns of consumption, or change our resource base.

Regarding the *scope* of IPP, many actors have called for the inclusion of *services*, stating that focusing solely on products is a both unpractical and out-dated approach. A further critique we would like to put forward is that the IPP strategy is in a sense a “*wish list*”, as it lists the instruments and tools that can be used, and the actors that need to be involved, but fails to state what the role of actors should be, and how to make sure that the instruments and tools are employed. A further point is that the *objectives* themselves are set in a way that makes it difficult to evaluate progress.<sup>37</sup>

## 5.2 Ways to improve the IPP

Let us now turn to some possible ways to improve the IPP strategy. The following sections will focus on broader issues, not details.

### 5.2.1 The IPP vision

Currently, we can see that it has been hard to communicate the added value of IPP to many stakeholders. IPP *lacks a clear vision* of what it wants to achieve. The need to clarify the vision and its application was identified in the very early stages of EU IPP policy formulation. It has been recognised that clarity is required in setting of objectives and priorities, in developing an approach for the use of measures, and in ensuring that the impact of actions can be measured and evaluated.<sup>38</sup>

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<sup>35</sup> For a discussion on this see for instance Tukker, A. (2002). Integrated Product Policy in relation to sustainable innovation. Blueprint workshop, Brussels.

<sup>36</sup> Some government initiatives have tried to address this. For instance, Sweden has involved the Consumer Agency in the IPP development.

<sup>37</sup> In the Communication we find the following formulations of the overarching objectives for a EU IPP: “.. *the EU Integrated Product Policy aimed at reducing resource use and the environmental impact of waste..*”; “*Its primary aim is to reduce the environmental impacts from products throughout their life-cycle.*”

<sup>38</sup> See e.g. Ernst&Young (2000). Developing the Foundation for Integrated Product Policy in the EU. Brussels, Ernst&Young: 35.

There are a number of reasons why it is important to have a clear vision:

- There is still a lot of confusion among actors on what IPP is. Therefore, we need a clear message on the scope of IPP, the goals and the means of reaching them.
- Given that the majority of EU member states have not developed product-oriented policies to any substantial extent, the IPP framework can provide scope and direction for national product policy developments.
- For the member states that have developed product-oriented policy it should allocate the responsibilities among the member states and between the member states and the European Union.
- For other important stakeholders it should elucidate the long-term nature of IPP and the type of instruments that will be used to achieve its goals.

Since the latest Communication does address many of these key requirements, it adds to the ambiguity of the IPP vision. There is a need to communicate that increasing consumption levels, growing populations and a limited resource base will require new types of strategies. We expect IPP to provide a vision of a more sustainable society and to guide the short and long term policy initiatives for reaching this.

### 5.2.2 IPP in relation to other policies

There is a need to clarify the role of IPP in relation to other policy areas. So far the IPP fails to distinguish between the tasks it should solve on its own and the tasks that are to be solved by other policy initiatives. Furthermore, while the Commission at length lists different instruments and tools expected to contribute to the greening of products, it fails to explain how IPP will contribute to ensuring that these tools are implemented.

### 5.2.3 IPP and systems innovation

New systems of production and consumption require new ideas and approaches, new knowledge, new conceptions of growth and quality of life, and new ideas that will create “win-win” solutions for the environment *and* the economy. Systems transformation requires involvement of all actors, including governments, industry, NGOs and people acting in their roles as citizens and consumers. To stimulate the systems transformation, the innovation perspective is increasingly stressed in environmental policy. Innovation is considered crucial since the eco-efficiency improvements are not sufficient for achieving factor 20 goal; systems innovation is needed with special focus on social and institutional innovations (Rennings, Kemp et al. 2003). Therefore, it is argued, the innovation rate must be much higher than in the past. Further, innovation must be guided in the right direction, since innovations as such are not necessarily sustainable (Vollenbroek 2002). *Sustainable innovation* might be limited due to factors such as inappropriate policy climate, resistance to change and technological lock-ins. Therefore, IPP should play an important role in facilitating the necessary changes; for this it should develop a *systems perspective*, comprising both the production and the consumption side. Adapting systems perspective will also necessitate the inclusion of services and functional sales/product service systems, as discussed in the following sections. Stimulating environmentally oriented innovation of products and services should be seen as the key component of IPP. However hitherto, the IPP Communication pays little attention to innovation. This is surprising, given the tone of favouring voluntary measures that aim to stimulate *innovation in frontrunners*. Although it is mentioned in the Communication that IPP will be closely linked to the forthcoming Environmental Technologies Plan, no further elaboration is provided.

#### 5.2.4 Including services in the IPP scope

Although the Commission explicitly notes that services are not excluded from the scope of IPP, the implementation strategy seems to focus primarily on products. Both the Council and the Parliament have called on the Commission to include services into the active scope of IPP. The importance of addressing services in the European context is crucial for a number of reasons. First of all it is almost impossible in the modern economy to find a product that is not connected to a service. Improving the environmental performance of a product over its life cycle would require that attention is paid to the services as a part of the life cycle (transportation, storage etc.). Secondly, any manufacturing company has “service” departments, such as accounting, security, etc. Further, many manufacturing firms are positioning themselves as companies that provide solutions or services, rather than sell products, e.g. a company producing office equipment markets itself as a document company. It is therefore, not meaningful to distinguish between manufacturing and service companies. And, even if we negate the second point, there is a statistically supported shift towards service industries, which contribute the lion’s share to GNP and employ up to 75% of the labour force in industrialised counties (Ayres 1998). It might not be very foresighted to exclude the largest sector from IPP. Some of the largest industries in the world are also service industries, e.g. tourism, and the environmental impacts from the service sector – which are often of an indirect nature – tend to be underestimated. It is therefore important to consider the possibility to integrate service industries into the IPP scope.

#### 5.2.5 Focus on functional thinking and product service systems

*Functional thinking* is a concept that is being developed and applied within industry. It’s potential to reduce environmental burden of business solutions was realised rather recently. Functional thinking moves attention away from a specific product – a particular technical solution, through which product function is realised. The question at the design phase is not how to design a product, but how to fulfil customer needs in certain function. This shift makes it possible to look for solutions beyond a particular technical artefact and to consider various alternatives, such as delivering mobility function not only through private car ownership, but also through car sharing schemes. The focus on function is also based on the assumption that there is always a mix of products and services participating in delivering the satisfaction. Thus if we would like to reduce environmental impact of delivering function, environmental impacts of both products and services need to be reduced.

Functional thinking provides basis for *product-service systems* that goes one step further and propagates the goal of improving the entire system that delivers the value to customer. In order to further improve environmental profile of a particular solution, not only environmental impacts of products and services need to be reduced, but also infrastructure established for taking care of material artefacts of the system and networks of actors are identified that will take part in collection of products, delivering services, remanufacturing products, and in their final disposal. If IPP is to be considered a proactive policy focussing on leaders instead of laggards, it is surprising why these elements are not included in its scope. Considering the fact that the core premise of IPP is a holistic system approach, the inclusion of PSS concept is extremely relevant.

#### 5.2.6 A coordinated information strategy

In the early sections of the latest Communication on IPP it is stated that IPP should encourage tools that contribute to improving information flows along the supply-chain. However, there is almost no recognition of the need for standardised formats for gathering

environmental information in supply-chains and the potential synergistic role of environmental management systems and other tools in assisting in this. The same is true for finding synergies in the provision of environmental information in various eco-label formats (ISO type I, II, and III).

A comprehensive *information strategy* that considers ways to encourage the collection of environmental product information in the supply chain and to provide the information to downstream actors is clearly needed. Examples of such systems for gathering product and process information can be found in the automotive and electronic sectors.<sup>39</sup> It should be noted that both sectors have legislation restricting the use of certain chemical substances, which has triggered the development of information strategy. Thus, the Commission should develop a more holistic information strategy to assist in environmentally sound decision-making of various actors. The strategy should be elaborated in consultation with all stakeholders, providers and users of the information. The most appropriate use of *mandatory vs. voluntary information requirements* should also be examined. The costs of obtaining the information should be compared with the needs of different actors and their ability to act upon it.

#### 5.2.7 Involving retailers in policy

*Retailers* serve as the link between producers and consumers, and are the main providers of information on products and services to consumers. Retailers have the capacity to influence consumer decision-making by informing, providing information and encouraging awareness. Their knowledge on what information systems exist for different products could become a necessary link in the information flow along the product chain. The retailer also plays an important role for the producer as a source of information about final customers, their preferences, interests and demands. However, we can see that retailers are often neglected in policymaking, and that they are seldom interested in conveying environmental information to consumers, partly because they lack necessary training (Jensen, Sørensen et al. 2002). Therefore, the role of retailers in delivering product information needs to be further investigated, both in regards to mandatory and voluntary information as a mean of raising consumer awareness. The need for training in environmental issues should be explored.

#### 5.2.8 Clarifying the role of different actors

We believe that the role of different actors needs to be clearly defined in the EU IPP strategy. It is important that the role of the European Commission in this work is clearly defined, and the Commission needs to clarify what is expected of political decision makers at the EU and member state level. Further we need to discuss what role industry shall play in relation to IPP. We would argue that IPP is a tool for policy makers. While industry may provide important input into the process of making policies, they are, along with consumers, essentially the target of these policies. Therefore we cannot ask industry to do IPP, it is the job of policy makers to implement policies under the IPP umbrella. These policies should enable and motivate industry, consumers and other relevant actors to incorporate lifecycle concerns in their decisions.

#### 5.2.9 Enacting instruments that will stimulate change

If IPP is to be successful we must make sure that the proposed measures will actually

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<sup>39</sup> E.g. International Material Data System, auto sector and the EICTA Supply Chain Management Initiative, EIA Standard Supplier Questionnaire, and Japan Green Procurement Standardisation Initiative (JGPSI).

stimulate change. There must be measures that enable and motivate individuals and organisations to reflect lifecycle concerns in their decisions. We need measures that address immediate challenges, as well as measures that lay the foundation for fundamental change in the long run. The instruments should stimulate and reward leaders as well as force the laggards to improve.

We also need to strengthen the demand side. As the increase of green taxes and removal of harmful subsidies progresses slowly, we need to rely on other instruments. One option is to not only promote green public procurement, but to make environmental criteria mandatory in public purchasing. There could also be measures to strengthen technology procurement at the European and national levels. On the European level, the only system that provides lifecycle based environmental product information is the EU flower, which has not been very successful. It is therefore imperative that measures are taken to either improve the EU eco-labelling scheme so that it becomes a real tool for encouraging and enabling consumers to make a green decision, or that alternative tools for providing environmental product information to consumers are developed.

#### 5.2.10 Indicators

To ensure that the entire European community is moving in the right direction we need proper indicators for monitoring IPP related progress at the EU level and on national levels. The indicators should reflect, among other things, the rate of green innovation, the availability of green products and services on the market, and the market share of green products and services (life cycle oriented demand).

## 6 Conclusions

In this paper we have provided an overview of existing policies for sustainable production and consumption. We have found that production-oriented policies are notably more developed than consumption-oriented ones. Although consumption has been identified as a key priority, very few concrete actions have taken place. Existing consumption-oriented policies are rather weak or have a narrow focus and therefore are not likely to stimulate necessary changes of consumption patterns. The EU has hitherto not developed any overarching policy framework for sustainable consumption, and, taking into account the general reluctance to address these issues, will probably not do so in the near future. There is an imminent risk that the ten-year framework of programmes for sustainable consumption and production that is being developed by the EU and many nations will only provide an overview of existing initiatives, complemented by the usual recommendations to increase the use of economic instruments, but not followed by a progressive agenda that will stimulate genuine change.

There are a number of ways to strengthen the sustainable consumption agenda. In this paper we first reviewed the possibilities to further integrate the environment and consumer policies. If a shift towards more sustainable consumption patterns is to take place, a minimum precondition should be the support by the actors that shape and influence consumer policy. Current trends that are likely to promote integration were identified and several ways to strengthen integration were suggested.

We also examined the possibilities to make IPP a more consumption-oriented policy. The current agenda limits the potential to make IPP an important strategy for sustainable consumption. In order to remedy this we propose a change of scope and vision. To reduce life cycle environmental impacts IPP needs to embrace a systems perspective and to focus more on innovation. This also requires an inclusion of services and strategies such as functional sales and product service systems. A more coherent information strategy, the

enactment of instruments that can help stimulate real change and a clarification of the role that different actors should have in delivering the goals of IPP should be provided in IPP. We further conclude that retailers are often neglected in environmental policy despite their potential to contribute to sustainable consumption, and therefore IPP should address this important actor.

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# Examining the Social Aspect of Sustainable Consumption

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## Abstract

Rethinking the role of consumption for individual well-being and societies' developments is key for addressing pressing environmental problems. We perceive a need to envision consumption as a social activity, which requires the active engagement of consumers in order to better enhance their quality of life. The paper focuses on one particular programme for more sustainable consumption, namely product service systems. After reviewing the potential and limitations of this programme, we explore the potential of LETS systems to overcome some of the limitations of product service systems schemes.

*Key words: needs, social capital, innovation, product service system, LETS*

## 1 Introduction

Current consumption patterns are a principal cause of environmental problems. Yet the rationale that more consumption is necessary for increasing quality of life has kept the questioning of consumption patterns out of the mainstream environmental agenda. Hence, the research community faces the great challenge of exploring the relationships between the appropriation of natural resources and the state of our well-being in order to develop and propose effective policy and programmes. This paper focuses on the role of the often forgotten social-context of well-being for making consumption patterns more sustainable. A promising path, relying on social processes and engagement, will be brought forth for sustainable consumption programmes.

This paper draws on a number of theoretical frameworks to illuminate on effective methods of implementation and dynamics for sustainable consumption programmes. First the evolutionary context of the problems is explored in order to use the different theoretical perspectives to consolidate the argument and bring out the importance of social considerations in sustainability programmes. These perspectives include a *needs-approach* to human well-being, the concept of *social capital* and its possible applications, and the benefits and contributions of the theories of *diffusion of social innovations*. The particular programme of Product Service Systems (PSS) is used as a base concept to apply the different theories to and illustrate potential paths that could advance its efforts to become a socially and environmentally conscious programme. In addition, in the second part of the paper the theoretical arguments are tested with empirical evidence based on the experience of an umbrella of British community programmes employing PSS-style initiatives. Primary data was gathered through a survey looking at people's behaviour and attitudes in the programme. This part serves as a case study illustrating highly participatory and socially-oriented programmes of alternative consumption.

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## 2 Consumption in its social context

The problems of consumption are embedded in a social context. The unsustainable appropriation of resources that has characterized consumption problems (Røpke 1999) has been largely a consequence of the path of development of our social system. Strategies to manage consumption-related problems must consider both the environmental and social urgencies.

The scale of economic activity has surpassed the biophysical capacity to sustain economic systems in the long run (Daly 1996). Fundamental physical principles like the second law of thermodynamics as well as tools such as the ecological footprint, or maximum sustainable yield studies clearly point out that growing demands from increasing consumption cannot be physically met with finite environmental resources. At the same time, social limitations do not suggest a growing need for consumption. On the other hand, there are a number of deep social problems associated with the current patterns of consumption. For instance, indicators like the ecological footprint show that more consumption for some, implies less consumption for others<sup>1</sup> due to the limited capacity of ecosystems to provide resources and absorb waste (Wackernagel and Rees 1995). Hence, current consumption patterns are not in congruence with important ethical principles such as that of equity and equal opportunities between and within generations (Borghesi and Vercelli 2003). Moreover, there is no consistent relationship between greater consumption and improved well-being and there have been many instances where quality of life has actually decreased with greater consumption.

The assumption that curbing consumption will compromise quality of life deserves greater scrutiny, as there is great room for sustainable consumption programmes to improve both environmental and social dimensions. Up until now, social factors such as the decrease in collective and participatory activities have reinforced the aggravating problems of consumption. Some examples include the decrease in public transportation, in community activity and ownership, and the increase in private property. Moreover, the lack of participatory strategies in developing economic goals and visions has been an obstacle for both environmental sustainability and to the improvement of social welfare. The resulting weaknesses in social processes and considerations can be tied to major social and technological movements co-evolving in a system driven by increasing consumption.

Starting with the Industrial Revolution, where mass production became possible and mass consumption a requirement, a consumption oriented socio-technical system began to develop (Goodwin *et al.* 2003). The production of many goods and services moved away from the household and the community and new social roles began to be defined in terms of consumption (Ibid). Institutions, cultural attitudes, and social trends then co-evolved and moulded to the new socio-economic system, which was being locked in unsustainable lifestyles (Sanne 2002; Jackson #, Røpke 1999).

Perceptions on quality of life and economic wealth have also been distorted in the worldviews of the emerging system. Increasing industrial productivity and rising incomes gave economic incentives to own more industrial commodities and discouraged repair and maintenance services as well as collective sharing schemes (Røpke 1999). Environmental and social externalities of industrial production and consumption were not incorporated into commercial transactions, distorting the real costs of the expanding economic system. Furthermore, fundamental social goals that had once justified the quest for larger economies in the name of improved collective well-being were becoming only background considerations of

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<sup>1</sup> It may be 'other' global citizens or 'other' generations to come.

a system geared towards economic goals. As Karl Polanyi argued, instead of economies being embedded in social relations and goals, social relations had become embedded in economic life (Polanyi 1944). This reversed system created negative impacts on the well-being of societies. For instance, norms of reciprocity, redistribution, and communal obligations were becoming more infrequent (The New School [no date]) and social goals were not properly integrated into economic priorities. Hence, the result was an inability to envision consumption problems as collective in nature and a growing social alienation of consumers in economic systems.

The internal dynamics of the market system encouraged a rising consumer society independent of social visions of well-being. Competition among suppliers for acquiring a larger market share led to the invention of more specialised and diversified products, creating new curiosities and desires among consumers (Witt 2001). At the aggregate level, the market system could not afford to have satiated consumers, as that would imply the collapse of market activity. 'More is better' became a principle rooted in market interests (Lintott 1998), an axiom equating well-being with material consumption and production. Consumption of many commercial goods and services became a vicious cycle of consumers striving to have the same or more than others around them. Hirsch (1976) explains some of the dynamics of this phenomenon as a social push, and trap, of continuous economic growth since many of our needs and wants are relative to the circumstances of others around us and depend on the aggregate of all the individual decisions. Therefore as some individuals increase their consumption, everyone else faces a different reference point, has new aspirations, needs, and structural opportunities; ultimately pushing the whole society to higher consumption levels. Hirsch (1976) refers to this relative characteristic of consumption as positional consumption and describes it as the result of competing individuals unwilling to co-operate and work together to envision their life as intimately interdependent.

Moreover, evolutionary theory has pointed out that social factors are crucial shapers of consumption behaviour. Through socialisation, imitation, and habit formation; trends of increasing consumption have spread rapidly throughout societies (Lintott 1998; Janssen and Jager 2002). As the dominant system became more infiltrated in social networks, the rate of adoption and intensity of adherence to new consumption patterns increased. At the same time, the increasing individualisation and formalisation of societies have increased consumption problems by deteriorating social life and the collective management of resources (Røpke 1999). Thus, the social context has been giving way to the expansion of the consumerist society in various ways.

The trend towards individualisation has allowed people to liberate themselves from social bonds and disengaged them from collective consumption activities. Households have increased in number and decreased in size, demanding more private household goods than before (Velcalsteren and Geerken 2003). Cultural bonds related to locality, religion, or class norms have also weakened, forcing individuals to define their identity within the emerging individualised commercial culture (Røpke 1999, Jackson #). As a consequence, the creations of social meaning, structures, and culture in general have begun to revolve more and more around consumption activities. Social hierarchies and status indicators are contingent on the degree of specialisation and diversity of one's consumption patterns (Witt 2001). Thus, current consumption in its social context has come to serve as an information system helping individuals to make sense of the world and of their social relations.

In addition, more individualisation has meant a decrease in the sense of security that was once derived from community relations and traditions, creating a feeling of insecurity, which is being compensated with impulsive buying behaviour (Lintott 1998). Consumption as

the search for comfort and stimulation has been substituting for some of the voids that have been created in societies where individualisation has propagated extensively. These voids are related to the alienation of individuals, the loss of generalised trust and security in a society, the decrease in collective action and all the consequences that these circumstances generate (Putnam 2000). The lack of social relations has thus intensified the demands being made from the world of material consumption.

Furthermore, the formalisation of social structures has combined with the individualisation phenomenon to exacerbate consumption related problems. Røpke (1999), and other scholars, have pointed out that there has been a gradual transfer of day-to-day activity into the formal economy. Over time, more labour and consumption has been devoted to the commercial sector in lieu of the household or the community. The result has been a decrease in informal networks of civil society that generally organise collective activities such as the sharing of capital goods, community improvement projects, and educational activities (Putnam 2000). In addition, private consumption has increased and global market networks have become more abstract and trans-national. In many ways, these consequences of formalisation have worsened the environmental and social problems of consumption.

For instance, the increased formalisation and expansion of markets has frequently alienated the average consumer from the economic process providing their consumption goods. Market structures have become more abstract and complex (Røpke 1999) with tight structures that are slow to adapt to changing environmental circumstances and arising citizen concerns (Whithworth 2003). Their regulation has been falling under the control of huge financial and trade institutions with vested interests and agendas. Moreover, people have been working in more specialised tasks and earning higher incomes in return for their higher productivity, which induces them to spend more in the formal market sector (Røpke 1999). Even more, these forces increasingly separate different sectors of the economy, making consumers more and more disconnected from the economic processes that enable their consumption. Unable to understand the complex processes of production, distribution, and retailing; consumers are less likely to take responsibility for their consumption patterns.

In the Veblenian tradition, consumption has been approached as a social activity, by exploring the driving forces and motivations beyond the individual. It has been found that some of the most important and deep-rooted causes of consumption are social in nature, and hence methods to alter consumption patterns must acknowledge these characteristics. The focus was on the social dynamics and trends in industrialised countries, which have led to acute increases in consumption without necessarily improving human well-being. The identified social causes demonstrate the need to make radical structural and social changes to approach consumption problems effectively.

### **3 Making consumption sustainable**

A wide range of initiatives has emerged at all levels of society in order to deal with the increasingly recognised problems of consumption. The business sector has invested greatly in technological efficiency and environmental innovations (McCann-Erickson 2002); governments and political groups have been implementing regulation and environmental agendas; and civil society groups have been mobilising in the name of sustainability (Wapner

1996; Linkages ca. 1995; Church 2002). Yet, in spite of all these efforts, the main problems of scale, consumer behaviour, and lifestyles have not been directly approached (Jackson #). Material intensive consumption keeps on growing (Gould *et al.* 1996; Borghesi and Vercelli 2003; Jackson 2002) while inequality also increases and improvements in well-being and human flourishing become more and more dubious.

One of the main problems of the solutions that have been implemented to deal with consumerism is the continuous overemphasis on economic goals and the relative neglect of environmental and social issues (Vlek *et al.* 1999; Gould *et al.* 1996). Producers, consumers, and policy-makers have feared that reducing consumption and interfering with the economy will affect a constituency's relative position and consumers' quality of life. As a result, most efforts have abstained from drastic changes, which give priority to social and environmental aspects over economic ones. For these reasons, sustainable consumption programmes have been slow to progress.

Social, economic and political structures have rarely been challenged and soft solutions, such as technological changes, have been favoured (Fabian Society 2003). Most efforts have opted for consuming more of new, green products (Jackson #); hence focusing on technological improvements that are accompanied by worsening rebound effects. However, avoiding the environmental and social costs of consumption as well as the behavioural and social aspects of it is proving to be detrimental for the success of sustainable consumption programmes (Oksana 2003; Rudd 2000; Jackson 2002). Ultimately, the current mainstream framework for addressing environmental problems is simply not enough. Even if there was complete adherence to plans of action, such as those proposed under the Brundlandt Report, more profound changes would still be needed to address the growing crises (refer to Duching and Lange 1994).

A good starting point would be to re-evaluate the concept of well-being and the individual and social goals being sought through consumption. A more ecologically aware and socially-oriented system should increase our quality of life given some of the failures of the current economically-driven system. For instance social and humanistic needs have been losing ground in material intensive economies; including the needs for social interaction, creativity, and engagement in meaningful processes. In turn, these voids are some of the most common causes of dissatisfaction and discontentment in contemporary industrial societies and of much defensive expenditure. A holistic and encompassing programme of sustainability must acknowledge that environmental and social goals are more essential than a growing economy; a frame of mind which requires radical changes in ideologies, behaviour, values, and organisational structure.

Looking at the design and experience of current sustainable consumption programmes will illustrate the kind of changes that need to happen to improve the ability to change consumption patterns. Both pitfalls and potential paths of work can be studied once the context of the problems and the goals for sustainability programmes are better defined.

### ***3.1 Product Service Systems (PSS)- A programme of sustainable consumption***

The particular programme of Product Service Systems is an interesting case study that sheds light on key dimensions influencing the success of sustainable consumption initiatives. Conceptually, it allows socially oriented and participatory solutions for consumption problems; yet its development has been vulnerable to the frequent overemphasis on economic goals and utilitarian perspectives. As the programmes acquire increasing popularity in research and

business communities, its potential for a successful sustainability transition will depend on the integration of stronger social components and better ecological understandings.

In practice, systems of service provision like PSS have always existed in different forms and organisational structures but the purpose of the current concept labelled Product Service Systems (PSS) is to move away from unsustainable consumption patterns. In this manner, PSS entails a shift from individual product ownership to a managed arrangement of utility provision via a mix of products and services subsequently reducing aggregate material consumption (UNEP 2002). With organisations such as the UNEP developing the concept as a sustainable consumption programme, PSS have been trying to reduce the life-cycle impact of different consumption activities by changing the systems of consumption.

The concept is not limited by a utilitarian perspective, as it can address many of the social dimensions of consumption problems. By promoting a collective and broad vision of consumption activities, PSS can become system-level changes affecting whole chains of economic processes and their various life cycle impacts (Bijma and Haffmans 2003). They re-evaluate consumption needs and wants and promote alternative mechanisms for satisfying them. Moreover, PSS encourage collective activities by advocating systems of leasing, sharing, and/or pooling of resources as well as alternative institutional structures that enable these kinds of arrangements. They recommend more intensive use of products and tools for consumption as well as more producer-consumer and consumer-consumer interaction (UNEP 2002). Consequently, the concept of PSS at least has *the potential* to implement more holistic solutions to the problems of consumption.

The organisational structure will play an essential role in exploiting the potential of PSS. At the moment, the dominant idea has been that providers assume more responsibility for the various impacts of the production and consumption process, giving economic incentives to maintain maximum efficiency at all stages of the commodities' life cycle in order to reduce costs and burdens of environmental regulation (UNEP 2002). However, given the complex nature of consumption problems and the systemic changes required, more consumer involvement will be necessary. So far, the experience of PSS initiatives has varied considerably from the business-led side to the consumer-led side. Those led by consumers have operated in a co-operative kind of style with strong social dimensions, more sharing schemes, and more widespread commitment to sustainability issues<sup>4</sup>. Those that have simply increased the responsibilities of producers have had various degrees of success and have remained isolated solutions modifying the channels of service provision<sup>5</sup>.

The state of the art of PSS programmes at the moment suggests that there are a number of aspects which still need to be further developed to achieve sustainability goals of economic, environmental, and social nature. Considering the lack of explicit social considerations and participatory approaches may help to explain the barriers that have prevented the realisation of the full potential of these programmes.

### 3.2 *A critical look at PSS*

To improve PSS as sustainable consumption programmes, fundamental social and environmental components need to be integrated into their framework. The goals of increasing

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<sup>4</sup> For example the co-operative farming company, Odin Holland; the wine-co-operative in Brazil, Civial; or the Greenstar, solar e-commerce and community center (UNEP 2002).

<sup>5</sup> For example the Interface Evergreen Lease Programme who has had difficult complications due to a lack of consumer involvement and understanding and an inappropriate regulatory environment (Interface 2002), an argument which resonates with the findings of other researchers of PSS and the experience of business-led projects (Wong 2003).

consumption, business profit, and the expansion of markets that have driven many sustainability efforts (Lovins *et al.* 2000) ultimately limit the effectiveness of the programmes. Cumbersome assumptions such as exogenous consumer preferences and the association of quality of life with material consumption must be re-evaluated. In a complex and dynamic system there is room for influencing consumption patterns based on unsustainable attitudes and beliefs, through participatory and informed processes (Norton *et al.* 1998). Aims like keeping harmony with ecological cycles could prevent serious and detrimental consequences. Moreover, improving social components could increase the rate of diffusion and adoption of the programmes as well as greater consumer commitment and satisfaction extracted. Yet most PSS frameworks have been too narrow in their focus on economic issues, compromising social and environmental goals.

From an environmental point of view, PSS programmes have not been very satisfactory. First of all, many programmes have used the structural concepts of PSS but have not taken any environmental consideration (Cooper and Evans 2000; Oksana 2003). Among those that have shown an interest on reducing environmental impact, the results have been far from achieving any sustainability goal. Some schools of thought argue that a sustainable society would have to rely on about 10% of the resources consumed today by industrialised countries (UNEP 2002), yet most programmes have been very far from making these kinds of reductions<sup>6</sup>. Further, the existence of rebound effects seems to be a dangerous trap for PSS (UNEP 2002). Efficiency improvements and lower costs can increase aggregate consumption because of increased savings. The benefits of PSS, in terms of reducing costs by dematerialising consumption and by applying more efficient technology and consumption arrangements, may end up hurting environmental goals. Therefore the real challenge for PSS programmes lies in integrating sustainability priorities into their institutional frameworks.

The cultural context that influences today's consumer society is a decisive element that must be tackled (UNEP 2002; UNEP [ca 2001], Pi-Net [no date]). Many of the principles of sustainability are incompatible with the existing social trends. For instance, the development of PSS is hindered by the strongly promoted values in the current system of personal accumulation, individualisation, and luxurious comfort (UNEP [ca. 2001]). These are ingrained attitudes and behaviour, which pose a barrier to a concept of PSS based on collective consumption and service provision. The programmes have to develop a consumption system that goes beyond utility and includes the crucial social and psychological functions of consumption.

One of the main weaknesses of PSS programmes has been the ambiguous regard for social and humanistic dimensions. In the literature, it has been acknowledged that programmes need to regard the social context of consumption (Fuad-Luke 2002, Collina 2003, UNEP 2002) but in practice, little has been done to implement social considerations. This is a failure, which has had grave consequences for the success of PSS in transforming consumption patterns, but it is not a failure inherent in the concept of the programme. On the other hand, PSS can approach some key social and humanistic aspects of consumption by creating stronger social relations in economic systems through more personal interaction and by increasing consumer involvement in the provision of the service. Humanistic and social goals are essential to continue the improvement of our lives in more sustainable ways.

Even at the economic level, there would be great benefits from integrating stronger social components. So far, implementation, diffusion, and adoption rates have been quite slow

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<sup>6</sup> Osaka (2003) argues that when environmental improvements have been made through services they have been of the factor range of 1.7-2 rather than the factor 4 or higher necessary.

and modest in scale (Vercalsteren and Geerken 2003; Cooper and Evans 2000). Most successful PSS projects have been associated with a compatible social and economic context, which have included car-sharing schemes, community art businesses, and co-operative style firms (refer to cases in UNEP 2002). Social components can enhance the chances of adoption and diffusion of the programmes by making them more acceptable and responsive to consumers needs and by helping to develop an appropriate surrounding framework for their implementation.

Overall, there needs to be an aim to implement the programmes at the system level (Bijma and Haffmans 2003; Ehrenfeld 2001). Entire economic chains and subsectors need to develop with the programmes to create system innovations bringing in new goals and considerations. It is not enough to focus on a switch to services as solutions, as these are not in themselves sustainable. Instead a redesign of economic systems, where all players and stakeholders can be involved is necessary to make real transitions to sustainable societies (Bijma and Haffmans 2003). The consumer society exists at different levels of the current socio-economic system; hence changes need to be all-encompassing and inclusive to have a solid basis of sustainability principles (UNEP [ca. 2001]).

Our systems are guided by social goals and visions and sustainable consumption programmes, like PSS, need to act in awareness of the existing limitations and promising possibilities. There have been a number of cultural barriers, lack of environmental commitment, and disregard for social issues, all of which have hindered the development of PSS programmes. Yet a closer look at the context of consumption problems shows possibilities to improve the effectiveness of PSS programmes by concentrating more on social and humanistic dimensions of consumption and well-being.

#### **4 Human needs and consumption**

The human needs approach is useful as an exploration of the relationship between consumption and well-being. They explain the social and behavioural causes of consumption as well as the theoretical meaning of our economic systems (Dodds 1997, Jackson et al. 2003). Production of goods and services is the production of satisfiers, which are consumed by individuals to extract satisfaction (Doyal and Gough 1991). The particularity about the needs approach to consumption is that our needs are said to be finite, few, and to some extent universal (Jackson #, Penz 1986). This theoretical framework sheds light on the nature of many consumption problems and the inefficiencies of current economic systems at satisfying fundamental needs and enabling further social developments.

The range of needs that has been identified by researchers illustrates the different dimensions of human existence. One of the most elaborate frameworks, developed by Manfred Max-Neef, classifies needs into nine main categories, which include subsistence, protection, leisure, participation, affection, freedom, understanding, creation, and identity. These needs happen simultaneously (except perhaps for subsistence needs) and they can complement or substitute one another depending on how they are being satisfied. According to Max-Neef, satisfaction happens in four different ways; by doing, having, being and/or interacting (Max-Neef 1992). Yet needs are met by an infinite number of different specific satisfiers, which are relative to culture or to social circumstances (Doyal and Gough 1991).

In essence the different human needs have physiological, social, and/or psychological dimensions, which implies the need for different kinds of satisfiers (Jackson #). However, in the current economic system there has been an over-emphasis on material needs and on the object of satisfaction rather than on the need (Max-Neef 1992). Increasing consumption

patterns have resulted from expanding material satisfiers creating new sets of wants, which have many times become more and more distant from the original needs they represented (Witt 2001). The reliance on commodities for the satisfaction of different and complex needs has decreased the efficiency of satisfiers in the current system.

The result has been a deprivation of many non-material needs; the satisfaction of which has been increasingly sought through material consumption. As Kamenetzky (1992) points out, “when one need or another goes unsatisfied- humans frequently find distorted paths for reducing the pain associated with the deprivation of the corresponding satisfiers. It has been shown that the lack of satisfaction of the need for emotional and physical communication gives rise to strong drives for power, domination, violence and possession, and consumption of goods” (p.#). Overall, it has been found that material commodities are effective satisfiers for material (physiological) needs but poor satisfiers of psychological and social needs. The more material means are used to satisfy these needs, the less they are actually satisfied (Kasser in Jackson #).

In the developed world social and humanistic needs seem to be among those most lacking, mainly due to the structure of consumption systems and their approach to human needs. In particular, the decreasing opportunities for direct human agency and involvement in need-fulfilment processes have been problematic aspects of current consumption patterns. Needs are fulfilled at various stages of economic processes and end-product satisfaction is only one of them (Ehrenfeld 2001). Programmes of sustainable consumption, like PSS, must avoid equating utilitarian services with need-fulfilment, as it disregards the role of human engagement in the attainment of satisfaction and the wider context of consumption activities.

Ehrenfeld (2001) describes products and services as different modes of delivery of satisfaction, with key differences in time structures and degrees of consumer involvement<sup>7</sup>. Using these axioms, PSS are consumption modes of immediate satisfaction and little consumer involvement; characteristics that forewarn a drive for increasing consumption from instant and easy rewards and a growing incompetence of consumers to use skills and other modes of satisfaction. Giving more responsibilities to suppliers to control consumption processes, can make consumers more dependent on producers and less capable to engage in self-satisfaction. The outcome is a loss of consumer autonomy, which many surveys have demonstrated “results in consumers feeling even more unsatisfied and therefore seek[ing] more consumption to fill the hole”(Ibid). Consequently, the time structure and degree of involvement of the consumer has serious implications for sustainable consumption programmes.

The growing passivity of consumers in the economic system has disempowered them by limiting the satisfaction of many human and social needs. By being at the receiving end (final consumption) of other people’s actions, consumers have been alienated and limited on their consumption choices. The involvement and engagement of consumers in the creation of goods and services yields direct satisfaction for many non-material needs such as participation, autonomy and creativity (for example). If these needs are not effectively satisfied, the resulting voids will lead to increased material consumption (Jackson 2002).

Sustainable consumption projects such as PSS must overcome these flaws by proposing innovative and effective satisfiers that correspond more to our fundamental needs while decreasing the material intensity of our societies. The findings from the ‘needs approach’ advocate institutions, which promote full and free participation of all social groups

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<sup>7</sup> Ehrenfeld (2001) describes products as tools to be used to create satisfaction in the future and services as immediate providers of satisfaction

(Kamenetzky 1992) as well as self-reliance and endogenous satisfiers to create satisfaction in process (Max-Neef 1992). Participatory strategies and collective evaluations of needs can help to make PSS programmes more effective at making our consumption more efficient, welfare enhancing, and sustainable.

## **5 Social processes and social capital**

Integrating social components into sustainable consumption programmes is an imperative step in order to tackle the social causes of consumption, to develop new programmes that increase our quality of life, and to have programmes widely adopted. Consumption is, above all, a social activity embedded in an institutional and cultural context that gives rise to prevailing consumption patterns. In order to improve current consumption patterns, there needs to be an evaluation of needs and goals as defined through collective ideas and visions (Ehrenfeld 2001).

Therefore, the concept of social capital is useful to the development of sustainability programmes in order to improve their process of implementation and resulting benefits. In definition, social capital is “the set of social relations, norms, and institutions of a society” (Rudd 2000). More particularly, it refers to social organisations, levels of trust, reciprocity norms, and social networks that can increase the efficiency of a society by instigating collective action (Putnam 2000). Increasing social capital in sustainable consumption programmes would imply enhancing interpersonal relations and creating more active and engaged communities achieving collectively established goals.

Through social interaction and the existing social culture, cognitive processes and preferences develop and shape consumption behaviour (Hodgson 1992). Studies have shown that behavioural changes are most effectively achieved through initiatives delivered at the community or group level as they help to remove the structural barriers to change and enhance the benefits derived. In addition, social interaction has been found to exert the most influence on attitudes and behaviour (social marketing article). People interact with each other to actualise their sense of being and well-being and to form many of the symbolic and communicative aspects of consumption (Helson 1992, Jackson 200?).

Many of the causes of consumption can be successfully tackled if envisioned as social problems since they are linked to issues of collective choice. In essence, environmental resources are public goods that have suffered the inadequate handling in the current system (Rudd 2000). They have been unequally and unsustainably appropriated<sup>8</sup> through the continuous insistence on privatisation and market mechanisms for handling scarcity (Ostrom 2002). Many cases of unsustainable consumption patterns have been the result of our inability to envision our needs and goals as ultimately social and to the lack of participatory and co-ordinated processes guiding a collectively-constructed vision of a sustainable future (Rudd 2000).

The disembeddedness of economies from the social world has fuelled consumption problems in numerous ways. The growing separation between producers and consumers, the lack of social satisfiers, and the compromising of social welfare to economic efficiency have been major obstacles for achieving sustainability goals. It has been difficult for consumers to include their concerns throughout the evolution of the market system, as the following passage illustrates, “from the outset, techno-economic innovations as a motor of permanent change have been excluded from the possibility of democratic consultation, monitoring, and

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<sup>8</sup> The concept of sustainability implies equal access to resources for existing and future generations without disrupting important life-maintaining functions.

resistance” (Beck 1992 cited in Georg 1999, p. 464). Overall, consumers as citizens have been feeling more disengaged from the economic processes shaping their lives (Jackson 2002). They are merely actors expressing their concerns through the purchase of commodities (Fromm 1976 in Jackson 200?). Social decisions have been falling subject to market mechanisms, which have not always been appropriate for dealing with the complexity of social problems<sup>9</sup>. Consumption solutions require economic activity to be embedded within social life in order to integrate social values, concerns, and needs into the economic system (Seyfang 2001).

Social capital can be a very valuable component for sustainable consumption programmes because it can help to enhance quality of life aspects while reducing inefficient consumption. In particular, many social needs can be directly satisfied by improving social relations and community life. In terms of the individual, social capital increases our sense of well-being and satisfaction (Putnam 2000). In addition, more trust and communication between economic actors lowers transaction costs, increases the provision of public goods, and reduces opportunism. Furthermore, more social interaction helps to develop effective institutions addressing social problems, facilitates collective action, and produces economies of scale (Rudd 2000). For the household, social capital can give new consumption opportunities through sharing schemes and public activities and can help to generate more income from stronger social relations and more equitable distributions of resources (Grootaert and Bastelaer 2002).

Moreover, goals of sustainability are many times easier to reach through local action and community projects (Church 2002). At the local or ‘neighbourhood’ level community, government, and businesses come together and are more likely to overcome their suspicions of one another and decrease misunderstandings (Gibson 1992). More communication and interaction can give rise to feasible and locally acceptable sustainability solutions. For businesses, it can increase opportunities and give a competitive advantage through key networks and social relations. For consumers/citizens/workers, social capital can increase their market knowledge and their corresponding responsibilities (Granovetter 1985; Grootaert and Bastelaer 2002). Therefore, social components have the potential to improve the performance of sustainability programmes and reduce many of the current barriers.

For a programme like PSS, social considerations are particularly important and easy to incorporate given the programme’s conceptual framework and goals. PSS are based on principles of collective consumption, tighter economic relations, and more efficient administration of economic processes- all of which can be improved with social components. At the same time, some of the main barriers that the programmes have faced relate to their neglect of social issues; these include the current trends of increased individualisation, the lack of time for social activities, and the decreased habit of collective consumption (Vercalsteren and Geerken 2003). Moreover, their spread and penetration of the market has been impeded by the inability to influence consumer behaviour and to co-ordinate the different players that would be involved in a system’s transformation (Oksana 2003). Altogether, these new sustainable consumption programmes must redefine themselves within the social sphere and promote collective well-being in order to become viable and promising paths.

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<sup>9</sup>For example refer to worsening inequalities and poverty caused by globalising free markets in Borghesi and Vercelli (2003).

## 6 Transformations in society

Given the public nature of consumption problems, the movement towards sustainable ways needs to be widespread and far-reaching. In particular, a socially-oriented vision is a requisite and integral part for the diffusion and adoption of sustainable consumption programmes. Effective PSS programmes will ultimately be system-wide innovations because they affect individuals and interests at different levels and require considerable co-ordination and co-operation of different actors (Manzini 1996 in Cooper and Evans 2000, Bijma and Haffmans 2003, Rennings 2000). Changes of these kind and magnitude can be better achieved with inclusive and participatory processes that take into account the different stages and requisites of social innovations.

The theory of 'diffusion of social innovations' gives many insights on ways to enhance the potential of Product Service Systems in terms of acceptability and strength of the programmes. In particular, the literature points to the importance of understanding the culture, local environment, and individuals of a system before an innovation can be spread in a society (Rogers 1995). Innovations must be compatible with values, beliefs, and past experiences of a locality for them to be adopted. In addition, the structures of the diffusion system in terms of the channels of communication, diffusion networks, involvement of participants, and incentive mechanisms are determining factors on the penetration of new social systems (Ibid).

In terms of social networks, both formal and informal structures are needed at different stages of the diffusion process. Formal ones are impersonal but useful for informing the public about the existence of an innovation. Informal structures have higher social capital components and are effective at persuading individuals to adopt new ways. The involvement of all players is essential and hence highly participatory structures are favoured. In particular, the inclusion of key players such as change agents and opinion leaders will help to generate innovations and influence adoption. Social transformations are generally the product of change at different levels of the system, catalysed by appropriate and effective incentive mechanisms in place (Rogers 1995).

Overall, empirical findings illustrate the importance of social relations, networks, and participatory institutions in bringing about social change (Ibid); strengthening the argument that sustainable consumption programmes need more social components. Social relations have been identified as 'powerful mechanisms' of social innovation (Cogoy 1999) and determining factors on the rate of diffusion and adoption of new knowledge (Grootaert and Bastelaer 2002). Interpersonal relations help to inform people and create subjective valuations, influencing the final decision to adopt an innovation and the satisfaction derived from them. On the other hand; extended, active, and heterogeneous social networks tend to increase their social acceptance (Rogers 1995)- an important point when innovations require changes in behaviour, values, and lifestyle. Interaction between actors allows them to reflect collectively, to reach agreements, and to work together to adopt attractive proposals (Whitworth 2003). More in particular, social norms of interaction have been found to be primary shapers of household consumption patterns (Georg 1999).

Research on diffusion processes has found that there is a proportionate relationship between the level of social participation and the level of adoption of innovations (Rogers 1995). The inclusion of different players facilitates the co-operation and synchronisation of individual innovating efforts and can help to form networks of complementary partners (Bijma and Haffmans 2003). In addition, people's different roles and interests in society; as consumers, workers, share-holders, or citizens can be better expressed and accounted for in participatory methods. There needs to be more space and opportunities for representing the

various social goals that we have as a society and means to allow the system to adjust to changing circumstances.

The domination that private firms and corporate networks have had on the development of sustainability initiatives has many times limited the sustainability cause (Faucheux and Nicolai 1998). In many occasions, these powerful actors have been interested in maintaining the existing status quo and also systems 'locked in' unsustainable but profitable consumption patterns. The result has been innovations serving the commodity economy, which struggles to maintain incessant liquidation and renewal of products, negative externalities outside the producer's costs, and increasing profits for the entrepreneur (Ibid). Under these conditions, sustainable programmes will keep on facing the same obstacles that have impeded their development so far.

To ensure sustainable consumption paths, programmes like PSS need to give more attention to the wider context of the problems to direct changes in the most appropriate ways. So far, the exploration of the problem reveals deep-rooted social phenomena around consumption problems and the need for pro-active and participatory methods to solve them.

## **7 Exploring LETS programmes**

In order to test the performance of more socially-oriented and participatory programmes, this section gathers empirical data from on-going community projects of alternative consumption. They are called Local Exchange Trading Schemes (LETS) and although they are not in theory sustainable consumption programmes; through their social and community consciousness, they have promoted many sustainability principles similar to those in PSS programmes. Findings for this case study were derived from a survey distributed to participants and organisers of LETS in the UK; a review of pamphlets and newsletter distributed by the central administration, LETSLink UK; and a review of literature written on the projects.

In essence, LETS are systems of exchange between people in a community where members can offer any service or product they are willing to provide and purchase other goods and services offered in the community. Transactions get recorded in the administration of the scheme to keep track of the balancing of accounts within the group. They operate at the community level and promote economic self-reliance.

The main priorities of LETS are to create social cohesion and inclusion in communities as well as more social equity (Seyfang 2001). By increasing social interaction and by giving people a medium to help each other, they develop and encourage the experience of the community (Shephard 1997). Originally, LETS were based on a green agenda as alternatives to unsustainable patterns of economic growth (Seyfang 2001) and its detrimental social consequences. Overall, they give interesting and useful information on the experience of sustainability initiatives with strong social components.

### **7.1 Survey design and methodology**

In the UK, as well as in many other countries, LETS-type of programmes have been attracting a growing number of people and interest. LETS in the UK have increased from 92 schemes in 1992 to about 300 today, including some 22,000 participants<sup>10</sup>. The survey in this research was based on the UK experience and it included 50 responses from organisers and participants of 27 different schemes.

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<sup>10</sup> LETSLink UK estimates that there are 450 existing groups with about 40,000 participants, however recent studies such as that done by Williams et al. [ca 2000] identified only 303 schemes and about 21,800 members.

The survey questions looked for the existence of social capital and its benefits to the system and members; the amount of sharing, leasing, and collective activities that take place; the perception, attitudes, and engagement of people in the programmes; their effectiveness at satisfying needs in innovative ways; and the dynamics of green social networks inside LETS. Most of the questions were close-ended but had a section for additional comments, clarifications, or examples. Therefore the data collected was both quantitative and qualitative. Quantitative data was analysed in EXCEL in order to test for patterns and trends. Qualitative data was used to enrich quantitative results, with specific comments and examples added by respondents.

The questionnaire was piloted and revised to be clear and intelligible. The same questionnaire was given to organisers and participants since the only difference is that organisers are more involved participants.

There were three forms of responses; online through a website (60% or 30 respondents), as an attachment on e-mails (14% or 7 respondents), and through telephone interviews (26% or 13 respondents). The only stratification was that telephone respondents were from the Yorkshire region. A list of 70 telephone and electronic contacts for this region was provided by LETSLink UK. The online questionnaire was distributed via the newsletter of LETSLink UK and through various LETS websites. When interpreting the results, it is important to acknowledge some limitations regarding the sample population of the study. First of all, the sample size may not be large enough to make conclusions that can be generalised to the whole population. The number of responses was limited because of the short period of time available for data collection, the lack of up-to-date records of member contact details, and the difficulty of talking to people geographically dispersed. Moreover, the methods of data collection had a bias favouring those with access to computers and Internet, as most people were contacted via electronic notices and encouraged to answer an online questionnaire. This may imply that the majority of respondents were of upper class, more urban, educated, and cosmopolite.

In spite of the possible limitations concerning random sampling techniques, the profile of respondents seems consistent with other studies (see for example Aldridge *et al.* 2001; Williams *et al.*[ca. 2000] ) and in relation to the different sources of data. For instance, age range and income categories in the UK sample and in the Yorkshire sample are similar (refer to table 7.2.2). The majority of LETS members in both samples tends to be middle aged (40-60 years old) and of middle to low income (£20,000 or less per year per person). In addition, 30% of respondents were male and 66% were female, a figure that corresponds to the actual gender division found in many LETS schemes (Lee 1996; Stott and Hodges 1996; Williams 1996b; Pacione 1997).

Moreover, given the respondents' profile, findings can be expected to be well-founded and informed since 54% of the people interviewed were organisers of LETS and 76% had been involved with the schemes for more than two years.

## **7.2 Results on the social aspects of sustainability**

The social capital promoted in LETS is important for sustainable consumption because it encourages more collective activities, sharing, and social visions, as well as the fulfilment of many needs of social nature which have been neglected in mainstream programmes. The factors motivating people to get involved in LETS reflect a will to get engaged in social activities and arising programmes conducive to practical benefits and environmental improvements. Community building was the most popular motivation, followed by

‘convenience’ and ‘environmental reasons’. These results illustrate the social and environmental concerns of these communities and the utilisation of alternative consumption programmes to tackle them.

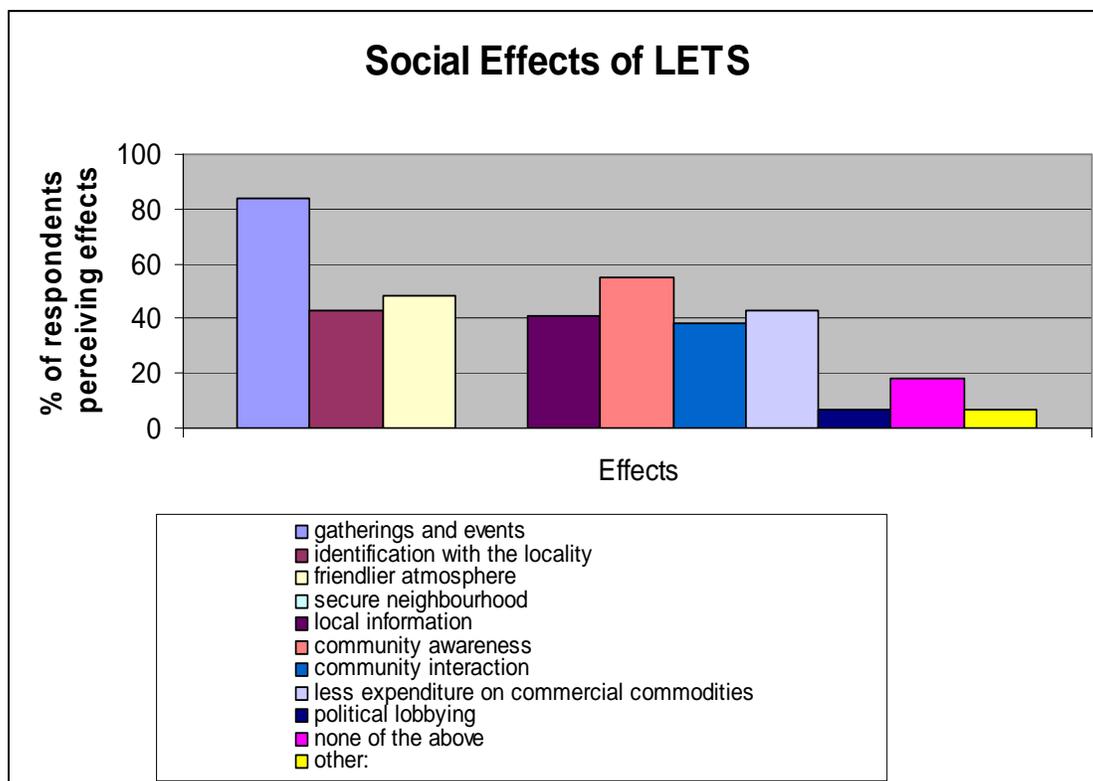
**Table 1 Motivations for joining LETS**

Motivations	Respondents motivation*	who mentioned
Community building	36	72%
Convenience	21	42%
Environmental reasons	21	42%
Socialising	19	38%
Economic reasons	17	34%
Desire to change lifestyle	14	28%
Develop skills/ideas	12	24%
Other	9	18%
Political reasons	4	8%
Learning from others	3	6%

\*Respondents could give up to three answers for their motivations. The first number is the amount of times the answer was mentioned and the second is the percentage of respondents who gave that answer.

Overall, LETS programmes seem to be developing the social and community consciousness they are striving for. Participants identified a number of arising social activities as a result of LETS (refer to graph 7.2.3). The most cited one was ‘increased gatherings and community events’, noticed by a large majority of respondents (86%), this was followed by ‘increased community awareness’, and by ‘friendlier atmosphere’ and ‘increased identification with the locality’. The improvements in social life that emerge from these social effects of LETS can improve well-being and may fulfil social needs that are being sought in the commercial sphere.

**Graph 1 Social effects as perceived by respondents**



*\*Please refer to Appendix 1, question 4 for social effects as written in the survey.*

The existence of initiatives promoting collective consumption initiatives was tested by asking individuals what percentage of transactions they thought involved leasing, sharing, and/or pooling of goods and services. From respondents' perception there seems to be substantial consumption activities of this nature, as illustrated in table 7.2.3, about 40% of respondents thought they happened in more than 20% of LETS transactions.

**Table 2 Collective consumption in LETS**

LETS transactions estimated to involve leasing, sharing, and/or pooling of resources	% of respondents estimating each range
60-80%	6%
40-60%	14%
20-40%	20%
Less than 20%	58%

In addition, respondents were asked in an open-ended question if they had perceived more collective action and consumption as an outcome of LETS. Many participants (about 40%) identified the existence of these kinds of initiatives and gave some examples such as 'garden tools, decorating equipment, video sharing, allotment work, transport, and other rotator, loan, and hire projects'. These collective consumption projects are similar to those envisioned in PSS and they are being initiated by communities themselves.

Community cohesiveness and action seem quite strong in LETS groups. Seventy-five percent of members reported being involved in other community groups and/or events and in most cases they joined them after being involved in LETS. These results suggest a high level of social capital and viable opportunities to improve the collective life of LETS groups.

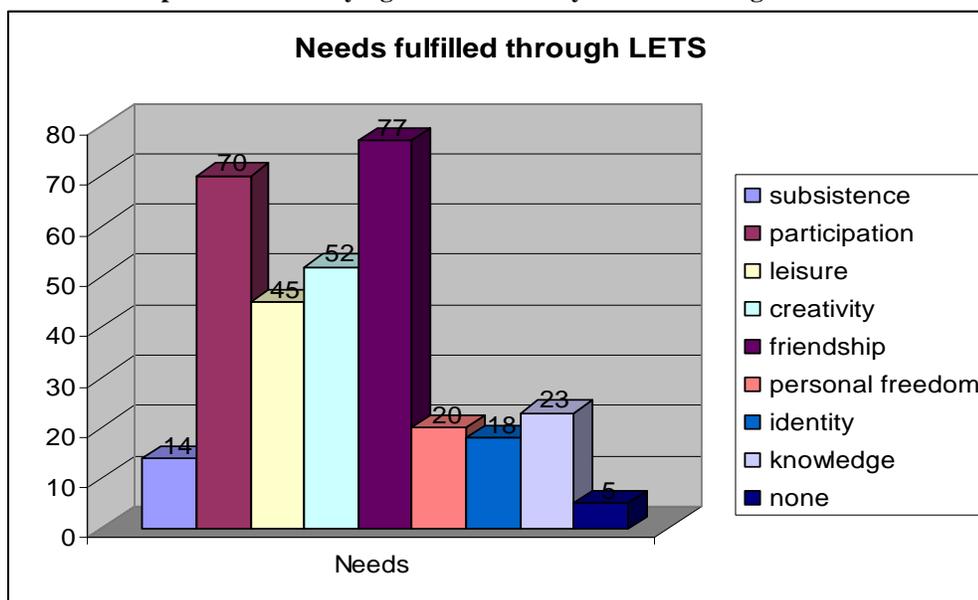
In relation to environmental goals, there seems to be a positive effect of enhanced social interaction on the diffusion of environmental awareness. Most programmes have been led by people with a high sensitivity for environmental issues and hence they tend to attract this kind of people (Williams [ca 2000]; Aldridge and Patterson 2002; Seyfang 2001). In addition, environmental awareness gets transmitted and augmented when all the different participants interact and the probabilities of adopting overarching environmental goals increase. In the survey, 52% of respondents had increased their environmental awareness to some extent. For 44% there had been no change, in many cases (45%) because they had already been very environmentally sensitive. Hence, there has also been an aggregate increase in environmental awareness through LETS programmes and their mechanisms of social interaction and collective thinking.

### 7.3 Effectiveness of LETS programmes

If LETS were to become exemplary frameworks for sustainability programmes, it would be important to consider their capacity to fulfil needs, their ability to promote innovative ideas and products, the amount of trust in the system, and satisfaction participants are getting through the programmes. These elements determine the strength and potential of new programmes with sustainability goals and, in particular, they help to evaluate the ability to address consumption problems with socially oriented initiatives.

Max-Neef's categories of needs were used to test the effectiveness of the programmes at fulfilling fundamental human needs<sup>11</sup>. Respondents were asked to choose and evaluate the needs that were being addressed through LETS. Graph 7.2.4 shows those needs perceived to be *effectively* or *very effectively* satisfied.

**Graph 2 Percent of respondents identifying needs effectively fulfilled through LETS**



The fulfilled need identified most was that for friendship, intended to correspond to the need for affection. The examples given for the satiation of this need included the following comments: 'meeting like-minded people who are environmentally aware', 'the benefits of this

<sup>11</sup> Needs were listed and in some cases modified to be easily understood in the context of what LETS programmes could provide. Please refer to question 9 of the survey.

programme when one feels alienated in society’, and ‘the chance to interact and meet people I would not have met otherwise’. Hence, LETS have provided new outlets of economic activity that operate in a collective and socially stimulating manner.

According to the survey, the second need most satiated was that for ‘participation’ followed by ‘creativity’. Many times the identified satisfiers were fulfilling both needs simultaneously; referring to community events, social clubs, and instructive and engaging workshops. In general, people were rewarded by the active and significant roles they could hold in the programmes. The fulfilment of these humanistic and social needs is an aspect that has not been given adequate importance in the mainstream economy.

Bottom-up programmes like LETS can also give rise to innovative ideas within the community context. In the survey, 62% of the interviewees perceived that more than 20% of LETS transactions were ‘innovative ideas, offering new concepts of products and services’. Examples included artwork and health services, helping the disadvantaged, repair work, Internet services, and house-chore help. As was mentioned by a respondent, many of these activities would not be economically viable in the market but are still needed by people. Moreover they tend to be of low material intensity and high social consciousness. However, the main perceived limitations were the lack of practical skills and wide-reaching communication.

Yet another advantage of LETS was the level of trust that exists in the system. Several respondents found it an asset to know each other personally in order to make exchange relations more solid, fair, and reliable. Fifty-two percent of respondents thought that trust existed in the form of ‘internalised norms and moral obligations’, suggesting a deep-rooted adherence to group obligations and rules that allow the system to function. In a system where there is trust and inclusiveness, it is easier to develop sustainability initiatives and have people adhere to them.

In order to measure the overall satisfaction of participants with the programmes, people were asked how successful LETS schemes had been in achieving their stated goals. Sixteen percent thought their scheme had been ‘very successful’, 28% thought ‘generally successful’, and 32% thought it had been ‘somewhat successful’. In general, people seemed pleased with the development and outcomes of their schemes and had found it a rewarding experience to participate in LETS. The main areas of problems were related to the need to have a hard working core group and committed leaders to make LETS flourish.

Overall, the survey gave some interesting findings related to the arguments being raised in this paper. The existence of social capital seems has been a positive factor on the perceived well-being of people and on their commitment to social and environmental issues. In addition, LETS systems appear to be empowering people by improving their skills and capacity to generate ideas and act collectively, all of which are important aspects for sustainable consumption initiatives.

### **Review of other studies on LETS**

There have been several studies carried out on different aspects of LETS. In particular, the findings related to the effects of greater social interaction and the promotion of sustainable consumption shed light on the arguments and conclusions of this research project. Most of these studies reaffirm the importance of social cohesion in achieving both social and environmental goals.

To start with, there is a general consensus that LETS programmes are effective at community building and at creating new social networks (Stott and Hodges 1996; Williams [ca. 2000]; Seyfang 2001; Aldridge *et al.* 2001; L. Thorne 1996). In turn, these effects have

led to more community ownership (Stott and Hodges 1996) and to a better integration of economic and community goals (Williams [ca. 2000]). Overall, participants have felt a reappearance of local networks (Williams 1996b) and a disposition for mutual aid programmes (Williams [2000]). These characteristics have made LETS successful at re-embedding exchange relations in the social sphere and at focusing more on the collective experience (Thorne 1996).

In relation to sustainable consumption, a number of attributes of LETS programmes have also been identified (Seyfang 2001). First of all, LETS get community members interacting, evaluating their needs, and co-ordinating their abilities and access to resources. They encourage sharing, leasing, and pooling of resources as well as more collective thinking. There are many programmes of tool and big-equipment leasing (Williams 1996a; survey), laundry-machine sharing (Williams 1996a), car and transport servicing, and collective workshops. Furthermore, they help to finance labour-intensive activities such as service, maintenance, and repair work (Shephard 1997) and promote recycling and reusing practices (Seyfang 2001).

They encourage the localisation of the economy (Seyfang 2001), giving incentives to identify local resources in culturally and physically appropriate ways (Shephard 1997), decreases transportation pollution and costs, and changes consumption patterns (Williams 1996b). They promote and develop new skills and self reliance and are thus effective at meeting many needs of humanistic and social nature that have been neglected in the mainstream economy. For instance, they satisfy the need for productive activity, work engagement (Aldridge *et al.* 2001), and social interaction.

A study conducted on the ability of LETS to promote sustainable consumption patterns concluded that the programmes' potential to promote a sustainable economy has not been fully realised and that their focus on social issues and community building has not been matched with an equal focus on environmental goals and changing consumption patterns (Mochiba 1998 in Seyfang 2001). However, evidence suggests that the focus on social and participatory processes can be an aid to the adoption of more environmental goals in an 'organic' way. Many participants already have radical environmental ideologies (Ibid), which over time get diffused and integrated into the dynamics of the system. Results from a survey conducted in Kwin<sup>12</sup> LETS shows the existing and expanding environmental awareness in the group. Ninety-one percent of the respondents agreed with the fact that development should involve less consumption but greater quality of life, 77% felt that LETS was a greener economy than the mainstream economy, 40% felt their quality of life had increased with LETS, and 31% felt more able to live a greener lifestyle (Seyfang 2001). Moreover the Kwin LETS survey revealed that for some members, the desire to reduce material consumption and waste were key goals that had gotten diffused and had influenced many other members in the scheme. Finally, 23% of respondents claimed to have become more environmentally aware of their localities through LETS (Ibid).

Therefore, the creation of green social networks has been a major strengthening factor for the environmental dimensions of LETS (Seyfang 2001). In many instances, the programmes have instigated changes in consumption patterns as a result of the concerns and action of some individuals. In the Kwin LETS the largest categories of trading by value were on locally supplied services and on repairs and property maintenance. In addition, 45% of members bought recycled or second-hand equipment from within the scheme, 25% directly reduced consumption, and 37% of traders got property repairs (Seyfang 2001). In a different

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<sup>12</sup> Kwin stands for King's Lynn and West Norfolk LETS

study carried out in Totnes LETS, maintenance and repair work was found to be the third largest good or service bought (consumed by 31% of members). The studies found that a large portion of these activities would not have happened outside LETS (Seyfang 2001). Thus, there seem to be powerful mechanisms in LETS with the potential to green local consumption patterns.

#### **7.4 A critical look at LETS**

A critical analysis of the experience of LETS is necessary to evaluate the contributions that participatory initiatives like LETS can make to the development of sustainable consumption programmes. Although LETS has offered many benefits through its social components and environmental inclinations, there have been a number of limitations obstructing its progress. Some of the most cited problems in LETS studies relate to co-ordination inefficiencies and to insufficient participation in the schemes.

In many occasions, there has been some dissatisfaction with the goods and services supplied in LETS. For instance, well over half of respondents to a survey conducted by Williams (1996c) felt their requests were not being met in time and the range of goods and services in offer did not match their needs. In particular, there is a perception that practical skills are lacking and that administration and leadership for the schemes is weak (Aldridge and Patterson 2001; Survey). Moreover, businesses have found it difficult to work with the radically different value-systems and informal organisation of LETS systems and hence their involvement has been minimal<sup>13</sup> (Williams 1996c; Seyfang 2001). Consequently, LETS programmes have not been able to substitute the mainstream market or to provide real alternatives for many consumption necessities.

In addition, low participation rates have also posed problems to the schemes. Many LETS felt affected by noticeable periods of inactivity and an unequal participation rate among members (Seyfang 2001; Aldridge and Patterson 2002). It was pointed out that organisers and administrators, who are always volunteers, tend to be over-strained with work and duties (Aldridge and Patterson 2002). Many times, programmes have not been able to sustain themselves due to the lack of a critical mass of participants (Lee 1996). Once people join the programmes, social networks develop quickly, but the main barrier is to reach wider audiences and to get them to join.

Some obstacles for wider participation relate to the existence of social capital itself, as sometimes very cohesive groups can be exclusive of outsiders (Putnam 2000). Many LETS programmes have remained small in scale and self-contained within class divisions and ideologically similar individuals (Seyfang 2001; Williams et al.[2000]). Therefore there has been an unintentional tendency to exclude people who are not similar to the core group. These trends are detrimental to the diffusion of the programmes and to the achievement of wider social and environmental goals.

Other identified causes for the lack of participation and co-ordinating efficiency relate to wider social issues in the dominant system. On one hand, many participants remain inactive because they have gotten used to feeling disempowered and hence lack the confidence, independence, and energy to work for themselves (Williams et al.[2000]). Furthermore, practical reasons, like the lack of skills and knowledge compound with the psychological and

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<sup>13</sup> The few businesses that have joined, at least in the rural regions, have tended to provide more consumer goods and less services (Williams) and therefore businesses have not integrated collective consumption schemes like PSS businesses are trying to do.

ideological barriers to keep people from participating and getting engaged in LETS. At the same time, problems of efficiency and administrative efficacy relate to the lack of well-defined incentives and reward mechanisms as well as to incompatibilities of LETS programmes with the mainstream economy that still dominates the essential economic activity.

The barriers that LETS systems have faced could be tackled with appropriate economic mechanisms that enhance the efficiency of management, the marketing of the programmes, and the compatibility of the systems with the wider socio-economic system. Studies have found that better management and administrative support could make LETS programmes more far-reaching (see Seyfang 2001). Environmental and social objectives would also become stronger and more widely accepted if LETS become more reliable and efficient. Overall, these are important aspects that LETS groups could improve.

## **8 Conclusions and reflections**

Consumption-related problems have been controversial and inadequately addressed because of a perceived fear that the way out involves a compromise with our lifestyles. Our notion of well-being has become associated with continuous growth and individual consumption from the material economy. For many, re-adjusting our lifestyles to ecological limits has come to resonate with decreases in well-being.

However, the evidence recollecting in this paper illustrates a promising path of improvement for our consumption patterns; the integration of social processes to contain material-intensive consumption and make progress on humanistic and social developments. Social alienation (Helson 1992), decreased access to collective goods and services (Fabian Society 2003), and the deprivation of many fundamental human needs (Max-Neef 1992) are pressing aspects of current consumption problems that need to be approached.

Programmes like Product Service Systems benefit from an underlying structure that can easily integrate stronger social considerations and processes. All there needs to be is recognition of the importance of these factors and their subsequent implementation in aspects like the design of artefacts, their institutional context and infrastructure, and consumers' practices-in-use (Ehrenfeld 2001). Many PSS-style programmes have already been integrating social, humanistic and environmental goals including; common kitchens, neighbourhood laundries, and other living-space services (Ibid). The active participation of many different actors can help the programmes get diffused, adopted, and internalised on a large scale. At the same time, many of the social causes of over-consumption are tackled and human needs are more effectively addressed.

The LETS case study gave insights on the experience of alternative consumption programmes, with similar principles to PSS, but specifically oriented towards social issues. In general, collective visions and social concerns seemed to be enhanced and, in many occasions, consumers also felt empowered and with increased agency in their economic systems (Survey; Williams 1996a). The schemes had been fulfilling some of the most often neglected needs in mainstream programmes; including the need for participation, creativity, autonomy, and friendship. Given the social and humanistic voids motivating much consumption, these aspects of LETS could be effective ways to improve well-being and possibly reduce the consumption of ineffective market satisfiers for social and humanistic needs. Moreover, increased social activity and collective reflection is a pre-requisite for consumer involvement in environmental goals.

On the other hand, the limitations of LETS programmes suggests that formal structures and the inclusion of essential economic sectors are still needed for the further diffusion of the

programmes. More allocative efficiency and incentive mechanisms, as well as formal channels of diffusion and marketing ideas could make the programmes more attractive to both consumers and investors, spreading the programmes to different sectors of society. While social and environmental objectives legitimise sustainable consumption programmes, economic efficiency and co-ordination mechanisms will allow the programmes to become viable alternative options. In sum, there are important roles to be played by both bottom-up and top-down initiatives as well as by formal and informal institutions as long as they are guided by well-informed and socially agreed goals.

Combining the experience of LETS and PSS programmes and integrating the key theoretical perspectives highlighted in this study shows that the current priority is to incorporate more social capital and ecological awareness within sustainable consumption programmes. The advantage of working together and building new shared norms, values, attitudes, and beliefs are thus required. Product Service Systems offer a valuable vision and concept for the future of sustainable consumption patterns. LETS programmes offer mechanisms for increasing social capital and for integrating participatory strategies. Therefore, sustainable consumption programmes must reformulate their strategies and begin to integrate more actively the social, environmental and economic pillars of sustainability.

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## **TOPIC FOUR**

*- The Roles of Knowledge and Public  
Participation for Sustainable Consumption -*

# **Environmental workshop: Factors in the gap between eco-consciousness and actual behavior for eco-products exemplified by study on returnable bottles**

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## **1. Introduction**

The dissemination of eco-friendly products (eco-products) is essential to realizing sustainable consumption. General consumers make purchases by comprehensively considering convenience and other aspects in addition to eco-friendliness. These consumers may not be provided with adequate information related to the environment, however, and it can therefore be assumed that they are most likely unable to make their choices based on environmental analysis. This study investigated the changes in consumer consciousness and their behavior when provided with information on the environment.

As one example of consumer behavior, consumer choice between beer in returnable bottles and aluminum cans was studied. Returnable bottles are made to be refillable. Both returnable bottles and cans are available at more or less the same cost, and contain the same volume of beverage to be consumed. A significant difference to the consumer lies in the convenience of handling one or the other. How they are collected and recycled also differs[1]. Studies applying existing life-cycle assessment (LCA) methods reveal that returnable bottles emit less CO<sub>2</sub> than aluminum cans during their life cycle[2].

The subjects of this study were divided into two groups: one group of 12 students, and a second group of 9 housewives.<sup>1)</sup> They were given three lectures concerning the features of returnable bottles and aluminum cans. After each lecture and following Q&A session, a questionnaire survey was conducted on environmental consciousness and behavior, to determine whether they thought returnable bottles were better than aluminum cans, and if they would actually purchase returnable bottles, in order to identify the gap between the two. The results showed that the provision of environmental information, especially information on LCA, proved enormously

effective in changing consumer consciousness, but is insufficient to change purchasing behavior.

<sup>1)</sup> It should be noted that all students recruited participated in the workshop, although only nine of those selected in the housewife group because three were unable to attend due to family reasons.

## 2. Survey Method Outline

The two groups of nine housewives and 12 students respectively were lectured about the features of returnable bottles and aluminum cans three times. All participants, recruited by survey specialists, were habitual consumers who purchased the beer themselves.

The participants were required to spend one full day from ten in the morning to four in the afternoon for the survey. Three lectures were given to them on the features of returnable bottles and aluminum cans of the same quantity, with the duration of each lecture ranging from 20 to 40 minutes. After each lecture and Q&A session, they were asked to reply to the questions “Which of the two containers do you think is better?” (consciousness), and “Which would you buy?” (behavior) with five possible choices as a response: “Can,” “Prefer can over bottle,” “In-between bottle and can,” “Prefer bottle over can,” and “Bottle.” The participants were also asked to explain the reason for their choice in the blank provided. Consequently, six replies were obtained from each subject.

A 25-minute closing meeting was also carried out at the time of assembly for the survey, after explaining the results of the preliminary survey on the participant’s consciousness towards the environment, following lunch after the first lecture, and after the final lecture. Adding the four questionnaires conducted immediately after these discussions, a total of ten responses from each participant were obtained. Table 1 shows the schedule of the survey and details of the lectures.

Table 1 Schedule and content of Survey

Time	Practice items	Content
10:00-10:05	Opening address	Explanation of intent of Work Shop
10:05-10:10	Questionnaire 1	
10:10-10:30	Report of pre-survey	Pre-survey of daily behavior about Environment of participants (Refer table 2)
10:30-10:35	Questionnaire 2	
10:35-11:00	The 1st lecture	<ul style="list-style-type: none"> <li>• Introduction about kind and feature of containers for beer</li> <li>• Difference of function between one-way container and returnable bottle</li> <li>• Shipment rate of oneway-bottle and returnable bottle</li> <li>• Market share of containers for beer Market share of returnable bottles was 50% at 1992, but decreased to 26% at 2000.</li> </ul>
11:00-11:05	Questionnaire 3	
11:05-11:40	Q and A	

11:40-11:45	Questionnaire 4	
11:45-12:45	Lunch	
12:45-12:50	Questionnaire 5	
12:50-13:15	The 2nd lecture	<ul style="list-style-type: none"> <li>• Sales roots and price Price of beer per 100ml in a returnable bottle is cheaper than it in a can.</li> <li>• Cost of recycle Recycle cost of a can is covered by tax, but it of a returnable bottle is covered by company.</li> <li>• Manufacturing process and recycle mechanism of containers</li> <li>• Recycle process of containers</li> <li>• Recycle ratio of glass bottles and cans</li> </ul>
13:15-13:20	Questionnaire 6	
13:20-13:50	Q and A	
13:50-13:55	Questionnaire 7	
13:55-14:10	Break	
14:10-14:40	The 3rd lecture	<ul style="list-style-type: none"> <li>• Explanation of Life cycle assessment</li> <li>• Study of comparison among containers by LCA</li> <li>• Influence of global warming gas</li> <li>• Inventory analysis Introduction of comparison data between returnable bottles and cans. CO2 emission, water consumption and solid waste of returnables are fairly less than them of can. Explanation of Packaging Recycle Law</li> </ul>
14:40-14:45	Questionnaire 8	
14:45-15:15	Q and A	
15:15-15:20	Questionnaire 9	
15:20-15:45	Closing meeting	Chat about general environmental affairs with beer in returnable bottles and cans
15:45-15:50	Questionnaire10	
15:50-16:00	Remark of WS	Drawing the remark of Work shop

### 3. Preliminary Survey

A preliminary survey by questionnaire on the attributes of the participants and daily eco-consciousness was conducted. Table 2 shows the results.

Table 2: Attributes by Preliminary Survey of Participants

	Students	Housewives
Assessment	<ul style="list-style-type: none"> <li>• Purchase beer to drink with friends at parties, etc. (purchase each time).</li> <li>• Purchase in the neighborhood</li> <li>• Not particular about brand and container</li> </ul>	<ul style="list-style-type: none"> <li>• Purchase beer to drink at home, and buy in bulk.</li> <li>• Purchase in the neighborhood at stores offering affordable prices</li> <li>• Not particular about brand and container</li> </ul>

	<ul style="list-style-type: none"> <li>• Rely on TV ad information for product selection, while having no interest in it. Do not know about eco products.</li> <li>• Little interest in environmental issues, but accepts inconvenience accompanying eco-friendly efforts.</li> </ul>	<ul style="list-style-type: none"> <li>• Rely on TV ad information and prices for product selection. Do not know much about eco products.</li> <li>• Interested in environmental issues, but do not accept inconvenience accompanying eco-friendly efforts.</li> </ul>
Volume consumed per time	Eight persons above 500ml →Comparably large quantity	Five persons above 500ml →Comparably small quantity
No. of persons drinking with	Ten persons above three persons, drink in large group →Drink in group	Two persons above three persons, ten persons under two persons →Drink at home
Quantity purchased in one week	Twelve persons not greater than 10 →Buy when drinking	Eight persons not greater than 10, four persons to 40 from 20 →Buy in bulk
Brand normally purchased	Eight persons no particular brand →Not particular about brand	Eight persons no particular brand →Same as students
Reasons for choosing brand plural-answers	Seven persons taste, Top priority placed on taste →Taste	Seven persons taste →Same as students
Container of product normally purchased	Eight persons random, four persons cans →No interest in container	Ten persons specific, four persons glass bottles →Take relation between container and content into account
Reason for choosing container plural-answers	Eight persons none in particular →Almost no interest in container	Five persons taste and flavor, three persons none in particular →Take relation between container and taste/flavor into account
Purchase mainly from	Seven persons convenience stores, three persons liquor stores, two persons supermarkets →Proximity	Four persons discounts stores, four persons supermarkets →Priority on cost
Reasons for buying from these stores plural-answers	Eleven persons nearby, available anytime→Convenient	Eleven persons nearby, available anytime →Same as students
Quantity purchased each time	Ten persons not greater than three →Buy when drinking	Eight persons not less than four →Buy in bulk
How containers are disposed after consumption	Four persons as unburnable waste, remaining dispose for recycling →Reasons for not disposing for recycling; no such system, or failure to follow rules	Three persons as unburnable waste, remaining dispose for recycling →Same as students

Lifestyle giving consideration to environment	Seven persons not following such a lifestyle →No interest in environment	All giving consideration one way or another →Interested in environmental issues
Details of consideration plural-answers	Nine persons sort waste to be disposed by type, four persons refuse excessive packaging →Waste issues	Nine persons sort waste, four persons refuse excessive packaging, four persons bring own shopping bag →Same as students
Environmental consideration when purchasing	One persons give consideration →Most do not give consideration	Five persons give consideration →More than students but not greater than half
Reasons for not giving consideration when purchasing plural-answers	Seven persons don't know what products are available →Not aware of eco products	Three persons don't know what products are available →Mostly don't know, but the number is not greater than students
Acceptance of inconvenience accompanying eco friendly efforts	Five persons accept →40% are willing to be inconvenienced	Three persons accept →Housewives less willing to be inconvenienced than students

#### 4. Results

As described above, the subjects were asked to reply to the questions “Which of the two containers do you think is better?” (consciousness), and “Which would you buy?” (behavior) from five choices: “Can,” “Prefer can over bottle,” “In-between bottle and can,” “Prefer bottle over can,” and “Bottle.” Replies were scored from “Can” being the lowest (one point) to “Bottle” being the highest (five points). The changes in their replies were tracked and mean scores were calculated. The following are the results of the two groups.

##### 4.1 Students

Tables 3 and 4 show changes in the replies of the subjects for the ten questionnaires, and Figure 1 shows the changes in mean scores. Replies to the question “Which of the two containers do you think is better?” at the time the students were initially surveyed were that six preferred bottles, three preferred cans, and the remaining three were neutral. At the end of WS, ten indicated that they preferred bottles and the remaining two were neutral. Their replies to the question “Which would you buy?” at the time they were initially surveyed were that five preferred bottles, six preferred cans, and the remaining one was neutral. Ultimately, seven preferred bottles and the remaining five preferred cans. These results indicate that this workshop influenced both consciousness and behavior in this group.

Figure 1 shows consciousness to be inclined towards bottles to a great extent after market

explanation, and further shifting toward bottles after cost and LCA explanations. At the same time, only a slight inclination in actual behavior regarding bottles was seen after the LCA explanation; yet overall, replies remained “In-between bottle and can.” The gap between consciousness and behavior at the time when the subjects were initially surveyed was slight at 0.7, increasing notably to 1.3 at the end. These results demonstrate that the provision of environmental information changes consciousness, but is still insufficient for changing behavior.

Table 3 The changes in the replies of students “Which do you think is better?”

Subjects	Ten questionnaires									
	No1	No2	No3	No4	No5	No6	No7	No8	No9	No10
1	4	4	5	4	4	4	4	4	4	4
2	4	4	4	4	4	5	5	5	5	5
3	4	4	4	4	4	4	4	5	5	5
4	1	1	3	4	4	5	5	5	5	5
5	2	1	4	3	3	5	5	5	4	3
6	2	2	1	2	2	4	3	5	5	4
7	3	3	4	2	2	4	2	4	4	3
8	3	3	5	5	5	4	5	5	5	5
9	5	5	5	5	5	5	5	5	5	5
10	4	2	5	5	5	4	4	5	5	5
11	4	4	5	5	5	5	5	5	5	5
12	3	3	4	4	4	5	5	5	5	5
<b>Average</b>	3.3	3.0	4.1	3.9	3.9	4.5	4.3	4.8	4.8	4.5

- No1 After Opening address
- No2 After Report of pre-survey
- No3 After The 1st lecture
- No4 After Q and A of No3
- No5 After Lunch
- No6 After The 2nd lecture
- No7 After Q and A of No6
- No8 After The 3rd lecture
- No9 After Q and A of No8
- No10 After Closing meeting

Table 4 The changes in the replies of students “Which would you buy?”

Subjects	Ten questionnaires									
	No1	No2	No3	No4	No5	No6	No7	No8	No9	No10
1	4	4	4	4	4	4	4	4	4	4
2	4	4	4	4	4	4	4	4	4	4
3	3	3	3	3	3	2	2	4	4	4
4	1	1	1	1	1	1	1	1	1	1
5	2	1	2	2	2	3	2	3	3	5
6	1	1	1	1	1	2	2	2	2	2
7	1	1	1	1	1	1	1	2	2	2
8	1	1	1	1	1	1	1	2	2	2
9	4	4	4	4	4	4	4	4	4	4
10	4	3	2	2	2	2	2	3	3	2
11	4	4	4	4	4	4	4	4	4	4
12	2	2	2	3	3	3	3	4	4	4
<b>Average</b>	2.6	2.4	2.4	2.5	2.5	2.6	2.5	3.1	3.1	3.2

## 4.2 Housewives

Tables 5 and 6 show changes in the replies of the subjects for the ten questionnaires, and Figure 1 shows the changes in mean scores. Replies to the question “Which of the two containers do you think is better?” at the time the housewives were initially surveyed were that seven preferred bottles and two preferred cans. At the end of WS, all nine preferred bottles. Replies to the question “Which would you buy?” at the time they were initially surveyed were that one preferred bottles, seven preferred cans, and the remaining one was neutral. At the end of WS, seven preferred bottles, one preferred cans, and one was neutral.

Figure 1 shows that consciousness and behavior inclined towards bottles after cost and LCA explanations, and the gap between consciousness and behavior at the time when the subjects were initially surveyed was significant at 1.7, decreasing finally to 0.9. Characteristically, consciousness and behavior of the housewife group changed through Q&A after lectures and the closing meeting rather than the lectures, suggesting that information collected in their community plays a significant role in purchasing behavior.

Table 5 The changes in the replies of housewives “Which do you think is better?”

Subjects	Ten questionnaires									
	No1	No2	No3	No4	No5	No6	No7	No8	No9	No10
1	1	1	2	2	2	5	5	5	5	5
2	4	1	1	2	2	3	1	3	5	5
3	4	3	3	3	3	4	4	5	5	5
4	5	5	5	4	5	3	5	5	5	5
5	5	5	5	4	5	5	3	4	5	5
6	2	2	4	4	4	4	3	4	4	4
7	4	4	4	4	4	4	2	5	5	5
8	4	3	4	2	2	3	1	5	5	5
9	5	5	4	5	5	4	4	5	5	5
<b>Average</b>	3.8	3.2	3.6	3.3	3.6	3.9	3.1	4.6	4.9	4.9

Table 6 The changes in the replies of housewives “Which would you buy?”

Subjects	Ten questionnaires									
	No1	No2	No3	No4	No5	No6	No7	No8	No9	No10
1	2	1	2	2	2	2	1	2	2	2
2	3	2	1	2	1	1	1	3	1	5
3	2	2	2	3	3	3	3	4	4	4
4	4	4	5	4	4	4	2	5	5	5
5	1	1	1	2	2	3	2	4	5	5
6	1	1	2	2	2	2	2	3	3	3
7	2	2	3	2	2	4	2	4	4	4
8	2	3	4	2	2	2	1	1	1	4
9	2	2	1	2	2	3	2	3	3	4
<b>Average</b>	2.1	2.0	2.3	2.3	2.2	2.7	1.8	3.2	3.1	4.0

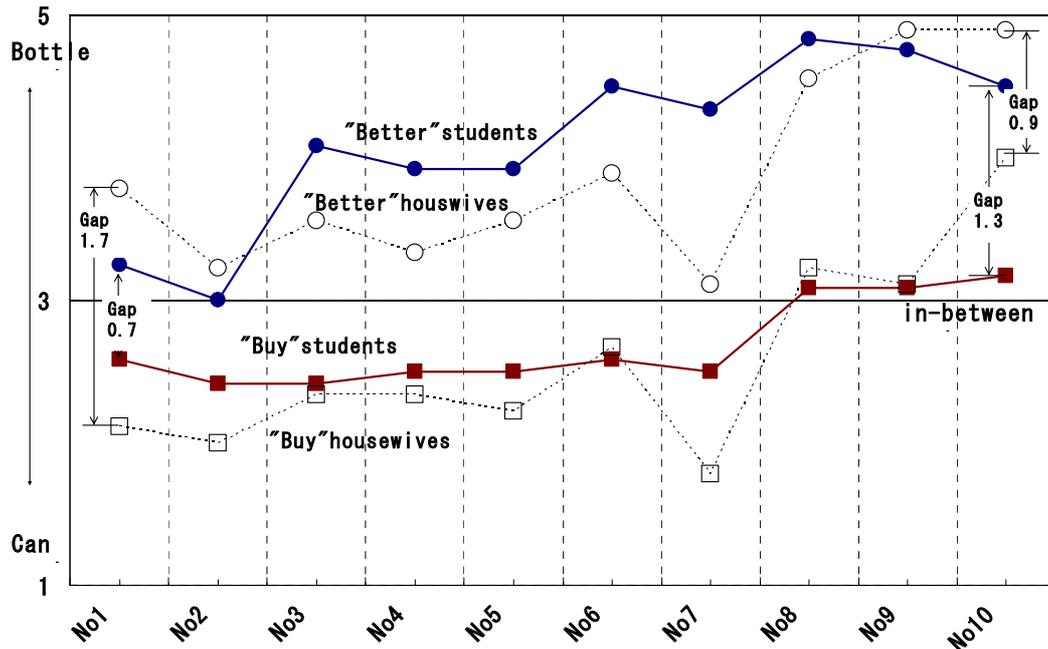


Figure 1 The changes in the mean values of the replies of all subjects over the ten questionnaires.

## 5 Summary

The results of the survey showed that the provision of environmental information changes both consumer consciousness and behavior positively toward the selection of eco-products. In particular, the provision of LCA-based environmental information had considerable effects on consciousness, but was not sufficient to change behavior, however.

The housewife group was influenced by discussions within the group more significantly than the lectures for both consciousness and behavior. In the future, it would be ideal to carry out a more detailed analysis of what triggers changes in the consciousness of participants of small workshops and the roles of lecturers, and to review methods on the efficient provision of environmental information and of building up discussions that bring about change in consciousness.

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## References

- [1] [Websites of the Glass Bottle Recycling Association](#) and the Aluminum Can Recycling Association
- [2] [Container Comparison Workshop](#)

# **On Nordic Consumers' perceptions, understanding and use of product related environmental information**

To be presented at the International Workshop for Sustainable Consumption, Leeds

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## **Abstract**

This paper accounts for Nordic experiences on consumer perception, understanding and use of product related environmental information. Nordic consumers have access to growing amounts information enabling them to make informed product choices, however their use of this information has been disputed. A common claim is that the wide array of information schemes aggravates consumer confusion. Another is that most consumers possess a sufficient level of knowledge about, and confidence in, the main eco-labels to be able to use them. The findings imply a prevalent consumer preference for simplified information. Both private and professional consumers have limited understanding of complex information, however, more detail has been found to instil confidence. The authors suggest alternative approaches to study consumers' uptake of product related environmental information closer to the purchasing moment and to take into account the dynamic context of consumers' differing purchasing situations.

## **Background**

The attention to the environmental aspects of consumption is not new. Environmental labels and lists of environmentally benign products existed years before the concept of "sustainable consumption" became common language. A number of initiatives, for instance life-cycle assessment, design for environment and supply chain management, have addressed the responsibilities and opportunities of manufacturers to improve the environmental performance of their products and services. Informed consumer choice constitutes a necessary element for realising the potential benefits of strategic environmental management. The knowledge about the factors that influence environmentally benign consumption behaviour is, as such, an important determinant for emerging product policies for greening the market.

It is often mentioned that environmental product information (EPI), in combination with consumer oriented pre-conditions such as consumer awareness, knowledge and attitudes leads to changed consumption patterns. Environmental NGOs, industries, industry associations, and policy makers have initiated a number of information schemes. Certified environmental labelling schemes (ISO Type I) in the Nordic countries have developed criteria for a growing number of products and product groups. The escalating coverage of the main eco-labels, such as the Nordic Swan, occurs in parallel with an increase in consumer recognition (Strandbakken, 2001). In addition, a range of declarations has emerged, both in terms of a Nordic initiative for certified environmental product

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declarations (ISO Type III) and as self-declarations from individual producers and industry sectors. Further, producers are frequently using own brands that are environmentally oriented as a way to differentiate products. In spite of all the available information combined with alleged good intentions and high recognition, the research reports a varying ability, interest and willingness of consumers to absorb and process the information. As a result, EPI has been recurrently been scrutinized with regards to its communication capacity.

The topic of consumer use of EPI is considered in various disciplines. Whereas much available literature takes the type of information system or product group as a starting point, few studies combine the context and other relevant factors such as consumer attitudes and understanding, which all determine consumer uptake of environmental product information. Yet other studies describe consumer characteristics, mainly in so called consumer segmentation models developed to analyse environmental loyalty and preference of consumers, and their use of EPI (e.g. Szatek, 2003, Konsumentverket, 1995/96, Hansen et al., 2001).

The purpose of this study is to display current knowledge of how Nordic *consumers perceive, understand and use environmental information on products*. The study provides a presentation of relevant research results, experiences and rationales from 1995 to mid-2003, basing the findings on a structured literature search among surveys and scientific studies, articles and debates, that is complemented with interviews with people with valuable and relevant knowledge or experience using a snowball technique. Literature search in Finland and Iceland was performed by local colleagues in these countries.

The search comprised literature and findings from surveys, scientific studies, articles, debates and interviews with key people. A number of key words, translated into the Nordic languages, related to consumer, consumption, purchase, environment, declaration, labelling, product, knowledge, understanding, and use were used for the searches.

The search assessed 144 semi-relevant publications of which 54 were considered highly relevant. The relevance was determined by whether the scope included EPI and whether the study was conducted from the consumer perspective, necessary because research on consumer willingness to consume green goods does not always regards the information issue. Lastly, the highly relevant studies were reviewed with regards to messages conveyed and methods employed.

In general, the examined studies take a starting point in particular EPI systems and investigate consumer knowledge and relations to those systems. Some studies focus on certain product groups subjected to declarations, claims or labels. Of the 54 studies reviewed, approximately half were conducted using questionnaires surveys for statistical descriptions. The second most used method used was focus group interviews or combinations of the two methods. A fraction of the studies used in-situ interviews.

### **Findings from the literature review**

Various eco-labels including energy labelling, environmental product declarations and producers' self-declared claims are common subjects of the Nordic studies among which eco-labels are the most predominant. The Nordic Swan holds a unique position together with national labels for organic food (such as KRAV, Godt Norsk and Ø-label) in terms of

available research.

In particular, the Swan is reported to be well recognised and known (> 90% of the consumers in Sweden, somewhat less in Norway, Finland and Denmark) and is, in general, also regarded trustworthy among Nordic consumers (TemaNord 1999:592, Solér, 2001, Konsumentverket, 1998, Szatek, 2003, Methi, 2000, Methi et al., 2001, Strandbakken & Stø, 2002). In Iceland, however, only about 50% of the consumers are reported to be familiar with the Swan label (Landsvirkjun, 2001, Nordisk Miljömärkning, 2002). Main national labels for organic food, and in Sweden the Good Environmental Choice label, follow a similar pattern. The EU Flower is subject to fewer Nordic investigations, however a notable increase in research on this scheme has recently begun to occur. Across most literature, though recognition of main labels is high, consumers admit a limited understanding (Heiskanen & Timonen, 1995, Vanninen & Viinikainen, 1995) of the meaning of the labels.

Ambivalent findings surround the range of labels on the market. The great number of marketed labels has, according to some authors, contributed to confusion (e.g. Poulsen & Juhl, 2002, Himmelstrup Dahl & Hjort., 2002), and is a reason for reduced credibility in all labels, stemming from difficulties in distinguishing certified environmental labelling from other types of labels (Statens Offentliga Utredningar, 1999). Others dispute the link between the number of available labels and the understanding of the information (Erhvervsministeriet, 1999) while some authors suggest that environmentally aware consumers are more prone to take in environmental information (Niva & Timonen, 2001, Thøgersen, 2000). On the other hand, there are also studies that report that consumers assert a need for more EPI in general to be able to make greener product choices (Armila & Kähkönen, 1997, Niva et al., 1996).

Despite the limited number of studies, the conclusions point towards general difficulties for consumers to explain environmental problems related to the products, the distinction between “green products” and conventional products or the communication of the actual benefits of a supposed superior or eco-labelled product. On the other hand, it was also demonstrated that the link between environmental literacy and preferences for purchasing environmentally benign products is rather weak (Heiskanen, & Timonen, 1996). Apparently many consumers who appreciate and use EPI do not differentiate between information on environmental, health and safety issues but tend view them holistically as an additional property of the product (Szatek, 2001). Rather, health is sometimes reported to be the main reason for consumers to choose environmentally labelled products (Neergaard et al., 2002, Jensen et al., 2002). The closer to the consumer’s body the product is used is a central factor of when EPI is regarded (Heiskanen & Timonen, 1995).

The view of the consumers on the actual quality of environmentally labelled products compared to their conventional alternatives varies from equal to lower (e.g. Konsumentverket, 1995/96). Eco-labelled products are repeatedly reported perceived as more expensive (Konsumentverket, 2001, Arvola et al., 2000).

The findings on what kind of information consumers desire and how extensive this information should be are also somewhat inconsistent. It is concluded that a majority of consumers appreciate the simplicity of logotypes as information carriers for most everyday products (Jensen et al., 2002, Niva et al., 1996, Strandbakken & Stø, 2002). A diverging message in some literature sources is, however, that a number of consumers find the simple

symbols insufficient and would like to obtain additional information. To meet the voiced consumer demand of more information, these studies often propose expanded textual information or declarations explaining the environmental features of the products.

The Nordic market is commonly referred to as a success for the application of EPI and, in particular, eco-labels. Both the turnover and the number of Swan-labelled products are steadily increasing on the Nordic market. The market for ecological food is expanding in EU and especially in growing with about 20-30 % per year in Sweden (Holmberg, 1999). In general, consumers hold an apparent positive attitude towards green products and eco-labels (Hansen et al., 2001) and, in a number of interview and survey results, state that they use them in purchase situations and that they are willing to pay a price premium for such products (Juhl & Poulsen, 2002, Jensen et al., 2002). Nevertheless, many studies report a discrepancy between intention and behaviour. Consumers are many times found to overestimate their use of EPI (Kuusela, 1996, Asikainen, 2000).

A significant portion of the literature aims to identify the reasons for consumers not to use eco-labels. The most influential factors are said to be that consumers prioritise price and quality and that purchases are guided by habits (Hansen et al., 2001). Consumers are furthermore reported to lack time and resources (in Unger, 2002) for searching and examining environmental information in the purchase situation. In particular, professional buyers are restricted by a lack of resources (Neergaard et al., 2002).

Studies of producers' own self-declared environmental claims are limited but seem to indicate a low trust in information. It is reported that consumers react negatively to the information that is issued by the producer and also to that which is not certified by third parties (Jensen et al., 2002, Consumers International, 1999). In general consumers prefer verified information (Kiljunen, 1998). Findings on mandatory labels are less elaborate from an EPI-perspective. However, consumers seem quite positive towards energy labels, apparently because they find its grading system useful.

In general, the studies on environmental product declarations follow two paths: focus group interviews addressing perceptions and understanding of fake or proposed declaration formats, and interviews with users of existing declarations. The findings on environmental product declarations are, however, rather distinct in reporting (both private and organisational) consumers' difficulties to understand and translate the information.

Studies using dummies or experimental templates show, however, that consumers perceive the opportunity to prioritise among environmental aspects positive. Furthermore, the comprehensive and quantitative information is reported to trigger positive consumer judgments about the reliability of the information (Palm & Windahl, 1998, Solér, 2001).

Existing declarations comprise both certified ISO Type III environmental product declarations, which however not have been studied and various quantitative and qualitative environmental declarations, The latter are often rather extensive standardised for certain industry sectors aimed for business-to-business communication in for instance the ICT, textile and construction industries and issued as voluntary self-declarations without any certification or control system. Consumer perceptions of these declarations seem to go in two directions. One direction indicates confusion and distrust in uncertified information from variations in the format of declarations while the predominant direction is insufficient consumer understanding (Solér, 2001, Fallenius et al., 1997, Palm & Windahl, 1998, Jönsson, 2000, Tufte & Lavik, 1997, Tufte, 1997) and the need for user guides (Palm &

Windahl, 1998, Kogg & Thidell, 2003). Recurrently, it is proposed that the consumers need education to be able to use them.

Therefore, the main conclusion regarding the level of detail desired by consumers tends to be that the simple information carriers, such as eco-labels, are sufficient for most consumers. The appropriate level of information is also a matter of consumer information processing capacity, which is an adjacent literature topic and highly relevant aspect in the discussion of the suitability of different types of EPI.

### **Conclusion and suggestions for research**

Most consumers seem to recognise and trust main eco-labels and contrary to common belief, consumers do not necessarily view the range of various labels as confusing. It appears that individual consumer knowledge of every single label is generally limited. Instead, the consumer knows only a few specific labels and regards others with less attention. The confusion is instead linked to environmental awareness, trust, familiarity and type of purchasing situations.

Consumers are, in principle, positive towards green products. They also state a willingness to pay premium prices for green products. Nevertheless, consumer attitudes do not directly translate to action. Instead, consumers apparently believe that they purchase more green products than they actually do.

The discrepancy between intention and behaviour is a recurrent theme in the literature however the understanding is still lacking about how to increase the effectiveness of EPI in this sense. Therefore, the current knowledge base will benefit from additional knowledge on how to realise the potential to increase the use of EPI. A number of suggestions have been derived from the literature analysis. The main message from this analysis is that a step forward in the research regarding consumers and EPI is to adopt study methods that bring the investigation closer to the consumers in action, and that differentiates between different purchasing situations and their contexts.

According most segmentation studies, merely 20-50% of consumers give some priority to environmentally related properties of the products they purchase. In other words, there is still a great number of individuals who are not perceptive to environmental properties of the products and are thus not likely to be interested in EPI. This may indicate current limitations of informative policy instruments and EPI, as they probably have little or no impact outside the greener consumer segments. Therefore, in addition to learning more about consumers who give EPI priority, an additional potential lies in understanding the factors that, according to the segmentation model, would imply the fluctuation of individuals between consumer segments.

In light of this, the body of literature reviewed has been analysed both in terms of the chosen methods and research topics. It is likely that a better understanding about how to more effectively reach more consumers would result from additional research along the lines suggested below.

Despite the documented high recognition and trustworthiness of the main eco-labels there is also negative attitudes and distrust among some consumers. Most certainly, the trust or distrust in the environmental relevance of labels affects consumer use of the label. In general, the distrust is explained by insufficient information in how schemes are organised,

who stands behind them, the environmental relevance of the product group and in what ways labelled products are superior to conventional ones.

Moreover, the issue of actual environmental benefits of choosing labelled products are likely to influence the not only the trust in the systems but also the attitude to the relevance of EPI. In other words, the labels would, in the long run, be in a stronger position if they did not entirely have to rely on general environmental awareness or altruistic feelings for the environment from the consumer. A potential tool could be evaluation models for the market shifts towards eco-labelled products and estimations of potential environmental benefits. The model should also include feedback mechanisms to the consumers, which in turn could help increase consumer motivation to buy green products.

The number of environmental declarations is increasing. Furthermore, producers sometimes adopt the declarations as a substitute for other information systems (Edlund et al, 2002). There is an apparent need to better understand environmental product declarations, both certified and uncertified. In addition to the existing studies, specific studies on how consumers and professional buyers perceive, understand and use the declarations would be useful.

Overall, product declarations may have a possibility to be useful in the supply chain, especially for buyers who are obliged to consider environmental aspects of products, for the use for aggregation purposes or for product groups of more complex products. The processing of this type of information is, however, difficult among both consumers and professional buyers, mainly because the information is supposed to come without any assessment of the product's environmental performance. The need for transparent guides, codes or interpretation tools is clear among the studies in the literature review.

Environmental marketing and particular self-declared claims of producers are occasionally mentioned as alternative or complementary to eco-labels, at least in product groups where labelling is not suitable. Therefore, it is possible to see an increase in the use of these claims in the future. However, the phenomenon is poorly researched in terms of its current function and use. Data on current use and trends in the use of claims are notably missing in the literature. Moreover, as the relevance of these claims is regulated by both an international standard (ISO 14021) and consumer protection legislation, it is important to gain a better understanding of how the control mechanism works in practice and how producers justify their claims.

A limited number of studies cover the role of sales staff and retailers in the process of supporting the environmentally conscious consumers. These actors appear to serve as ecological gatekeepers. Studies so far indicate, however, that sales personnel have limited knowledge about eco-labels, but that they could be able guide consumers to environmentally sounder purchases if they are provided with the appropriate information. Similarly, the shops' display of eco-labels, environmentally benign products and information provision about these products may also be important to consumer choice of products. The shop-shelf can be considered as a leverage point for most consumers. Nevertheless, no studies were found that investigated the role that displays have in providing environmental information. A comparison and benchmarking of different displays would allow for identification of their potential to influence green purchases.

The majority of up-to-date consumer surveys seem to capture the attitudes and intentions from citizen-interviewees rather than from consumer-interviewees because the interviews

take place in situations distant from the purchase situations. Furthermore, these studies have a tendency to aggregate statistically average situations, implying that the consumers follow regular behaviour patterns. The answers to why individuals do not use EPI or choose eco-labelled products, however, bring to light different behavioural patterns and varying actions according to varying situations. These situations may be influenced by available time and money, external stimuli like campaigns and information, the availability of eco-labelled products, trust in the information provided and, probably, also motivation and understanding of the relevance of different product choices. Therefore, it is suggested that interviews are conducted so as to understand relevant preferences and factors that influence the purchase criteria at a given time. The opportunities to learn more about these factors, therefore, are likely to become clearer when consumers are studied closer to the actual purchasing situations. From the few studies that have engaged in these types of consumer observations and interviews come the examples of a study on food labelling (e.g. Hansen & Mörch Marckmann, 2001) in which interviews and inquiries into consumer rationale occur at the time of the purchase and a follow-up study based on in-situ interviews in combinations with a subsequent survey (Hansen et al., 2001). This approach has most likely resulted in a picture that better describes individuals in their role as a consumer.

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# **TOPIC FIVE**

*- Measuring Effects of Lifestyle Change -*

# **Sustainable Consumption of Food**

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## **Introduction**

Members of affluent households have the option of working less, earning less, and consuming less and in the process freeing up more time for other kinds of activities. Another option is for households to consume less and save more of their income, or simply consume differently. When these differences are substantial, they leave the realm of substitutions of one consumption item for another and qualify as lifestyle innovations. Some kinds of lifestyle innovations are no doubt indispensable for achieving “sustainable consumption,” and both common sense and research suggest that the crucial areas are food, housing, and transportation (see, for example, Spangenburg and Lorek 2002) because of their use of resources and environmental impact. However, the consequences of these behaviors are complex, and a definitive judgment about favorable environmental and social impact of a particular lifestyle innovation merits closer analysis to identify the most viable scenarios.

Innovating households might be motivated by non-materialist objectives for improving their quality of life and perhaps by concerns about the environment and social justice. And despite a multiplicity of sometimes contradictory motivations and behaviors, there is reason to believe that the number of such households may be substantial and could become even more important (Ray 1997). But a mass appeal for lifestyle innovation would be most likely to succeed if lifestyle recommendations are described concretely and if resulting benefits are also well-defined and even measurable.

This paper indicates how these conditions could be satisfied for the important case of changes in household diets. It describes specific dietary changes that promise to have major implications not only for environmental sustainability but also for improving personal quality of life. It shows how the integration of life cycle analysis with an input-output model of the economy can reveal the varied and partially offsetting implications of the changes as a basis for refining and prioritizing dietary recommendations and, eventually, examining them side by side with changes in housing and household transportation.

A realistic approach for achieving such changes in diet needs to take on two complicating factors. First, this scenario is fundamentally a global one because the degree of change envisaged will affect comparative advantage in agriculture and food production and corresponding world prices. Consequently only an analytic framework that distinguishes production, consumption and trade in all parts of the world can provide insight into the substantial changes that are likely to unfold. Second, powerful vested interests might strenuously resist the kinds of dietary changes described here; these stakeholders are identified and approaches suggested for changing their behaviors.

## **A Scenario about Diet Change**

It is not straightforward to classify people's diets because many combinations of nutrients can support life and health, and even a given mix of nutrients can be achieved through different combinations of foods, "techno-foods," and food supplements.<sup>1</sup> Nonetheless, individual diets can be grouped into a manageable number of patterns. There is a Standard American Diet, for example, high in calories with a large portion of the energy from animal fats and added sugars (i.e., those not occurring in crops but added during processing). Aware of the shortcomings of this diet, the US Department of Agriculture has developed a Food Guide Pyramid<sup>2</sup> that provides general guidelines for a healthier diet. This Healthier American Diet, in turn, is substantially different from the Mediterranean Diet (both discussed below), which is plant-based, lower in calories, much lower in animal products and sugars, and relies for fat mainly on olive oil with little of the problematic saturated or trans fats. Nutritionists associate variations of the Mediterranean Diet with dietary traditions of Crete, other parts of Greece, and southern Italy, whose populations have long enjoyed unusually good health and long life, at least through the 1960's when these diets began to change (Willett et al., p. 1402S).

It is well documented that the Standard American Diet is responsible for an epidemic incidence of obesity leading to long-term disabilities and chronic diseases. This type of diet is rapidly spreading to other rich countries and even to developing countries that have simultaneous challenges associated with under-nutrition. The World Health Organization has drafted a global strategy on diet, physical activity and health motivated by their estimate that "by 2020 two-thirds of the global burden of disease will be attributable to chronic non-communicable diseases, mostly of them strongly associated with diet" (Chopra et al, p. 952).

What if Americans turned to the Mediterranean Diet, or even the Healthier American Diet, and succeeded in setting that as the standard to be emulated as a sign of affluence? Would this diet represent a substantial step toward sustainable consumption, taking account of the major shifts in agricultural production and the handling of crops and foods that it would entail? Would this diet have a sufficient impact on obesity, disability, and chronic illness to motivate households to adopt it and health insurers to promote it? The next two sections indicate how these questions can be addressed, first in a preliminary way and then through model-based quantitative analysis. If the scenario proves promising, the stakeholders who could help realize such changes need to be reached and those who would oppose these changes need to be given a stake in moving things in the right direction.

### **Preliminary Assessment of the Diet Change Scenario**

A recent, pioneering study (O'Brien 1995) identified the major categories of changes in food intake that would be needed in order to furnish Americans with a diet broadly consistent with the USDA Food Pyramid, made quantitative estimates of their directions and magnitudes, and described the kinds of obstacles that would be encountered.

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<sup>1</sup> Techno-foods are "foods and beverages that have been constructed to confer health benefits beyond the nutritive value of the foods themselves." They include fortified foods, such as breakfast cereals to which vitamins have been added, or non-foods like the fat substitute olestra, "an oil-like compound that is not digested." Supplements are "products taken in addition to food, and for some health purpose, in the form of pills or potions." They include vitamins, minerals, herbs, and diet products. Definitions are from (Nestle 2002.)

<sup>2</sup> See, for example, [http://www.pueblo.gsa.gov/cic\\_text/food/food-pyramid/main.htm](http://www.pueblo.gsa.gov/cic_text/food/food-pyramid/main.htm).

O'Brien's main innovation was to frame the question in this way, that is, to recognize that estimating the impact of and obstacles to such changes is separable from the more familiar question of how people might be encouraged to change their diets. The study was followed a few years later by a more detailed investigation along the same lines by 2 researchers at the USDA (Young and Kantor 1999) and an assessment of the policy implications by the chief economist of the USDA (Collins 1999).

Young and Kantor found that the transition from the Standard American Diet to the Healthier American Diet would involve:

- Substantial reduction in fat intake and sweetener consumption.
- Significant increases in fruit and vegetable consumption.
- Smaller increases in cereal consumption.
- Moderate increases and marked shifts in the mix of dairy products (to low-fat items).
- Smaller increases in the consumption of meat products and marked shifts in their mix and characteristics (to poultry, fish, reduced fat).

They identified the principal challenges on the supply side to be:

- 6 million additional acres of cropland would need to be planted. This amounts to 2% of the 1990-1995 average acreage planted and is much less than the 22 million acres idled under Federal planting constraints.
- 60% reduction in caloric sweeteners.
- 36% reduction in intake of fats and oils, with major impact on the demand for soybeans (the principal source of added fats and oils).
- More than 100% increase in fruit consumption, especially citrus fruits.
- Quadrupling of the consumption of dark-green leafy and deep yellow vegetables, accompanied by reduced intake of starchy vegetables, mainly potatoes.
- Substantial changes in production, trade, and nonfood uses of specific food items. For example, the decline in the demand for soybeans for oil would be to some extent offset by increased exports and use in animal feed, industrial applications, and possibly biofuel; citrus fruits would need to be imported to meet the increased demand.
- Large-scale dislocations in the feed-livestock complex.
- Substantial changes in the demand for water, different kinds of labor, capital, and chemicals. For example, fruits and leafy green vegetables require more labor than potatoes, oil seeds, corn or sugar beets; water could be the limiting factor for citrus production in California and Arizona.
- Sharp reduction in beet and cane sugar acreage as well as acreage in corn for sweeteners which, combined with the downsizing of feed-grain production, would have a concentrated negative economic impact focused on the Corn Belt (Iowa, Illinois, and parts of adjacent states).
- Shifts in prices of individual items (in the opposite direction of demand) with unclear impact on the bottom line for the diet as a whole. A fall in the domestic price of sugar, in particular, would suspend the U.S. sugar price-support program with further consequences for sugar imports, world sugar prices, and domestic production levels.

The authors concluded that the exercise would require the profound rethinking of the rationale behind American farm programs that date back to the 1930s in their objective of promoting U.S. agriculture mainly through price and income supports for feed-grain and livestock producers. Fruits and vegetables, by contrast, have not been favored crops; in fact, a statute actually limits their production (by subsidized grain and cotton farmers) with the rationale of maintaining prices in the fruit and vegetable markets (Collins, p. 314). The legislative package both reflects and reinforces the fact that the American culinary tradition is focused on meat and potatoes.

Thus the transition to the Healthier American Diet will impact demand for specific factors of production (i.e., land, labor, water, capital) both directly and as mediated by inter-sectoral relationships, e.g., impact on the grain sector of changes in the demand for livestock or the impact on the demand for corn (and corn syrup) of reduced use of added sugars in processed foods. Its potential impact would be heavily dependent on changes in agricultural policy and trade policy, and in any case would alter crop and food import and export behavior. Evaluating the scenario requires moving from the rough estimates of individual impacts, as provided by O'Brien or Young and Kantor, to a modeling framework that takes many individual changes simultaneously into effect and offers the possibility of analyzing a variety of alternative scenarios with systematic documentation of the underlying assumptions. This framework requires life-cycle descriptions of individual crops and foods ("from farm to fork"), an input-output representation of inter-sectoral relationships, and a model of the world economy able to capture effects of changes in demand patterns on global trade flows and associated world prices.

### **Toward a Model-Based Assessment of Diet Change Scenarios**

The Standard American Diet is being emulated in all parts of the world. Relative to that baseline, a global shift toward a Healthier American Diet combined with a reduction in total caloric intake (widely advocated but not explicit in the studies cited in the last section) could be expected to have a favorable impact on the environment, quantifiable in terms of the use of water and other inputs (Faist et al. 2001). Personal health benefits are described and quantified in the public health literature (Shikany and White 2000, McCullough et al. 2002, Brand-Miller 2003, Bosetti et al. 2003). Changes in the food production, processing, handling, and serving sectors to satisfy the changed demand for food need to be more closely quantified. It is already clear that fruit and vegetable production will need to expand substantially both in the U.S. (Young and Kantor 1999) and globally (World Health Organization 2003) if consumption is to approach recommended levels. Better understanding of these changes will facilitate the identification of specific agricultural, trade or other policies that obstruct change and those that would promote dietary innovation.

The design and quantitative representation of dietary scenarios is a major challenge, as is the design of a modeling framework to analyze them. The basic requirement is: radical simplification while maintaining empirical content, namely a discriminating choice of exogenous variables and of parameters relating variables to each other. I propose the following characteristics:

- Life cycle analyses (LCA) are needed for the major agricultural and food products that vary most across dietary scenarios: sugars, edible oils, feed grains, food grains,

fruits, vegetables, fish, poultry, and livestock. Analysis of prepared foods, technofoods, and restaurant meals poses a particular challenge.

- Input-output tables are needed to represent production relations in major regions of the world at a moderate level of detail for agriculture and food processing sectors and with more aggregated representation for the rest of the economy.
- Methods need to be standardized for integrating selected LCA detail in computations with the less detailed input-output tables.
- Consumption should be treated as exogenous and alternative dietary scenarios represented as a household food consumption vector, disaggregated from the rest of the final demand vector.
- Policies affecting quantities or prices of crops and foods need to be identified for key governments, both at the present time and under alternative scenarios.

The comparative advantages of different regions of the world will shift in response to changes in the demand for food, and in agricultural and food handling costs, especially if these changes are accompanied by adjustments in legislation, with potentially important implications for the relative prices of different foods and for the price of the entire diet relative to labor income. Thus a model of global production, consumption and trade is needed to represent physical endowments and cost structures and compute physical flows and price relationships, based on a direct comparison of cost structures. For the diet change scenarios, both agricultural subsidies and energy use for transportation associated with trade should be taken explicitly into account. Duchin (2003) describes an operational model and database with most of these properties.

### **Scenarios Based on the Mediterranean Diet**

While the research cited earlier anticipates that the shift from the Standard American Diet to a Healthier American Diet based on the USDA Food Pyramid would be disruptive for American agriculture, the latter diet still leaves a lot to be desired from a personal health point of view. Something closer to a Mediterranean Diet would substantially reduce (rather than increasing) the amount of animal products in the American diet, lower intake of added sugars much more steeply, and shift to healthier sources of fats.

Food pyramids have now been constructed for a variety of diets including not only the Mediterranean Diet but also vegetarian, Asian, and Latin American diets (Oldways 2003). There is a substantial literature on various forms of the Mediterranean Diet and other plant-based diets that have stood the test of time, including discussion of both their environmental and health implications. See, for example, (Nestle 1995; Willett et al. 1995; Heimenidinger and Van Duyn 1995; Gussow 1995) in a special issue of the *American Journal of Clinical Nutrition* devoted to this subject.

In developing countries traditional diets, which still feed most of the population, are based on staple plants such as rice, wheat, corn, millet, or sorghum and roots and tubers. Increasing affluence is bringing more diversity into the diet in the form of more fat and animal products and more sugar and processed foods, in part through purveyors like McDonald's and Coca Cola and the rapidly globalizing retail grocery industry that will be an increasing pressure for dietary standardization. While a move to a healthier diet in the rich countries might be expected to reduce resource use and environmental problems, these improvements may be more than offset by the upgrading of developing country diets, even if they are upgraded toward the Mediterranean Diet rather than the Standard or the

Healthier American Diet. A global scenario could take the form of convergence across regions to any one of these diets, with regional variations reflecting traditions and local availabilities (notably in the source of fats).

### **Stakeholders to Promote a Diet Change Scenario**

The principal stakeholder for a move to healthier diets is the general public, who choose what they eat and have personal interest in avoiding disability, disease and premature death. The public health community and professional nutritionists have a long history of designing and implementing media-based educational campaigns and more direct interventions to promote dietary changes and increased levels of exercise and physical activity. Such interventions have unfortunately not been sufficiently successful to reverse the trends toward increasing obesity, now considered of epidemic proportions even among young children. Nonetheless, segments of the population are heeding the message, and there is a substantial body of research about interventions that can possibly be utilized with more impact once some of the obstacles to change (see below) are removed.

The U.S. Department of Agriculture and the Food and Drug Administration in the Department of Health and Human Services are among the agencies charged to protect the public's food supply and health. Responsible for a wide range of activities from agricultural subsidies to permissible health claims on labels, these agencies have other interests to balance against improved public health, namely the prosperity and autonomy of the industries that grow, process, distribute, serve, and export crops, livestock and foods. The agencies operate within a regulatory environment that has been shaped over many decades. But global economic, social, and environmental realities today are dramatically different from those that guided existing agricultural and food legislation and policies. The case for substantial policy changes that could benefit a variety of stakeholders remains to be identified based on analysis of the kinds of scenarios described in this paper.

Corporations seek ways to differentiate themselves from their competitors as part of a marketing strategy to increase current and future profitability. Some stakeholders within the corporate food chain may find it in their interest to innovate in ways that situate them as pioneers by offering healthier foods and meals, provided they anticipate that the public will buy them. If companies are convinced that in the future they will in any case be obliged to move in this direction, in response to a combination of household demand and government regulation, it would clearly confer a public relations advantage to be the industry leader. McDonald's is an important prospect because of its huge global reach. The company collaborated with the Environmental Defense Fund to improve their packaging materials and increase recycling, and it recently made a prominent addition of fresh salads to the menu. Their decision to tell farmers "to stop growing Monsanto's transgenic potatoes" (Nestle 2003, p.245) and another to stop purchasing meat from animals treated with certain antibiotics (Nestle 2003, p.259) had immediate impact on the behavior of large-scale suppliers. If they chose to offer a healthier menu, the impact could be substantial.

The World Health Organization (WHO) has developed a strategy of systematic change in diets for the prevention of chronic disease (WHO 2003). To realize its objective, WHO aims to establish partnerships with industry leaders in the food, sports, insurance, and advertising industries (Chopra et al. 954). Unfortunately, the WHO strategy report has already elicited a protest from the U.S. Secretary of Health and Human Services, who

officially requested on behalf of the American food industry that WHO “cease further promotion” of the report (Brownell and Nestle 2004). Sharpest opposition is being expressed by the trade associations for the sugar, corn refining, and snack food industries. Recommendations in the WHO report provoking the most opposition are constraints on food advertising directed at children and the provision in schools of foods high in salt, sugars, and fats in lunch programs and in vending machines (New York Times 2004).

Controversy over inappropriate influence on the dietary preferences of children is strongly reminiscent of perhaps the central issue in the successful product liability law suits against the tobacco industry in the U.S.: taking advantage of the impressionability of children to create future (or present) customers. After several years of litigation, a landmark settlement in 1998 awarded nearly \$250 billion to be paid by the tobacco companies over 25 years to the 50 states for smoking-related medical expenses incurred (Tobacco Master Settlement Agreement Summary 2004). Among the terms of the settlement are a prohibition on targeting youth in advertising, promotions, and marketing of tobacco products and the requirement to demonstrate executive-level actions at tobacco companies to reduce access to and consumption of tobacco by young people. The success of this lawsuit was a clear turning point in stimulating others in the U.S. and elsewhere and empowering global initiatives as well.

In 2003 WHO adopted the Framework Convention on Tobacco Control (FCTC), several years in preparation, which now needs to be ratified by 40 countries. The FCTC builds on the acknowledgment of US tobacco companies of the devastating health consequences and addictive nature of smoking, vigorously denied at the outset of the lawsuit and achieved through a process that was unremittingly confrontational. The proportion of adult smokers in the U.S. dropped from 42% in 1965 to 23% in 2001 (Centers for Disease Control and Prevention 2003) as a result of anti-smoking campaigns, labeling requirements, and mass communication of compelling scientific evidence of its ill effects on health. To the extent that lifestyle dietary changes consistent with sustainable consumption are also fundamentally important for promoting improved personal health, the environmental and public health communities will be able to strongly reinforce each others' efforts.

## **Conclusions**

Beyond food, housing and transportation are the next priorities for investigation in promoting sustainable consumption. The environment provided by ever larger homes in more distant suburban locations requiring reliance on automobiles and involving little physical exercise has aptly been called *obesogenic*. Clearly, housing and transportation decisions, like dietary ones, have implications not only for resource use and environmental degradation but also for personal health, thus again engaging the public health community. The community of urban, regional and especially transportation planners naturally also have a professional interest in the design, utilization, and maintenance of the built environment, from both an economic and social point of view. They are concerned with traffic congestion, with the provision of public spaces, and increasingly with the tenets of the New Urbanism, a movement within architecture intended to promote more socially cohesive, walkable communities in place of sprawling suburbs. Other new ideas are on the horizon for promoting sustainability in high-density cities, namely state-of-the-art building materials and construction techniques for high-rise buildings that can each house the population equivalent of a small town while generating energy through a skin clad in

photovoltaic panels and circulating operational material flows in closed-loop cycles (e.g., no discharge of sewage).<sup>3</sup>

A research program focused on sustainable consumption needs to identify alternative ways in which households can provide themselves with food, housing, and transportation and make concrete recommendations about beneficial lifestyle changes. Those of us who are specialists in life cycle analysis or input-output modeling have theories, models, methods, and databases that are invaluable for analyzing such alternatives. We can investigate the physical feasibility of scenarios, their economic costs, and their environmental, health, and social implications. However, we are not content experts in these areas. Thus we need to collaborate with experts in nutrition, public health, and regional and transportation planning to develop scenarios that are bold and appealing yet plausible. In this paper I have tried to indicate how this collaboration could proceed in the case of dietary change.

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<sup>3</sup> See, for example, the description of the 2020 tower designed for New York City and other innovative structures at <http://enr.construction.com/features/buildings/archives/030210.asp>.

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## Integrated Sustainable Consumption Research

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### Can Time Tell?

(A paper prepared for the International Workshop on Sustainable Consumption held in Leeds, March 2004)

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#### ABSTRACT

Having considerably furthered the understanding of the relationship between the economy and the environment during the last 15 years, the next big task for sustainability research is to find ways to integrate social aspects into quantitative models. This is particularly true for sustainable consumption research, where behavioural and demand-side issues have commonly been emphasised. This paper explores the possibilities of approaching this challenge by the means of time use data. As physical data in the ecosphere, the hours of time use as a measurement units allow to bring all activities – market and non-market - in a society into the scope of applied models under full and equal coverage of the population. Therefore, it is the ideal complement to monetary data for the description of the socio-economic system. A unique set of monetary, physical and time input-output tables for Western-Germany is used to demonstrate how time-use data can help to build an integrated model of sustainable consumption. In a preliminary application, the environmental, social and economic implications of different lifestyles are compared. The paper concludes by stressing the potential of time-use data for sustainable consumption research and briefly outlining some promising future applications.

**Keywords:** time use, input output modelling, social aspects, sustainable consumption, sustainable development, sustainability

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# 1 Introduction

It can be argued that the fundamental scarce resource in the economy is the availability of human time, and the allocation of time to various activities will ultimately determine the relative prices of goods and services, the growth path of real output, and the distribution of real income. While the importance of time allocation as an analytical construct is close to being self-evident, the use of data on time allocation either to model economic behaviour or to understand the economic change over time has only recently begun to attract the interest and attention of economists.

(Juster and Stafford, 1991, p. 471)

The debate around the concept of sustainability during the last 30 years is mainly rooted in the shared perception that mono-disciplinary approaches are too simplistic to provide a satisfactory understanding of society. Therefore, the trinity of sustainability (economy, environment, society) has constituted a new paradigm in theoretical and applied research. It suggests that a comprehensive description and analysis of society requires information about the economic, environmental and social reality. Models should serve to support multi-dimensional decision-processes by deepening the understanding of the linkages between different dimensions and showing ways how to reconcile them, wherever possible.

The sustainable development discussion in industrialized countries during the late 1980's and early 1990's, however, has treated the social dimension rather step motherly for two main reasons. First, due to economic prosperity and high living standards social issues were seen as a rather marginal problem, while environmental degradation associated with high levels of per capita material consumption was identified as the stumbling block on the way towards a more sustainable future. Second, a strong belief into the power of technology as the means to overcome the antagonism between economic growth and environmental degradation allowed the identification of sustainable pathways, which did not require major behavioural changes of citizens.<sup>4</sup> Therefore, social determinants of behaviour did not need to be addressed.

During the second half of the 1990's, however, there has been growing evidence that such a technocratic, supply side focussed approach might not bring the desired environmental improvements (e.g. UNEP, 2002).<sup>5</sup> Therefore, in recent times more and more attention has been paid to the social context and driving forces of people's behaviour recently. This has been particularly true in the sustainable consumption debate, which has commonly stressed behavioural and demand side issues. However, those efforts have largely remained at the theoretical level, while empirical work is still limping behind. As a consequence applied sustainable consumption models have largely remained two-dimensional in focus.

The overall objective of this paper is to provide some initial thoughts on how to bridge the gap between two-dimensional and integrated three-dimensional modelling by means of time use data. More specifically, it sets out to familiarize the reader with time use data and its potential to extend environmental-economic models for social aspects. It is also intended to demonstrate the feasibility and value of such an integrated modelling approach in a preliminary study of the economic, social and environmental impact of household consumption. For this purpose, a unique data set of extended monetary, physical and time input output tables for Germany is used covering the reporting period 1990. Despite the

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<sup>4</sup> Concepts like Cleaner Production, Eco-Efficiency or Ecological Modernization are a good documentation of this climate of technological optimism.

<sup>5</sup> The discussion around higher order effects of technological change underline this perception. For details refer, for example, to the debate on the rebound effect. See, Khazzoom (1987), Binswanger (2001) and Jalas (2002a).

demonstrational purpose the empirical application intends to provide some methodological inspiration on how to use a combined system of three sets of input-output tables for integrated policy analysis.

The paper is organised as follows. Section 2 discusses the potential of time use data for the integration of social aspects into sustainable consumption research and briefly summarises the state of the art in empirical sustainable consumption research. Section 3 introduces the data set as a basis for the description of the methodological approach in section 4. Section 5 presents the main findings and discusses results. Some conclusions and an outlook on possible areas of future research are presented in Section 6.

## 2 Time use data – the value for sustainable consumption research

This paper focuses on the introduction of time use data<sup>6</sup> to empirical sustainable consumption modelling for the following reasons: First, working with time use data is still a relatively unexplored field of research, while other applications using, for example, socio-economic statistics are much more established. Second, time allocation data seem to offer a high potential to overcome the limitations associated with monetisation in socio-economic analysis. Section 2.1 intends to familiarise the reader with time use data and their particular properties preparing the ground for the literature review of empirical applications of time use data in the sustainable consumption in Section 2.2.

### 2.1 A short introduction to time use data

In general, time use or time allocation data have been collected systematically since the early 1960s.<sup>7</sup> However, data availability differs significantly among countries and time use surveys are not necessarily carried out on a regular basis. Good time survey data bases can be found in Denmark, USA, Canada or the Netherlands. For the UK three time use surveys – 1995, 1999, 2000/2001 - are available to our knowledge (ONS, 2000), while in Germany only one survey has been carried out for the period 1991/1992.

Table 1: Information provided by time use data

Static perspective	The following information can be analysed when referring to a single reporting/ survey period.
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<sup>6</sup> "Time use data" and "time allocation data" are used as synonyms.

<sup>7</sup> For a brief history of time use surveys see Juster and Stafford (1991).

	<ol style="list-style-type: none"> <li>1) the activities realised in the course of a representative day for different purposes</li> <li>2) the during of these activities</li> <li>3) the allocation or distribution of these activities during the day</li> <li>4) differences among different groups of a community</li> </ol>
Dynamic perspective	<p>As soon as at least two comparable time budgets for different points in time are available, the analysis can be extended to address as well</p> <ol style="list-style-type: none"> <li>5) shifts in time use patterns regarding the information pieces 1 to 4, e.g. activities with absolute time gains or losses, shifts in the allocation or distribution of activities during the day or shifts in differences among different groups of a community</li> </ol>

Source: Stone (1975)

Table 1 provides an overview on the information content of the raw data collected in time surveys. It is grouped according to an activity classification. This gives rise to some unique properties of time use data, which seem extremely useful to introduce social aspects into (environmental-) economic models:

- Time use data cover all activities in the socio-economic system - not only market activities – carried out by an individual during a surveyed day irrespectively when and where they take place (spatial location; in or outside market system etc.). This is an analogy to the full coverage of physical data in the ecosphere.
- Time allocation data equally represents the entire population – irrespectively of age, health status, labour force participation, the position in the lifecycle etc.

These properties of time use data result from universal character of time use as a measurement unit, which is not bound to any institution in society like for example money.<sup>8</sup> Hence, from a time use perspective integration of social aspects can be defined as a complete analysis of the activities of a given population (Stahmer, 2003). As physical data has proved to be the appropriate complement to physical data in the environmental sphere to overcome the limitations of monetisation, time use data seems to play the same role in the socio-economic sphere.

The information contained in time-use data can be used in different ways and at distinct levels to introduce social aspects to sustainable consumption analysis. At the micro-level time use data is helpful to open models of household behaviour for non-market determinants (see Becker, 1965; Gronau, 1977; Juster and Stafford, 1991; Becker, 1993; Klevermarken, 1999). It allows to see consumption as a process that uses market goods and time as intermediate, substitutable inputs to derive utility from the resulting flow of service. This comprises both labour supply and consumer demand models. On the macro-level, time-use data have primarily served to broaden welfare estimates by accounting also for (productive and non-productive) activities, which take place outside the market. In this context time use data are either used indirectly to value non-market time and extend economic accounts or directly to augment the monetary accounting system with information of society's time-use (Pyatt, 1990; Stahmer, 2003). Essentially, this results in extended concepts of production, investment and capital. Computable general equilibrium models might help to unify micro- and macro-level approaches in one coherent framework.

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<sup>8</sup> Again, physical data has the same universal character to cover all material processes in the ecosphere.

## 2.2 Time Use Data in Sustainable Consumption Research

Time use data has been introduced into different types of economic models on the micro- and macro-level as already indicated above. Reviews can be found in Juster and Stafford (1991) and Klevermarken (1999). Hofstetter and Madjar (2003) provide an interdisciplinary review sustainable consumption studies with empirical application of time allocation data. The following brief literature review is limited to studies concerned with integrated modelling frameworks linking monetary, physical and time use data on the macro-level.

The relationship between consumption, well-being and a society's time use was already stressed in classics such as Linder's (1970) "The Harried Leisure Class" or Hirsch's (1977) "Social Limits to Growth". Time use as an essential component of sustainable consumption modelling with an explicit integration of environmental aspects was probably most prominently introduced by Mario Cogoy (1995, 1999, 2000) in a series of theoretical pieces. Further work has been carried out among others by Wenke (1999), Perrels (2002) and Binswanger (2001, 2002).<sup>9</sup>

Integrated, empirical sustainable consumption models drawing from time allocation data have remained both scarce and limited to a single area of application – the sustainable lifestyle debate. This debate analyses the linkages between different lifestyles and material and energy flows triggered by household consumption activities. Conventional models define **a lifestyle as an expenditure cluster of a socio-economic group with a defined set of characteristics**. Studies in this area share the motivation to identify lifestyle groups with environmental saving potential (Vringer and Blok, 1995; Weber and Perrels, 2000; Wier et al. 2000; Bin and Bowlatabadi, 2004). Technically, such studies commonly build on generalised input-output models with further SAM-type disaggregations of the final household demand vector. These approaches are associated with two main shortcomings. They usually lack a link between consumption goods/ services and the activities they are used for. Furthermore, information on the duration, frequency, sequence and location of activities is missing, though of crucial importance for understanding changes in consumption patterns and follow up changes in material and energy flows. Those shortcomings can be overcome by a consideration of time allocation data.

A few authors have already made attempts in this direction. In contrast to the conventional definition of lifestyles (see above) they define **a lifestyle as a pattern of household activities**. Such an activity-based definition is broader than the expenditure-based understanding of a lifestyle. It takes into account that activities do not only require financial but as well temporal and material/ energetic resources. In an early, visionary effort Schipper et al. (1989) explored the linkages between lifestyles and energy use patterns using data sources on consumption expenditure, time use, ownership and travel distances.<sup>10</sup> Inspired by a study on the relationship between time use and consumption activities (Mogensen, 1990), Jalas (2002a, 2002b) extended the conventional methodological approach by integrating time use data into a generalised input-output framework. In this way, he estimated the associated direct and indirect energy/ material intensity of household consumption activities in an integrated fashion. Similarly to Jalas' approach Van der Werf (2002) used a hybrid lifecycle assessment framework in combination with time allocation data to evaluate the energy use associated with different household activities. All those

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<sup>9</sup> The latter has probably gained most attention as he prominently introduced the concept of a "time rebound effect".

<sup>10</sup> Note that the authors do not make an attempt to link those data sources to an integrated framework.

studies, provide the energy/ material intensity of different household activities not only per monetary, but also per time unit. The results usually reflect that pollution coefficients differ quite significantly when expressed per time instead of per monetary units leading as a consequence to markedly different policy implications.

Schipper et al. (1989) strikingly summarizes the importance of time allocation data for a proper understanding of energy use patterns and the design of reliable policy scenarios and forecasts. “[...] With a firm understanding of the infrastructure of energy-using equipment, buildings, and vehicles, we propose models of activities that use time (and location), which provide the best insights into what people are doing as well as where and for how long. Since the number of hours in the day is limited, the time-based activity approach forces the analyst to consider both what people might do in the future that is different from what they do today, as well as what they will not do as a consequence of their new activities” (Schipper, et al., p. 317).

### 3 The data set – a “Magic Triangle of Input-Output Tables”

The data set applied in this study is unique. It is worldwide the first data set that comprises input-output tables for all three dimensions of sustainable development. It was compiled for West-Germany for the reporting period 1990 in a visionary effort by a group of statisticians lead by Prof. Carsten Stahmer (Statistisches Bundesamt, 2003). The data set contains monetary, physical and time input-output tables. A detailed discussion of the data set can be found in Stahmer (2000, 2003a). Early applications of this data set have been provided by Staeglin and Schintke (2002) and Stahmer (2003b). In the following, its main structural features as well as additional information on relevant details regarding the modelling efforts presented in sections 4 and 5 are summarised. In concrete, the data set comprises four distinct sets of input output tables. This study focuses on the following three of them:

1. **EMIOT** - a set of socially extended, monetary input output tables. EMIOT is derived from the traditional input-output table (TMIOT)<sup>11</sup> used in Germany. It is based on a higher sectoral disaggregation level (89 sectors) than TMIOT (58 sectors) since it explicitly accounts for environmental (protection) services (2 sectors), educational services (10 sectors) and private household activities (19 sectors). The concept of production is broadened in so far as the market value of non-market activities is imputed as long as these can be considered alienable. An alienable activity is defined as an activity that could be carried out by someone else. This is often referred to as third person criterion. The concepts of capital and investment are broadened as an educational capital stock is introduced and the purchases of goods for everyday life is considered as a capital investment.
2. **ZIOT** - most remarkably a time input-output table (ZIOT). ZIOT records not only the direct time inputs during a reporting period, but also indirect time inputs.<sup>12</sup> The indirect time inputs can be understood as the working and education time “clotted” in

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<sup>11</sup> Since TMIOT is used for comparative purposes only in this study, no further details are provided on TMIOT. For a detailed description refer to the standard input-output publications in Germany.

<sup>12</sup> The direct time input concept denotes the total available time budget of society. For the 63.3 million citizens in Western Germany with an individual time budget of 365days\*24h=8760h/year, this direct time input was 554 billion hours.

production and human capital. The main value and advantage of ZIOT compared to other input-output tables is that – based on the time dimension – it is capable of providing a complete picture of all market and non-market based household activities (Stahmer 2003a). Essentially, ZIOT is the equivalent to EMIOT measured in time units and can for this reason be interpreted as an alternative way of representing human activities within the socio-economic system.<sup>13</sup> So, ZIOT shares the extended production, capital and investment concepts as well as the explicit treatment of environmental services, educational services and household activities.

3. **PIOT** - a set of physical input-output tables (PIOT)<sup>14</sup>. PIOT (detailed description in Eurostat, 1999) exhaustively describe the material inflows, throughflows and outflows in tons associated with economic activities in line with the material balance principle (Ayres and Kneese, 1969; Georgescu-Roegen, 1971). In PIOT, natural capital is introduced as an additional capital stock.

Each of the three input-output tables has its particular strengths and weaknesses. ZIOT and PIOT can give a complete picture of/ depict all activities and processes within the socio-economic and bio-physical system respectively. However, each unit is indistinctively treated in the same way.<sup>15</sup> In contrast, EMIOT does not cover all activities and processes, but has the strength to put a particular value on all the ones considered. This allows to build theories about preferences, utility and welfare. All this underlines the fact that the value of the data set’s input-output tables for sustainable consumption research is not directly linked to either one or the other but ultimately lies in their interplay. This is why they are referred to as “the magic triangle of input-output”.

Table 2: Treatment of household activities in the data set

<i>Household Activity</i>	<i>alienable</i>	<i>inalienable</i>
Household Production	x	-
DIY (do it yourself work)	x	-
Employment/ Search for Employment	x	-
Voluntary Work, Social Services	-	x
Qualification and Education (split into 10 sub-sectors)	x	-
Personal Care/ Physiological Recreation	-	x
Personal Contacts/Communication/ Socialising	-	x
Leisure Activities/ Use of Media	-	x
Care for other people	-	x
Residual activities/ non-allocatable times	-	x

Since the empirical part of this paper focuses on household activities, a few more words should be spent on the treatment of households in the data set. Within the input-output tables the household sector is broken down into 19 activities. Technically, the different household activities are treated as production sectors in all three tables of the “magic triangle” (EMIOT, ZIOT, PIOT). Private purchases of consumption goods beside time inputs valued at market prices and the use of goods are therefore recorded as intermediate inputs to a particular household activity and not as final demand. This is very much in line with the intuition behind Becker’s (1965) household production approach. Final demand of

<sup>13</sup> A procedure to derive a ZIOT from EMIOT is briefly outlined in the appendix.

<sup>14</sup> Further PIOTs are available for Denmark and Italy.

<sup>15</sup> This has been particularly extensively discussed in the case of PIOT. Opponents have blamed PIOTs to follow an indistinctive ton ideology. For this reasons, the German PIOT can be further disaggregated for water, energy and other materials.

households in EMIOT and ZIOT only comprises the final use of services provided by private household activities. This could be termed “Eigenverbrauch” of private households (Stahmer, 2003). The distinctive criteria where to record a private household activity is again the third-person criteria. Only inalienable activities, i.e. activities, which do not correspond to the third person criterion, are recorded as final demand in EMIOT and ZIOT. Table 2 provides an overview of the treatment of household activities in EMIOT and ZIOT. Please note that 10 educational sectors have been aggregated in a single one here. All alienable activities have a zero entry in the final demand vector. Because the production activity “Home Services of Private Non-Profit Institutions” is also considered partly inalienable, there are 7 non-zero entries in the final demand vector. Note that while EMIOT and ZIOT are partly closed for household activities as outlined, PIOT is completely closed.

## 4 The Model – first steps towards integrated analysis

This preliminary modelling exercise consists of two parts. The first part will introduce the standard Leontief model. In the second part, an integrated modelling framework is established that integrates the different input-output tables within one coherent data framework. A methodology will be established to assess the economic, social and environmental impact of household consumption activities.

### 4.1 Basic Input Output

The static, open demand side model usually starts from a monetary input output table. However, its algebra applies to the other two types of input output tables used in this study as well. To distinguish those three input output tables, we add an additional superscript  $k=e,z,p$  to denote the different tables ( $e=EMIOT$ ;  $z=ZIOT$ ;  $p=PIOT$ )

Denoting intermediate flows of goods and services from the  $i^{th}$  to the  $j^{th}$  sector by  $z_{ij}^k$  (in the respective tables) and total output of the  $j^{th}$  sector by  $x_j^k$ , we can derive the direct coefficient matrix  $A^k$  by dividing the intermediate flows of goods and services from the  $i^{th}$  to the  $j^{th}$  sector  $z_{ij}^k$  by sector  $j$ 's total output  $x_j^k$ , that is

$$A^k = [a_{ij}^k] = \left[ \frac{z_{ij}^k}{x_j^k} \right] \quad (0.1)$$

By doing so we conventionally assume a Leontief type production function, where the  $n$  different inputs used by the  $j^{th}$  sector are perfect complements.<sup>16</sup> Defining an identity matrix  $I$  of the same size than  $A^k$ , we can establish the basic demand side input output model named after Vasily Leontief, that is

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<sup>16</sup> We therefore assume constant returns to scale and the sectoral use of inputs in fixed proportions.

$$\mathbf{x}^k = (\mathbf{I} - \mathbf{A}^k)^{-1} \mathbf{y}^k = \mathbf{L}^k \mathbf{y}^k \quad (0.2)$$

where  $\mathbf{L}^k = (\mathbf{I} - \mathbf{A}^k)^{-1}$  is the Leontief Inverse.

## 4.2 Towards an integrated model

To build up an integrated model for analysing the economic, social and environmental impact of household consumption activities, we combine all three sets of input output tables in an augmented Leontief model. In our first integrated model we define the direct requirement matrix in terms of the monetary output vector  $\mathbf{x}^e$  and denote it by  $\mathbf{A}_{samio}^e$ , that is

$$\mathbf{A}_{samio}^e = \begin{pmatrix} \mathbf{Z}^e & \mathbf{O} & \mathbf{O} & \mathbf{O} & \mathbf{O} & \mathbf{O} \\ \mathbf{V}^e & \mathbf{O} & \mathbf{O} & \mathbf{O} & \mathbf{O} & \mathbf{O} \\ \mathbf{Z}^z & \mathbf{O} & \mathbf{O} & \mathbf{O} & \mathbf{O} & \mathbf{O} \\ \mathbf{V}^z & \mathbf{O} & \mathbf{O} & \mathbf{O} & \mathbf{O} & \mathbf{O} \\ \mathbf{Z}^p & \mathbf{O} & \mathbf{O} & \mathbf{O} & \mathbf{O} & \mathbf{O} \\ \mathbf{V}^p & \mathbf{O} & \mathbf{O} & \mathbf{O} & \mathbf{O} & \mathbf{O} \end{pmatrix} * \begin{pmatrix} \mathbf{x}^e & \mathbf{O} & \mathbf{O} & \mathbf{O} & \mathbf{O} & \mathbf{O} \\ \mathbf{O} & \mathbf{O} & \mathbf{O} & \mathbf{O} & \mathbf{O} & \mathbf{O} \\ \mathbf{O} & \mathbf{O} & \mathbf{O} & \mathbf{O} & \mathbf{O} & \mathbf{O} \\ \mathbf{O} & \mathbf{O} & \mathbf{O} & \mathbf{O} & \mathbf{O} & \mathbf{O} \\ \mathbf{O} & \mathbf{O} & \mathbf{O} & \mathbf{O} & \mathbf{O} & \mathbf{O} \\ \mathbf{O} & \mathbf{O} & \mathbf{O} & \mathbf{O} & \mathbf{O} & \mathbf{O} \end{pmatrix}^{-1} \quad (0.3)$$

where  $\mathbf{Z}^k$  are the the intermediate flow matrices,  $\mathbf{V}^k$  the primary input matrices,  $\mathbf{x}_s^k$  the total sectoral output vectors and  $\mathbf{x}_p^k$  the total primary input vectors for all three different tables ( $k = e, z, p$ ). The size of this aggregate matrix is 333x333, where only the first 89 columns contain non-zero elements. Defining the final demand vector  $\mathbf{y}_{samio}^e$  only in terms of monetary units we can estimate our integrated Leontief model by

$$\mathbf{x}_{samio}^e = (\mathbf{I} - \mathbf{A}_{samio}^e)^{-1} \mathbf{y}_{samio}^e \quad (0.4)$$

Following the same rational we can specify  $\mathbf{x}_{samio}$  and  $\mathbf{y}_{samio}$  just in terms of the corresponding vectors in the time use input output table and derive the same model in terms of time units, that is

$$\mathbf{x}_{samio}^z = (\mathbf{I} - \mathbf{A}_{samio}^z)^{-1} \mathbf{y}_{samio}^z$$

## 5 Results and discussion – what time can tell

### 5.1 Descriptive statistics – some basic indicators

A convenient way to familiarize the reader with the data set is to provide some basic indicators. Those can be directly taken from the data set's input-output tables as descriptive statistics. The indicators are summarized in Table 3.<sup>17</sup> Although it will be distinguished between economic, social and environmental indicators here, it is not the intention to provide a complete indicator set for sustainability or sustainable consumption research. The aim at this point is rather to demonstrate the richness of the data set and give a first taste social measures that can be derived.

Table 3: A sustainability indicator set

<i>Table</i>	<i>Indicator</i>	<i>Estimate</i>	<i>Units</i>
TMIOT	Gross Output	4657.01	Billion DM
	Gross National Product (GNP)	2245.25	Billion DM
EMIOT	Gross Output	7879.24	Billion DM
	Gross National Product (GNP)	3230.21	Billion DM
	Change in Educational Capital	7.146	Billion DM
	Monetary Trade Balance	117.78	Billion DM
	Employment Level	28.49	Million person
ZIOT	Total Time Budget	545.10	Billion hours
	Employment Time	46.26	Billion hours
	Change in Educational Capital	-0.648	Billion hours
PIOT	Total Material Input (TMI)	62.95	Billion tons
	Physical Trade Balance	0.184	Billion tons

Standard economic indicators can be taken from TMIOT. In 1990 the gross output of the western-German economy was 4657.01 billion DM and GNP accounted for 2245.25 billion DM. In correspondence with the explanations provided in Section 3, gross output and GNP estimates from EMIOT exceed the ones from TMIOT by 69% and 44% respectively due to the extended concepts of production, capital and investment. The difference can be interpreted as socially adjusted versions of those two basic welfare measures.<sup>18</sup> Moreover, West Germany showed a monetary and physical foreign trade surplus of 117.78 billion DM and 0.184 billion tons respectively. Note that it is not possible to deduce from this physical trade balance whether Germany benefited from its trade relations in terms of total environmental impact (approximated by a material flow indicator).

The figures derived from ZIOT can be interpreted as social or socio-economic indicators. In 1990, the population in West Germany 63.3 million. As each citizen had a yearly time budget of 8760 hours, the total direct time input of the population was 545.1 billion hours. From this total time budget of society only 46.26 billion hours were spent in employment – this is only about 8.5% of the total available time. This “employment time” was accumulated by a total of 28.49 million citizens. Clearly, the unemployment rate as

<sup>17</sup> Not much care has been given to correspond with common accounting practises as the main point is to inspire... The required adjustments

<sup>18</sup> Recall that social in the time-use concept means to take all activities of a given population into account (see section 2).

proposed for example by Spangenberg (2002) would be more suitable as a socio-economic indicator. However, this kind of information cannot be extracted from the input-output tables.

Human capital represents another important socio-economic indicator.<sup>19</sup> In particular, it can indicate both an economy's (future) competitiveness and its general access to education and qualification. The human capital indicator as shown in Table 3 measures the change in educational capital during the reporting period, i.e. the difference in investment in and depreciation of educational capital. Interestingly, the monetary indicator shows a net increase of 7.15 billion DM, while the time measure indicates a net reduction in educational capital of 0.65 billion hours. Stahmer (2003a) explains the difference in estimates as a result of a relatively high weight allocated to education times of students and pupils (depreciated over their working life), which are not monetised.

As environmental indicator "total material input" (TMI) as proposed in Eurostat (2001) can be directly taken from PIOT. TMI is defined as all materials which are of economic value and used in production and consumption activities within an economy plus the domestic unused material extraction (domestic hidden flows).<sup>20</sup> It summed up to 62.95 billion tons during the reporting period 1990.

Hence, standard indicators in the economic, environmental and social sphere have been defined without the ambition to provide a systematic sustainability indicator set. However, a systematic indicator set derived from such a combined conceptual and data framework would have the major advantage that it could be used directly applied in modelling exercise as well. By means of models for policy analysis one could for example directly assess the impact of different policy instruments like taxes, contingents or other institutional arrangements (working hour restrictions etc.) on those key variables for society. Even though this exceeds the scope of the paper in hand, it demonstrates the broad variety of opportunities for integrated modelling and the potential of time use data to capture the social (and institutional) reality of society.

## **5.2 Time uses by socio-economic groups**

As already indicated above, the population in West Germany spent on average about 91.65% of their time outside the production sector and only 8.35% inside. This underlines the importance of modelling approaches that consider activities lying outside the production sector in order to get a detailed picture of society. As argued above, this can only be achieved comprehensively in the socio-economic sphere by means of time use data. Table 4 records the allocation of time budgets across activities for the average population, the group "students and pupils" and three socio-economic groups which are distinguished by their skill level. It shows that the largest share of the total time budget of the average population is used for the activity "personal care/ physiological recreation" followed by "leisure activities/ use of media" and "household production". The least time is spent on "social work/ voluntary activities" and "DIY (Do-it-yourself) work". However, there are some differences across socio-economic groups.

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<sup>19</sup> According to the Oxford Dictionary of Economics human capital is "the present discounted value of the additional productivity over and above the product of unskilled labour, of people with skills and qualifications."

<sup>20</sup> Hence, by deducing the hidden flows, the direct material input indicator could be estimated again. Based on a single region model assumption, also the total material requirement estimator could be easily derived.

Table 4 - Time Use by different social groups classified by skill level

Activity/Sector	Average population		Un- skilled	Low/m edium skilled	High skilled	Pupils and student s
	In billion hours	%	%	%	%	%
Market Activities	46.27	8.35	5.11	12.44	15.56	5.18
Household Activities	507.83	91.65	94.89	84.44	87.76	94.82
Household Production	64.23	11.59	17.66	12.77	10.59	5.07
DIY Work	6.15	1.11	0.87	1.54	1.21	1.07
Employment/ Search for Employment	12.25	2.21	1.41	3.12	4.07	1.74
Voluntary Work, Social Services	3.12	0.56	0.46	0.72	1.20	0.43
Qualification and Education (split into 10 sub sectors)	15.43	2.78	0.34	0.37	0.80	13.84
Personal Care/ Physiological Recreation	265.58	47.93	49.00	45.04	43.48	45.77
Personal Contacts/Communication/ Socialising	33.55	6.06	6.27	6.31	6.21	7.48
Leisure Activities/ Use of Media	94.54	17.06	16.35	15.17	13.95	17.55
Care for other people	8.81	1.59	1.78	2.09	2.11	0.57
Residual activities/ non-allocatable times	4.16	0.75	0.75	0.63	0.82	1.30
$\Sigma$	554.10	100	100	100	100	100

As to be expected the amount of time citizens spend on market work increases with their skill level. While unskilled people only use 5.11% of their available time, low and medium skilled people invest already 12.44% and high skilled people even 15.56% of their day into market work. However, unskilled people partly compensate for this smaller effort by enrolling more into household production. They spend 17.66% of their day on this activity against 12.77% and 10.59% spent by low/medium and high skilled households. Compared to other socio-economic groups, high skilled people also invest more time in “social and voluntary work” and “employment/search for employment” as well as less in leisure activities. Interestingly, the time budget share spent on “personal contacts/ communication/ socializing” is almost identical across socio-economic groups. This might be an indication for a societally cross-cutting need for communication outside the working environment.

Further analysis has been carried out for a distinction of socio-economic groups by age and employment status. The results have not been included here. However, they indicate differences in time use patterns depending on a person’s position in the lifecycle. In particular, time spent on “household production”, “personal care/ physiological regeneration” and “leisure activities/ use of media” show large variations across groups. In scenarios it is of crucial importance to take those information into account. For example, the population in Germany is ageing. Therefore, within the next 50 years a significant shift in time use/ activity pattern can be expected. On the one hand, an ageing population points towards a reduction in total labour market hours. On the other hand, activity patterns of society can be expected to shift towards activity patterns of the older population. This would induce significant changes in patterns of production, consumption and resource use.

In a brief analysis of a society’s time use patterns it has been demonstrated why it is essential to consider this type of information in monitoring and policy analysis. The next section, will show how this knowledge can be applied to explain the economic, social and

environmental implications of household activities. While the analysis has remained descriptive and isolated so far, it will move now towards modelling and integration.

### 5.3 Towards an integrated model

#### 5.3.1 The analysis of resource intensities – some clarification

Table 5 gives the resource uses for different household activities per monetary unit (column 1) and per time unit (column 3). The former will be termed monetary resource intensity and the latter time resource intensity in the remaining of this paper. Column 2 and 4 show the rank coefficients of the different household activities. Each element in the first column gives the direct and indirect amount of physical inputs from sector/primary resource  $i$  per monetary unit output required in sector  $j$  to provide an extra unit of final demand. In a similar fashion the third column in Table 5 gives the direct and indirect amount of physical inputs from sector/primary resource  $i$  per time unit required to provide an additional unit of final demand.

Table 5- Resource use per monetary unit and per time unit

<i>Activity/Sector</i>	<i>t/1000DM</i>	<i>rank</i>	<i>t/1000h</i>	<i>rank</i>
Household Production	10.81	15	131.61	2
DIY Work	8.31	17	121.93	3
Employment/ Search for Employment	12.67	11	51.81	9
Voluntary Work, Social Services	6.09	19	73.37	5
Qualification and education – kindergarten	14.45	4	22.47	19
Qualification and education – primary school	13.91	6	28.95	13
Qualification and education – secondary school (type 1)	13.49	9	26.67	16
Qualification and education – secondary school (type 2)	13.46	10	25.61	17
Qualification and education – grammar school	13.55	8	27.24	14
Qualification and education – vocational school	14.19	5	71.90	6
Qualification and education – technical school	10.93	14	24.48	18
Qualification and education – college of higher education	11.33	13	29.04	12
Qualification and education – university	10.77	16	26.97	15
Qualification and education – other activities of households	11.88	12	31.73	11
Personal Care/ Physiological Recreation	16.39	3	57.03	8
Personal Contacts/Communication/ Socialising	13.88	7	43.39	10
Leisure Activities/ Use of Media	18.01	2	67.88	7
Care for other people	7.33	18	87.27	4
<b>Residual activities/ non-allocatable times</b>	<b>24.14</b>	<b>1</b>	<b>232.64</b>	<b>1</b>

The results show that both resource intensity of the activities and their ranks differ considerably depending on whether they are estimated in terms of time or monetary units. The resource intensities of the (residual) category “residual activities/ non-allocatable time” is highest both as time and monetary resource intensity. However, “household production” and “DIY-work”, which rank 2<sup>nd</sup> and 3<sup>rd</sup> among the time resource intensities, only come 15<sup>th</sup> and 17<sup>th</sup> among the monetary resource intensities. The same opposing tendencies can be observed for many other activities like “voluntary work”, “physiological regeneration” or “leisure activities”. The differences in absolute size of the coefficients between column 1 and 3 are mainly related to the size of the individual entries in the total output vectors in time and monetary units respectively. The differences across activities are motivated by the differences in the relative distribution of output in time and monetary units across sectors. Hence, those relative differences in resource use coefficients simply reflect the fact that an

activity, which is relative resource intensive in monetary terms does not need to be in terms of time use. In fact, people might spend little time on an activity they pay a significant amount of money for and which require high levels of material inputs.

It has been suggested in the literature that it is desirable to shift from more resource intensive to less resource intensive activities. Here, due to the differences among the two types of resource intensity indicators, the policy implications seem to be less obvious. At first sight it remains rather unclear, which type of coefficient to rely on. This directs attention towards a careful interpretation. It has been suggested that time resource intensities are more suitable as they depict and help to understand household consumption activities as a *process*. Moreover, time use patterns are directly linked to a citizen's daily routines and allow (policy maker) to understand much better the importance of individual activities in this time schedule. Therefore, authors have suggested to shift consumption processes towards activities with lower time resource intensities. This policy suggestion is problematic for at least three kind of reasons:

First, time patterns and the use of natural resources are not directly linked to each other as money and natural resource are. For example, even if people spend a similar time at home, the associated total resource use of housing per unit of time should still highly differ. It crucially depends on the size and the equipment endowment of the house, which are directly related to house prices and therefore the flow of expenditure and people's income among other factors.

Second, time resource intensities can give a distorted picture as soon as a high amount of durable good are involved, which are associated with high amounts resource inputs in their production and relatively small resource requirements during their use phase. This is particularly true for all infrastructural goods. In those cases the time resource intensities of an activity might be very high although the resource requirements for an additional time unit might in fact be very low and –*ceteris paribus*– environmentally desirable. A validation of this argument might be seen in the efforts of the eco-efficiency debate to achieve high levels of product use for durable goods and in the related fight of built in obsolescence. However, this problem can be circumvented by either treating those durable goods separately as done by Jalas (2002a, 2002b) or by depreciating the material content of durable goods over their lifetime.

Third, a change in average time use is expected to lead to changes in behaviour. On the micro-economic level this has been explained by models of authors like Becker (1965) or Gronau (1977). It cannot be expected that an additional hour of a certain activity will be necessarily shaped in the same way than the previous one although this might be true for an additional hour of watching television. However, an additional hour for household production or leisure activities has potentially very different material implications. For example, having more time for a hiking trip might make people choose different hiking areas, which might lead to longer travel times and travel distances. Hence, assuming non-substitutability between time and resource inputs as implied by the time resource intensity coefficients might be too restrictive, while it seems much more justifiable for monetary inputs at least with respect to the (very) short-term.

At first sight this might look as a drawback for the value of time-use data for sustainable consumption models. However, the opposite is the case as it all stresses the importance to include time-use data for understanding consumer behaviour. Based on these considerations, the proposed Leontief model might be too restrictive to suggest reliable material implications of changes in time use patterns of society. Scenarios obtained using

these methods should be interpreted with greatest care as results might not make a lot of sense. The time resource efficiency, however, remains a valuable piece of information to monitor the interesting relationship between a societies patterns of time and resource use. Moreover, a good understanding of time use patterns of the different socio-economic groups with some additional information on demographics, innovation etc., should allow to estimate more reliably changes in consumption expenditure patterns in combined econometric and input-output models. More realistic behavioural assumptions could also be included using computable general equilibrium instead of input-output models. In this way time use data should be very helpful - used indirectly - to build more realistic sustainable consumption scenarios within the Leontief framework.

### **5.3.2 The societal impact of final household consumption activities**

The following three tables give the total economic, social and environmental outputs associated with household activities for four different socio-economic groups – children below the age of 12 (SOC1), people between 12 and 65 not enrolled into the labour market (SOC 2), employed people between 12 and 65 (SOC3) and people over 65 (SOC4). The way in which the socio-economic groups are classified depends on the aim of the researcher. For example, a grouping based on skill levels could have been undertaken to analyse in details the impact of skilled labour force on the economy. Here we keep the classification small to illustrate the potential of the methodology.

Table 6 summarizes the activities originating in the household sector itself, while Table 7 informs about industrial production activities triggered by final (exogenous) household consumption activities. In both tables activities in household and industrial sectors are recorded in their monetary, physical and time dimension. Hence, each activity explicitly requires not only financial and natural but also time resources. This allows to apply a richer lifestyle definition as the one usually provided in the debate (see, page 215) and to see consumption as a process as proposed by Becker (1965) for the micro-level. However, as the physical measures in

Table 6 and Table 7 only comprise the physical weight of goods and services<sup>21</sup>, the physical primary inputs triggered by household activities have been recorded separately in Table 8. They comprise also unused extraction, which never enters the economic system and, therefore, give a complete picture of the physical flows associated directly and indirectly with final household activities. To our knowledge it has been the first time that such a complete picture of socio-economic (by the means of time use and monetary data) and material imprints (by the means of a complete physical data set) of household activities has been given.

The interpretation of the results requires to distinguish between alienable and inalienable activities. Only the latter ones are exogenous in the input-output model. The alienable household activities “Household Production”, “DIY-work” and “Employment/ Search for Employment”, in contrast, are treated endogenously like productive sectors. Therefore, the results must be interpreted in a slightly different way. Clearly, the estimated monetary and time values of total production for the different lifestyle groups must be identical to the ones in EMIOT and ZIOT. They represent the direct time and money inputs for those

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<sup>21</sup> To be correct: They also comprise pollution as long as it serves other sectors as an input.

activities by the different lifestyle groups. For example, people older than 65 (SOC4) value “Physiological Recreation” (expressed by their purchases of goods and services and their (imputed) value of time) worth 197.60 billion DM on and devoted directly and indirectly 57.50 billion hours of time to this activity. Note that this also includes the “clotted” time embodied in production capital. In the case of household activities these are mainly the consumption goods. The direct time input with 45.51 billion hours was considerably lower. However, as PIOT is fully closed for household activities, the total amount of material inputs associated with this activity needed to be estimated. The direct and indirect inputs of goods summed up to a total weight of 118.16 million tons in physical terms.

In the case of alienable household activities the interpretation is a little bit different as they are “instrumental” to final household activities as all other productive activities. For example, the inalienable final demand activities of children below 12 (SOC1) required directly and indirectly “Household Production” worth 129.07 billion DM, a time input of 10.71 billion and 60.19 million tons of physical goods. Only by looking at the direct time inputs as shown in Table 9 in the appendix, it can be seen by whom the household production activities are carried out. The direct time input of children themselves (as it should be expected), for example, is 0.<sup>22</sup> The same interpretation applies for each of the industrial sectors shown in Table 7.

Table 6 – Results for the household sectors

<i>Household Activities</i>	<i>SOC1</i>	<i>SOC2</i>	<i>SOC3</i>	<i>SOC4</i>	$\Sigma$	<i>Units</i>
Household Production (alienable)	129.07	279.96	378.29	156.20	943.53	bil DM
	10.71	23.23	31.39	12.96	78.30	bil hours
	60.19	120.91	160.06	68.98	410.13	mil tons
DIY Work (alienable)	14.16	33.51	43.47	17.76	108.90	bil DM
	0.98	2.32	3.01	1.23	7.53	bil hours
	5.32	10.82	14.16	6.11	36.41	mil tons
(Search for) Employment (alienable)	2.25	4.54	6.63	2.59	16.01	bil DM
	0.56	1.14	1.67	0.65	4.03	bil hours
	6.15	12.51	16.37	7.07	42.10	mil tons
Voluntary Work, Social Services (inalienable)	0	24.92	34.66	15.14	74.72	bil DM
	0	2.10	2.92	1.28	6.30	bil hours
	0	2.21	2.90	1.25	6.36	mil tons
Physiological Recreation (inalienable)	175.27	310.61	464.71	196.60	1147.19	bil DM
	51.26	90.84	135.92	57.50	335.52	bil hours
	102.89	209.08	273.69	118.16	703.83	mil tons
Socialising (inalienable)	8.23	39.62	58.69	20.81	127.35	bil DM
	2.71	13.03	19.30	6.84	41.88	bil hours
	14.11	28.67	37.52	16.20	96.50	mil tons
Leisure Activities/ Use of Media (inalienable)	84.51	123.89	156.27	81.86	446.52	bil DM
	23.08	33.83	42.67	22.35	121.93	bil hours
	66.22	134.57	176.15	76.04	452.99	mil tons
Care for other people (inalienable)	0	105.86	86.05	15.37	207.25	bil DM
	0	9.07	7.38	1.31	17.76	bil hours
	0	13.64	17.86	7.71	39.21	mil tons
Non-allocatable times (inalienable)	5.72	28.48	12.99	7.11	54.30	bil DM
	0.61	3.02	1.38	0.75	5.76	bil hours

<sup>22</sup> This is different for inalienable activities. If the direct time input for inalienable activities is zero, also the total production value in terms of monetary and time units must be zero as well.

	11.51	23.39	30.62	13.22	78.75	mil tons
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While the physical weight, directly and indirectly, required to satisfy the inalienable final household activities can be broken down by sector, this is not possible for the primary inputs as they are recorded in the rows of PIOT by type. Table 8, therefore, gives the direct and indirect amount of primary resource inputs required to allow for the final household activities by the different lifestyle groups. For example, if we look at wastes for landfills, we can immediately determine that the group with the highest impact is the group of individuals aged between 12 and 65, who are enrolled in the labour market (SOC 3), which triggers a total of 1.42 million tons of landfill waste. In comparison, the same age group that is not enrolled (SOC 2), triggers a total of about 30 per cent less landfill waste. The dominance of water among the primary inputs should be noticed. Depending of the purpose of the inquiry, it might, therefore, be often very useful to exclude water from PIOT.

Among the household sectors physical, monetary and time sphere is dominated by only three activities - "Physiological Recreation", "Use of Media" and "Leisure Activities". Among the "industrial production activities" the physical flows of goods and services in absolute terms are highest - as to be expected - in "Energy, Water, Mining" followed by "Manufacturing" and "Non-market services". However, total production triggered by final household activities in terms of money and time<sup>23</sup> is largest for "Market Services" followed by "Manufacturing" and "Energy, Water, Mining". Therefore, a deeper analysis might find empirical evidence that a shift towards a service economy is desirable for economic, environmental and social/employment reasons. However, this issue needs to be analysed in more depth in future work.

As it is not the aim of the authors to provide a complete analysis of the different lifestyles at this point, it seems sufficient to stress the much richer picture that can be gained, if time-use data is included into the data framework. Moreover, the picture is complete as all activities of citizens within the socio-economic system during the reporting period are captured. It could be seen as an economy-wide snapshot of the household production approach on the macro-level at a certain point in time.

Table 7 – Industrial production triggered by final household activities

<i>Industrial Production</i>	<i>SOC1</i>	<i>SOC2</i>	<i>SOC3</i>	<i>SOC4</i>	$\Sigma$	<i>Units</i>
Agriculture, Forestry, Fishery	6.45	13.58	18.42	7.61	46.06	bil DM
	0.37	0.78	1.06	0.44	2.65	bil hours
	19.93	41.85	56.378	23.48	141.638	mil tons
Energy, Water, Mining	10.09	20.59	27.34	11.65	69.67	bil DM
	0.29	0.59	0.78	0.33	1.99	bil hours
	653.92	1329.97	1749.99	751.54	4485.42	mil tons
Manufacturing	57.98	120.03	161.36	67.62	406.99	bil DM
	1.92	3.97	5.35	2.24	13.48	bil hours
	156.33	320.36	420.93	180.52	1078.14	mil tons
Construction	3.85	7.84	10.31	4.43	26.43	bil DM
	0.13	0.27	0.36	0.15	0.91	bil hours
	5.50	11.17	14.74	6.32	37.73	mil tons
Market services	122.38	247.65	328.79	140.78	839.6	bil DM
	4.55	9.25	12.33	5.25	31.38	bil hours

<sup>23</sup> Recall that this is to be expected due to the close relationship between EMIOT and ZIOT.

	14.05	28.51	37.50	16.14	96.2	mil tons
Non-market services	6.75	12.98	35.84	7.52	63.09	bil DM
	0.27	0.51	0.68	0.30	1.76	bil hours
	31.56	64.13	83.97	36.24	215.9	mil tons
Imports – goods	20.70	45.80	60.20	25.03	151.73	mil tons
Imports – services	0.61	1.17	1.61	0.69	4.08	mil tons
Labour Input	1.18	2.39	3.49	1.36	8.42	mil people

Table 8 – Primary inputs triggered by final household activities

<i>Primary Inputs</i>	<i>SOC1</i>	<i>SOC2</i>	<i>SOC3</i>	<i>SOC4</i>	$\Sigma$	<i>Units</i>
Wastes for recycling	0.47	1.01	1.29	0.55	3.32	mil tons
Wastes for treatment	0.14	0.30	0.39	0.17	1	mil tons
Wastes for landfill	0.52	1.09	1.42	0.60	3.63	mil tons
Unused wastes	52.52	107.32	142.63	60.66	363.13	mil tons
Energy carriers	10.723	22.04	29.23	12.42	74.413	mil tons
Minerals of soil	0.066	0.14	0.19	0.077	0.473	mil tons
Soil excavation – throughflows	1.19	2.41	3.16	1.36	8.12	mil tons
Other soil excavation	0.61	1.23	1.61	0.70	4.15	mil tons
Other solid materials	11.59	25.121	33.22	13.76	83.691	mil tons
Cooling water	2818.50	5749.56	7641.96	3252.22	19462.24	mil tons
Other water	480.29	976.42	1306.96	552.78	3316.45	mil tons
Oxygen	58.67	128.42	168.72	70.51	426.32	mil tons
Carbon-Dioxide	27.34	57.70	78.25	32.32	195.61	mil tons
Other Gases	0.06	0.13	0.17	0.072	0.432	mil tons

## 6 Conclusion and outlook on future research

In this paper, it has been argued and demonstrated in an empirical application how time use data can be used to integrate social aspects into sustainable consumption analysis. The term social aspects as it has been used here means the extension of socio-economic models to include all human activities. Therefore, a brief introduction to time-use data has been given and the sparse empirical literature has been reviewed. A modelling exercise has been presented using a new, unique data set of monetary, physical and time input output tables to demonstrate some of the merits of time use data for applied sustainable consumption modelling. Although these research efforts have remained on a preliminary stage so far, there are some interesting findings.

Time use data has unique properties, which make it almost indispensable for sustainable consumption research. It allows to analyse activities – market and non-market - of a given population under full and equal coverage. As physical data has been shown to be the appropriate complement to monetary data in the environmental sphere, time use seems, in analogy, seems to be the best complement in the socio-economic sphere. By extending the scope of the inquiry for non-market activities, it can help to improve behavioural models on the micro-level and to improve welfare estimates and the understanding of economic change on the macro level.

In the empirical application some descriptive statistics have been presented to demonstrate how time use data helps to enrich standard models for social information both directly as in the human capital stock measured in time units and indirectly by extending the concepts of capital, investment and production through imputation. In a next step this paper has tried to give some inspiration how those three different types of input-output tables can be used simultaneously in an augmented Leontief model. As a case study the environmental, social and economic implications of household consumption activities have been assessed for different socio-economic groups in a time-extended “sustainable lifestyle”-model. To our knowledge this is the first model that allows to analyse household activities to under full coverage of the socio-economic and physical sphere.

Results have confirmed previous studies in that resource intensities with respect to time and money differ significantly. Moreover, time resource intensities add valuable information on the relationship between the duration of activities and resource use for the understanding of household consumption activities. However, it has also been stressed that suggestions to shift a societies’ time patterns towards activities with low time resource intensity might not stand on well-justified grounds. As there is no direct link between time and resource use, the non-substitutability assumption of Leontief models seems to restrictive for the relationship between time and material inputs. This also implies that scenario analysis should not be carried out in such a time-based Leontief model. The analysis has illustrated that the integration of time use data gives a much more detailed picture of direct and indirect effects of household activities. The availability of monetary, physical and time inputs allows to see consumption as a process that requires different market and non-market inputs.

Considering the application of time-use data in sustainable consumption research, future work should focus on three areas. First, in order to improve the understanding of consumer choices and behaviour in general, time-use data should be applied in integrated models on the micro-level as well. First theoretical attempts have already been made (e.g.

Binswanger, 2001; 2002). Second, for monitoring purposes a further disaggregation of household activities in the data set would be desirable as well additional SAM-type disaggregations of households activities and value-added. Third, scenario and forecasting models should be developed. One important step is to use combined econometric and input-output models to estimate new final demand vectors and technical coefficient matrices in time and monetary units. However, most important – also to exhaust the rich data set used here – is to leave the restrictive input-output setting completely and explore possibilities of linking micro- and macro approaches in a computable general equilibrium model.

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## 8 Appendix

Table 9 – Direct time Inputs by socio-economic group

<i>Activity/Sector</i>	<i>SOC1</i>		<i>SOC2</i>		<i>SOC3</i>		<i>SOC4</i>	
	bil h	%	bil h	%	bil	%	bil h	%
Production Activities	0	0	0	0	46.27	18.54	0	0
Household Production	0.63	0.94	25.12	16.60	23.04	9.23	15.43	17.86
DIY Work	0	0	1.63	1.07	3.90	1.56	0.63	0.73
Employment/ Search for Employment	0	0	0	0	12.25	4.91	0	0
Voluntary Work, Social Services	0	0	1.04	0.69	1.45	0.58	0.63	0.73
Qualification and Education	5.123	7.67	8.27	5.47	1.84	0.74	0.20	0.23
Personal Care/ Physiological Recreation	40.58	60.71	71.91	47.52	107.58	43.11	45.51	52.67
Personal Contacts/ Socialising	2.178	3.24	10.44	6.90	15.46	6.20	5.48	6.35
Leisure Activities/ Use of Media	17.89	26.77	26.23	17.34	33.09	13.26	17.33	20.06
Care for other people	0	0	4.50	2.97	3.66	1.47	0.65	0.75
Residual activities/ non-allocatable times	0.44	0.66	2.18	1.44	0.99	0.40	0.54	0.63
<b>Σ</b>	<b>66.83</b>	<b>1</b>	<b>151.31</b>	<b>1</b>	<b>249.54</b>	<b>1</b>	<b>86.42</b>	<b>1</b>

# Exploring the Application of the Ecological Footprint to Sustainable Consumption Policy

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## 1. Introduction

The issue of sustainable consumption encapsulates many of the environmental impacts we face today. While we may not necessarily see the effects of consumption of products directly, somewhere on Earth emissions to water, air and land as well as other adverse environmental impacts like land degradation are caused along the production and supply chains of these products. Even though consumption has been a long-neglected topic in dominant environmental discourse there are indications that it is now moving closer to the centre of contemporary policy-making (Cohen 2001<sup>1</sup>, DEFRA/DTI 2003a<sup>2</sup>). This is one of the potential reasons for the ecological footprint's popularity; the increasing acknowledgment of the environmental impact being placed on other countries by the developed world through their consumption patterns. At present there are no indicators in the UK that addresses this issue. The ecological footprint provides an overview of the developed countries dependency on energy and materials. The UK government's preliminary set of sustainable consumption and production indicators only show whether the UK has managed to "decouple" economic growth from environmental degradation (DEFRA/DTI 2003b<sup>3</sup>). Not one of the indicators has been able to address the issue of shifting environmental pressure onto developing countries by the UK although there is the chance to include this issue in a revised set of indicators.

Regional and local governments within the UK have shown a strong interest in the issue of global responsibility and many organisations have ended up considering the use of the ecological footprint as a comprehensive indicator of sustainable consumption.

The objective of this paper is to review how the ecological footprint approach has been applied in policy and assesses the effectiveness of the various methods employed in its application. Results of a survey of all the local authorities that have undertaken an ecological footprint study in the UK are presented. Three case studies of UK local authorities are highlighted. It will be confined in its review largely from the UK context.

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<sup>1</sup> Cohen M.J. (2001) Exploring Sustainable Consumption – Environmental Policy and Social Sciences, Eds. Cohen M.J. & Murphy J. Pergamon, Elsevier Science.

<sup>2</sup> DEFRA/DTI (2003)a, Changing Patterns – UK Government Framework for Sustainable Consumption and Production, [www.defra.gov.uk/environment/business/scp](http://www.defra.gov.uk/environment/business/scp)

<sup>3</sup> DEFRA/DTI (2003)b, Joint DEFRA/DTI consultation paper on a set of 'decoupling' indicators for sustainable development, [www.defra.gov.uk/environment/business/scp](http://www.defra.gov.uk/environment/business/scp)

## 2. The Ecological Footprint

The ecological footprint (EF) provides an aggregated indicator of natural resource consumption (energy and materials) in much the same way that economic indicators (such as Gross Domestic Product or the Retail Prices Index) have been adopted as a way of representing dimensions of the financial economy. Co-originated in the early 90s by Professor William Rees and Dr. Mathis Wackernagel, ecological footprint analysis has rapidly taken hold and is now in common use in many countries at national and local levels. Its application includes analysis of policy, benchmarking performance, education and awareness raising and scenario development.

EF essentially accounts for the use of the planet's renewable resources. Non-renewable resources are accounted for only by their impact on, or use of, renewable, bioproductive capacity. The ecological footprint deals only with demands placed on the environment. It does not attempt to include the social or economic dimensions of sustainability. The footprint is a 'snapshot' estimate of biocapacity demand and supply usually based on data from a single year. Both available biocapacity and the eco-efficiency of the economy can change over time which is why it is not possible to forecast or 'backcast' footprints from current data although it is possible to make assumptions about future consumption and thus create informative scenarios.

The EF of a region or community is defined as the bioproductive area (land and sea) that would be required to sustainably maintain current consumption, using prevailing technology. Probably the most important dimension of the ecological footprint is the fact that impact is related to the population of the city or region that consumes the goods and services. Traditionally, environmental pressures were mostly local or national, meaning the consumer was affected by the environmental consequences of the production. However, with recognition of global environmental concerns (eg climate change) and an increasingly globalised economy, geographic location of environmental pressures has little relation to the location of consumption. EF takes on the task of re-allocating the environmental pressures to the consumer.

The ecological footprint is defined as consumption (measured in, for example, kg) times production efficiency (hectares/kg). Production efficiency in ecological footprint terms means simply how much bioproductive area it takes to produce one unit service of a given product. The ecological footprint depends on the efficiency of production – for a given farmer/county/state/country, their footprint varies depending on whether they use more or less area to produce a given unit of goods or services.

The basic ecological footprint is an additive model. It sums several mutually exclusive uses of bioproductive area: arable, forest (for both wood products and carbon sequestration), pasture, degraded or built land, and sea space. A key issue in the calculation of ecological footprints and biocapacities is the method used to aggregate areas of different quality facilitating international comparisons. Areas of generally different productivity (arable, pasture, forest, sea) are 'normalised' by multiplying them by equivalence factors relating to their bioproductivity. The equivalent areas are then expressed in standardised global hectares as described earlier.

Use of fossil fuel-derived energy is typically accounted for in terms of its carbon dioxide emissions although it is also possible to assess ecological footprints of energy use in terms of the land area required to sustainably derive biofuel alternatives. The former results in a more conservative estimate of the impact of fossil fuel use and have thus been the more common method.

## 2.1 The popularity of the ecological footprint

A range of regional ecological footprint projects have been produced including the South East<sup>4</sup> and London<sup>5</sup>. Starting in 2004 the project, 'Ecological Budget UK' project will undertake a detailed resource flow analysis and ecological footprint of the UK by regional development area (RDA) and devolved country<sup>6</sup>. The project will ensure that a structured analysis of material and energy flows of each RDA has been undertaken and it will also calculate the ecological footprint of each RDA to highlight the impact of such flows.

At present, there are a growing number of local authorities that have conducted an ecological footprint for their local authority area and are applying the results. One of the first ecological footprints of a local authority was undertaken for the Isle of Wight. Since this initial study, Ecological Footprints of Liverpool, York, London, five Scottish cities; Aberdeen, Dundee, Edinburgh, Glasgow and Inverness, as well as Angus and Brechin, North and North East Lincolnshire, Herefordshire and Oxfordshire and Essex have all been undertaken. The islands of Jersey and Guernsey have also been footprinted. The Scotland's Global Footprint project – a partnership between WWF and Scottish local authorities began in 2004.

## 3. Applications of the Ecological Footprint

The fundamental ideas behind performance indicators are to assess/evaluate progress and promote improvement. The Department of Food, Environment and Rural Affairs has described indicators as “central to the monitoring and reporting of progress towards sustainable development”.

A survey was undertaken of all the local authorities that have undertaken an ecological footprint study in the UK. In this section the results of this survey study are presented.

North Lincolnshire Council stated that it was an important tool to assist in developing a community- based approach to sustainable development. This involves the integration of the ecological footprint into the community planning process through “Local Strategic Partnerships” (LSPs) and the “Community Strategy”.

Other important reasons for conducting an ecological footprint study were to analyse potential scenarios to determine targets and predict footprint reductions, to assist in sustainable development and environmental strategy formation and to provide a snapshot in time to inform local agenda 21 and community strategies.

There was a general consensus amongst respondents that the ecological footprint would act as a baseline data set from which future projects could be performed. The overall results suggested that the general aim of footprint studies have been more focused towards that of public awareness and education with its use as a policy tool taking a more secondary role.

The majority of the local authorities found the results of their ecological footprints to contain valuable and interesting results. York City Council stated that it was very useful to gauge themselves against the average earthshare of land of 1.9 global hectares as well as gaining new insights from including such a broad range of data. Camelford reported that

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<sup>4</sup> [www.takingstock.org](http://www.takingstock.org)

<sup>5</sup> [www.citylimits.org](http://www.citylimits.org)

<sup>6</sup> For more information on this project please contact the Dr. John Barrett (jrb8@york.ac.uk)

they were surprised at the larger size of the EF and the large impacts of waste, nourishment and mobility. In contrast Angus city council said that the results were not that surprising however it did provide them with a very useful data set.

The questionnaire revealed that in both the UK and elsewhere the most important perceived outcome of ecological footprint studies has been the interest that it has created from local residents, environment groups and other key individuals due to its resonance. Mersey Travel stated that it “Identified a way forward with regards to making the academic research more accessible by developing an educational tool”. This response was supported by York City Council who said that the EF “Offers a focus for policy and action that is tangible and measurable, academically compiled and easy to understand”. Outside the UK this view was also supported. The university of Oslo who carried out an Ecological Footprint for the city reported that they were surprised at the large scale of media interest. This had the knock on effect of informing NGO’s and environmental officers at differing levels of government increasing the level of awareness of the Ecological Footprint.

With regards to internal promotion of the Ecological Footprint Angus Council had very positive experiences; “ people were interested in the project just because it was unusual – they hadn’t heard of an EF before. The concept is easier to understand than sustainable development – that term just switches people off”. It was recommended by a number of local authorities that the concepts and ideas had to be promoted in a very simplified manner that was easy to understand as decision makers want things “simple and short”.

A wide variety of methods have been used and suggested by local authorities as to the best way of communicating the EF results to policy makers. These included gaining good PR through involving the press, producing a short one page colourful summary and conducting a simple, lively presentation that policy makers could understand using simple examples from their lives. It has also suggested that a presentation conducted by an expert in the field is highly useful as they can answer difficult questions and help to convince sceptical policy makers. The city of Vantaa recommended that it was best to produce a publication before conversing with policy makers as it was important to get the initial ideas into their heads.

In conclusion the main purposes for undertaking ecological footprint studies were:

- Use within the “Community Plan”
- To analyse potential scenarios to determine targets and predict footprint reductions
- To assist in sustainable development and environmental strategy formation
- To provide baseline data set from which future projects could be performed
- To provide useful information to undertake public awareness and education campaigns
- To use the ecological footprint as a key performance indicator

### **3.1 Policy Outcomes**

The ecological footprint is a tool that can be used to inform policy makers on the impacts of the different policy options that they are considering. From this information it should then be feasible to derive a range of policy options that can lead towards the development of a comprehensive sustainable development strategy. For example, Oslo city recognises the use of the footprint to evaluate the alternatives in development processes, for example where there are specific requirements for energy efficiency, land use management and

essential infrastructure. Both the construction process itself and the subsequent use of the housing would thereby be subject to a form of environmental management. Most Local Authorities reported that it was difficult to identify concrete policy outcomes as a result of the Ecological Footprint study. It has however been noted by a number of people, including Lewan Lillemor from Lund University, that the Ecological Footprints have spread the insight of scarce natural resources and western land appropriation. Angus Council commented that the ecological footprint project helped to raise environmental issues amongst elected members. Although they cannot be sure that policy outcomes are a direct result of the Ecological Footprint study a number of important initiatives have been put into practice since the completion of the project. These include the implementation of a fair trade policy, the investigation of a Green Procurement policy, the set up of a group for monitoring I.T waste issues, the further development of a Green Transport plan and the development of a State of the Environment Report for Angus. Bristol City Council has used their Footprint study as a key performance indicator within their community strategy to evaluate the interest in sustainable development. York City Council also stated that they would be using the footprint as part of their community plan but would also use it as a monitoring tool as part of the councils Environment Management Strategy. The Borough of Telford and Wrekin have made the Ecological Footprint part of the local strategic partnership thinking and have also used it to help form organisational policies.

To support local authorities a number of software tools have been produced or are in the process of being produced to support local authorities and make the task of undertaking an ecological footprint less arduous. FLAT (Footprinting Local Authorities Tool) allows local authorities in England to calculate a 'snap shot' ecological footprint of their area for 2000 and allows the user to compare their ecological footprint directly with that of the UK. Another software tool in development is REAP (Resource and Energy Analysis Programme). REAP is a scenario-based integrated resource/energy-environment modelling system. Its methodology is based on a comprehensive accounting of how energy and resources are consumed, converted and produced in a given region or economy under a range of alternative assumptions on population, economic development, technology, price and so on.

#### **4. Experiences in Using the Ecological Footprint**

Listed below are a group of case studies where the ecological footprint has been applied to policy. The first case study (Cardiff City Council) demonstrates the value of process and integration as well as being prepared before the start of an ecological footprint project. The second case study (Angus) identifies the value in adopting a community-based approach. The third case of York discusses how the ecological footprint was included in the Community Strategy along with the value of lifestyle scenarios.

##### **4.1 Ensuring Longevity – Cardiff City Council Case study**

###### **4.1.1 Introduction**

The above analysis clearly highlights that local authorities envisage a wide variety of policy applications. However, it is difficult to find examples of where a policy decision has changed solely because of an ecological footprint analysis. Partly this is due to the inherent complexity and inclusiveness of strategic decision-making. The Ecological Footprint may have helped focus the minds of the council members on a particular issue, the impact of imported food for example, but may not have been used to calculate the reduction that a

new farmer's market may have had on the ecological footprint. Of course, the subtle extent to which the footprint may have influenced policy is probably impossible to quantify with any certainty. It is safe to state, though, that there is no evidence that the ecological footprint has been systematically used to help construct, analyse, and measure and then monitor the effect of a specific policy within a local authority.

One of the main barriers identified by local authorities is not having the capacity to undertake such an analysis. Either an analysis of policy was not included within the project brief or the local authority officers do not have the tools to undertake the task after the completion of the project. Other barriers mentioned were concerned with "political buy-in" (or lack of it) of the ecological footprint and the sustainable consumption agenda. These issues are discussed below in more detail. As a case study to explore these issues it was decided to provide a case study of a local authority that is currently undertaking an ecological footprint study. The case study (Cardiff City Council) was seen as a good example for overcoming many of the problems faced by local authorities. Not every measure taken by Cardiff City Council may be directly relevant to other local authorities but the underlying principles of their approach are both transferable and applicable.

#### **4.1.2 Background the Cardiff City Council (CCC) and the Ecological Footprint**

The initial reasons that CCC wanted to undertake an Ecological Footprint study were two fold. Firstly, it concerned the policy level where CCC wanted to get a handle on the impact that Cardiff was having at a global level. Even though CCC had developed a range of sustainability indicators there was a feeling that these indicators did not consider the global impact that Cardiff was causing. CCC felt that this is an element that has been lost in many local authorities. Secondly at a practical level the ecological footprint could be seen as an educational tool and means of raising awareness. The first step that CCC took two years before starting the project was to include a commitment within the local Sustainability Strategy stating that Cardiff had a responsibility to reduce its global impact and that the ecological footprint would be employed to assess this impact.

#### **4.1.3 Internal Steps undertaken by Cardiff City Council**

CCC were concerned that previous ecological footprint studies didn't seem to be making that much difference on the ground. While the studies themselves were both highly interesting and scientifically robust the ecological footprint was not being employed to inform policy decisions. CCC believed that one of the key reasons for this was because the ecological footprint was not mainstreamed into the policy of the organisation. By relying on existing structures that had already been formed with CCC, the process of embedding the ecological footprint within the organisation.

As mentioned, the first step was to include the ecological footprint in the Sustainability Strategy. Even more important than this was including the ecological footprint within the Community Strategy as an established target. CCC believes that the Community Strategy is currently the driving force for local authorities. This is supported by a number of local authorities as national government has placed a significant emphasis on the strategy. The modernisation agenda suggests that the Community Strategy (or Plan in Scotland) is all encompassing with the local transport plan and other such strategies sitting below. It is an overarching strategy driving the performance of the business plan.

As well as the Community Strategy CCC also built the ecological footprint into the Performance Plan or Corporate Business Plan. All these actions were to ensure that internal stakeholders were aware that an ecological footprint project was going ahead. It was

important for CCC that internal stakeholders would not just be used within the data collection process of the project. This would disempower them by not consulting them and ignoring their valuable contribution to specific issues in Cardiff. To avoid this from the beginning of the project the internal stakeholders are thinking about the scenarios they could explore with the ecological footprint.

A cabinet report was produced on the ecological footprint. Permission was sought from the cabinet to engage in the project. In the report it stated that this project will have an affect on CCC policies and that all parts of the authority have to engage in the project. This was seen as essential and a very specific measure within the “buy-in” process.

A structure that already existed within CCC was an internal management group called the “Sustainability Advocates”. The “Sustainability Advocates” consist of senior managers throughout the organisation from a wide range of departments including transport, economic strategy, housing, waste and planning. The function of the group is to embed the ideas of sustainability throughout the organisation attempting to ensure that the concept of sustainability does not just exist as a small branch of one department. The group meets regularly and has constantly been informed of the ecological footprint project. Presentations to the group have been made by ecological footprint “experts” to encourage political buy-in. This approach has ensured that politicians and senior managers know what to expect from the project, be ready to provide data and ensures that the ecological footprint will be put to use throughout the organisation. CCC strongly believes that the project cannot be run in isolation from the professionals who work in that field.

#### **4.1.4 Conclusions**

Since the project has started in Cardiff there has been a change in the potential use of the ecological footprint after project completion. In many respects the project has been seen as a “learning curve” a “process” where the full potential is being realised. CCC believes they have developed a more sophisticated view of the kind of impact it can have on the authority. They now see the footprint as more of a policy tool than an educational one. This contradicts the results from the questionnaire and it is possible that in other studies the full potential of the footprint have yet to be realised.

One potential criticism that has been faced is the idea that policies are not built on numbers and figures; they are based on trade-offs and what can realistically be achieved within the current political climate. Therefore, knowing what the impact of a particular policy is irrelevant. CCC would suggest that this is a simplistic argument. Politicians do need to think about the issues of economic growth and social welfare. The ecological footprint is not making the decision for you; it is providing sounder information about the relative impact of a policy. CCC has no doubt that having calculated the ecological footprint that it will have an effect on policy decisions. Policy development in the council is all about providing relevant information for decision support producing “evidence-based” policy decisions.

#### **4.2 Integrating with the Community - Case Study of Brechin**

Angus Council carried out an ambitious ecological footprinting project as part of its Local Agenda 21 Strategy for Angus. The main aim of the LA21 Strategy is to promote sustainable development as a means of improving the quality of life locally, while at the same time making a contribution to tackling global problems, and ensuring that the quality of life of future generations is also safeguarded.

The LA21 Strategy is closely linked to the Angus Community Plan that includes sustainable development as one of its three key principles. The process of preparing the Community Plan involved a partnership approach between the Council and key agencies supplemented by extensive consultation.

From the outset the ecological footprint was considered more as an educational and awareness raising device than one which drove policy. The ecological footprint was seen primarily as a means of empowering the community - as one means of communicating the concepts underpinning sustainable development.

Angus Council therefore decided to carry out a survey of households in the Brechin area to determine the size of the average household's ecological footprint. This involved inviting people to complete a questionnaire regarding their lifestyles, e.g. questions on travel, energy use, water, and shopping, waste and the local environment. The responses were analysed and reported back to the community.

This was the first **community based** footprint project in Scotland. An ecological footprint is normally calculated as a desktop exercise looking at resource flows in and out of an area and the results are then fed back to the community. However, this exercise **involved** the community in gathering the information to formulate the footprint.

Questionnaires were given out through schools in the Brechin area but were also available to the public through the libraries, housing office, and the local community centre. People were encouraged to take part through money-off vouchers for items that would help reduce their footprint, e.g. low energy "A" rated white goods and window blinds – donated by local stores. Other local businesses donated items for a prize draw, e.g. an organic food hamper, a bicycle, wild bird food and organic dog food. Everyone who participated in the project and returned a completed questionnaire received a free low energy light bulb.

Children participating through the schools all received a free goodie bag (made out of unbleached cotton), containing items which reinforce the message, e.g. recycled pens, pencils, rubbers, rulers, mouse mats (donated by the Scottish Executive), and wildflower seeds (donated by Scottish Natural Heritage) as well as leaflets containing information about the environment.

Pre publicity included a leaflet explaining the project, and the concept of ecological footprinting, being placed in the lid of every household's bin. Some publicity was also given through the local press, which included a photograph of schoolchildren participating in one of the schools and another with the businesses who sponsored the prizes.

A paper questionnaire was produced (on 100% recycled paper) because schoolchildren needed to take it home for help to complete it. However, people were encouraged to complete the questionnaire "on-line" at Best Foot Forward's website. Most of the schools had the children complete their questionnaires "on-line" and the website also included a facility for teachers to request an eco footprint for their class.

The questionnaire also contained an insert page giving "Footprint Tips" on how to reduce the size of a household's footprint. The "Footprint Tips" page was loose and could be retained by the recipient for future reference. The schools also received a "Footprint Challenge" leaflet giving numerous ideas for projects and offering prizes for the best ones.

Future plans include rolling out to the other burghs in the Angus area.

The project was part funded by the Fresh Futures/New Opportunities Fund and was match funded by the Council through "in-kind" contributions of officer time and cash for printing costs, purchasing the cotton goodie bags, and recycled pens, etc.

The ecological footprint concept is seen by the Council as being a very useful tool to communicate sustainable development issues to the community. The only setbacks experienced in this study concerned the questionnaire, which was described as having too many vague questions that did not expose any useful data. Questionnaires need to be concise and better targeted to suit their intended audiences.

The methods used for this project are easily replicable and other local authorities in Scotland have shown a great deal of interest. Indeed, a seminar was held in Arbroath in March 2003 on the topic of EF, which was very well attended by representatives of almost all the local authorities in Scotland through the Sustainable Scotland Network and WWF Scotland<sup>7</sup>. The interest in EF has grown enormously in recent years as both a means of communicating sustainability as well as a method of measuring our progress. This project provides a practical use to the concept, which may prove to be the catalyst for further “on the ground” projects in future.

### **4.3 Building the Ecological Footprint into the Community Strategy**

One of the earlier ecological footprint studies in the UK was undertaken in York. With expertise at the local university in ecological footprinting, most individuals with an environmental agenda were aware of the methods. This was partly due to the members of the university playing an active role in local agenda 21 and other sustainability activities across the city. The Local Agenda 21 Steering Group were keen to undertake an ecological footprint study of the city. The opportunity arose under a one-year scheme introduced by the Energy Saving Trust called “Planet-York”. Planet York was designed as a demonstration project that attempted to bring together communities to tackle the issue of climate change. Over the period of a year schools, businesses, energy suppliers, the City Council and householders were involved. The overall aim was to reduce the carbon dioxide emissions of the city. An ecological footprint study was undertaken to act as a tool for communicating the ideas of sustainability and linking local action to global issues. The project also undertook a number of practical measures to ensure a reduction in the ecological footprint and carbon dioxide emissions. These being:

- More than 10,000 homes fitted with energy efficient insulation, boilers, appliances and low energy lightbulbs;
- Cleaner air, with at least 100 buses, vans and trucks fitted with special pollution traps;
- Solar energy in the first schools, homes and businesses;
- 100 new vehicles running on clean fuel - LPG, natural gas or electricity.

The results available so far show that 5,000 householders and 79 businesses took part in Planet York. One of the results from the study, that is difficult to monitor, is how often the local press, environmentally concerned residents and the City Council now quote the ecological footprint. Numerous press articles quote the need to reduce the ecological footprint even though they do not have a technical grounding in the approach. It is a recognised term across the city and there is general acknowledgement that it is important to reduce the ecological footprint. One of the reasons for this occurrence was the seminars organised across the city to various interest groups. The project researchers made presentations to different groups in the City Council, environmental organisations, housing

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<sup>7</sup> Sustainable Scotland Network: <http://www.sustainable-scotland.net/>

associations and general public groups. The researchers also appeared on the radio on a number of occasions that generated a lot of public interest.

After all this hard work there was a danger that the ecological footprint could still disappear from the policy agenda with a change in the “Sustainability Officer” and political parties in the May 2003 local elections. It is fair to state that the City Council were not sure what they were going to do with the study after the initial excitement. It was the enthusiasm of the Sustainability Steering Group that helped keep the momentum alive. A year after the study has been completed the ecological footprint is now forming one of the central themes in the Community Plan. The new Sustainability Officer is keen that the ecological footprint is adopted as an indicator for the city and the first “Strategic Aim” of the Community Strategy is:

“To reduce the ecological footprint of York to a more sustainable level”

The Environment Forum was established in January 2003 to ensure environmental issues were considered as part of the Local Strategic Partnership to produce the Community Plan. The group is chaired by a member of the Local Agenda 21 Steering Group and is made of representatives from groups in the city with interest in the natural, built and global environment. The group has produced its section of the Community Plan with strategic aims, key actions and success measures. All of these mention the Ecological Footprint of York. With advice from the Forum and officers a group of senior officers and councillors felt that measuring the sustainability of York was very difficult but that the Ecological Footprint provided an ideal opportunity to York.

## **5. Technical Issues**

The respondents identified the lack of technical knowledge and expertise needed to be able to conduct a rigorous, consistent, reliable and comparable ecological footprint study as the greatest implementation barrier. While the final results may be easy to comprehend there are complex calculations underlying the ecological footprint. The city of Vantaa in Finland and the University of Oslo in Norway, as well as practitioners in the UK including SEI-Y and Best Foot Forward, have attempted to reduce the lack of technical know-how by giving lectures, providing opportunities for relaying information and holding discussions on the ecological footprint.

The experience of the authors in dealing with local authorities suggests that at the heart of this technical ‘deficit’ are the twin issues of data complexity and transparency of the methodology. Most local authorities appear comfortable with the principles underlying ecological footprint analysis but are concerned at what they often consider to be a ‘black box’ calculation.

As examples in the UK and Europe have demonstrated, what at first sight may appear to be a ‘black box’ becomes a lot more transparent with some minimal training on the methodology. This needs to be much more widespread. A lack of training is often, and wrongly, interpreted as an opaqueness of method. However, the problems of data complexity and lack of local data remain. Aggregated indicators, such as the ecological footprint, rely on a range of data sources and are necessarily time consuming and complex to calculate. This problem has been solved by some authorities in the UK and elsewhere in Europe by investing in calculation tools which save considerable time and effort.

Inconsistencies in the methodologies and results calculated are strongly prevalent even amongst the most technically experienced professionals in the field, raising scepticism of the methodologies being adopted. This problem was highlighted early on, in the European Common Indicators Programme resulting in the development of a standardised, transparent methodology for calculating the footprint of sub-national geographical regions (SGA) (Lewan and Simmons 2002). The methodology was trailed in 5 European cities (including Oslo in Norway and Bristol in the UK) using a calculation tool developed by Best Foot Forward but, unfortunately, European funding was discontinued before the results of these trials could be integrated back into the methodology and fully documented.

Clearly, as with technical standards in other fields, if a footprint methodology is to be properly documented, maintained and improved in the longer term, collaborative working amongst experts is essential. Providing this in the context of an educational setting where wider training can take place is important, as highlighted by the City of Ancona in Italy.

The issue of standardisation, transparency and credibility are central to the emerging international ecological footprint network that passed an initial declaration, the “BEDZED Declaration” (REF at least to website). Several people involved in the footprinting of cities and regions attended this meeting.

## 6. National and Local Government Concerns

At the **local level** there is unanimous concern amongst the respondents about the incorporation of the ecological footprint approach as a main driver into an already very broad set of policy initiatives. One of the reasons being that many of the issues covered by the EF are felt to be of a scale beyond the control of the local authority.

Due to the complexities surrounding the theory of the ecological footprint, and the fact few people outside the environmental scene are aware of its existence it has often been met with ignorance and critique. York City Council highlighted the very important fact that before any misconceptions concerning the ecological footprint can be clarified, there is a desperate need to get policy makers to understand the relevance of sustainable development, and only once this is engrained into the system will it be possible to understand the context in which the ecological footprint belongs.

There is a clear need for greater dissemination of the ecological footprint and its relevance to policy makers and politicians, with effective communication this is a barrier that can potentially be overcome successfully. However, it is not just a lack of communication that exists. There are still key methodological issues that need to be addressed; issues that opponents to ecological footprinting will happily quote in an attempt to discredit the methodology. These include issues related to carbon sequestration, the incompleteness of the ecological footprint, uncertainties in calculations and aggregation. This is not the place to answer these concerns<sup>8</sup>. However, it is important for any user of the ecological footprint to be clear about its limitations, it is essential that no one “oversells” EF and finally it is important that when presenting the ecological footprint the speaker has a basic grounding in the methodology. One difficult question that cannot be answered has the ability to discredit the whole methodology.

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<sup>8</sup> Please refer to Section 1.5 that provides details of the various critiques on the ecological footprint.

## 7. Culture within Local Authorities

The success of the ecological footprint is not purely dependent on whether it is or isn't the most appropriate indicator of sustainability, but whether the local government prioritise the sustainability agenda.

Comments made by survey respondents suggested that barriers exist because of non-existent management systems, lack of commitment from the top, and little importance given to environmental concerns. For example, the University of Oslo admitted that economic interests always take priority in the forming of local policy, while environmental concerns to some extent are viewed as limited and separate efforts. Until sceptics become more aware of the increasing interdependencies between the economy and the environment the EF will come up against this barrier time and time again.

In practice, local authorities, on the whole, do not use performance indicators to improve services and reduce environmental impact. Evidence-based policy decisions are not the norm. The report "Acting on Facts – Using Performance Measurement to Improve Local Authority Services" jointly produced by the Improvement and Development Agency (IDeA) and the Audit Commission (AC) highlight some of the issues behind this phenomena in England and Wales. This highlights that while LAs have been collecting the data and publishing the results, the authorities have not put the necessary procedures in place so that the information is used to improve performance. Comments made by the auditors from AC identified that over 50 per cent of authorities said they found it difficult to develop a corporate approach to performance management, or to set meaningful targets.

There is very little connection between strategy and plans produced by the authority and the performance indicators. Both IDeA and AC recognise the importance of performance measurement being used as a part of everyday management activity. This requires PIs to move away from being a complacent activity to becoming a drive for improvement.

As well as these manageable and cultural obstacles there are also practical problems associated with PIs. These can range from selecting indicators that are difficult to measure to indicators that provide no insight into the related issue. Many local authorities have faced difficulties with an endless list of indicators and not being able to understand the complete picture.

Another problem lies in the lack of internal collaboration between the different departments of governing bodies. As stated by the university of Oslo other sections of the local government, such as the transport or energy departments, may have little interest in what comes from the environment section. One response to this has been the work of De Klein Aarde, in collaboration with the Van Hall Institute and a number of local authorities in Holland. Here the footprint has been actively used to try and draw together the agendas of different local government departments and promote a cross-cutting sustainable development programme. City Council are going down the same route. The following quote by Dr. Alan Netherwood from Cardiff City Council highlights the problem of conflicting goals due to the fragmentation of policy and decision making.

"We are very excited about this integrated and long term way of measuring sustainable development. The information from the MFA and footprint will help us to develop our policy in a much more informed way, joining up data from traditionally separate policy areas. The process we're adopting in Cardiff will hopefully enable the footprint to bridge silos and achieve the buy in to change the way we think about formulating policy, taking on board the big 'crunch' issues."(Dr. Alan Netherwood, 12.11.03).

At a national level the same problem exists, as identified by Sharon Ede (Government of South Australia). There is a desire to reduce greenhouse gas emissions as well as a focus on increasing exports where local produce would suffice.

In summary, the EF can be seen as a tool that will help promote “integrated thinking”, promote a performance culture and help prioritise the importance of sustainability.

## **8. Conclusions**

In terms of its policy application, many of the misconceptions concerning the ecological footprint exist because of “over-selling” the indicator, suggesting that it can provide a comprehensive indicator of sustainability. This approach has resulted in criticism and has helped undermine the usefulness of the ecological footprint, particularly in the policy arena. This means having a clear understanding as to what the project entails from the beginning.

A real financial commitment to understanding the global impact of a local authority or a region is required. To provide such an integrated and complex tool is a difficult process. However, the authors would argue that it is a necessary one. Sustainability cannot be reduced to a simple list of 15 questions requiring a tick in the right box. The issues are complex and require a deeper understanding of resource flows, land appropriation and global equity. Such an understanding cannot be achieved through the development of indicators that have not truly quantified environmental impact at the local and global level.

Cardiff City Council has shown what can and will be achieved in the future by embedding the concept within the organisation. Their approach suggests that there is little reason behind just undertaking an ecological footprint study. Hertfordshire county council have taken a similar philosophy by engaging with their policy development officers in an internal working group to develop policy proxies, assist in data collection and to develop scenarios. A software tool is required that will allow the user to explore the concept and its findings in more depth. It is difficult and presumptuous to suggest that one indicator can induce change. However, by undertaking an ecological footprint there is often the acknowledgment that sustainable consumption is an important issue.

In the past, ecological footprint studies have not been taken further because the project has been the driving force of one dedicated individual within the local authority. If this individual leaves the organisation the situation can occur that no one has the necessary interest or enthusiasm to carry on the work. This identifies the importance of organisational capacity and political “buy-in”.

Something that was made clear by many organisations was the need for transparency in the EF approach. In reality this does not mean more detailed reports about the methodology but also the need for training to gain an understanding of why it is a complex model.

Data concerns do still exist but these are gradually being dealt with. As mentioned, the adaptation of an already existing survey or the use of ACORN data will help this process in the future. The price of an ecological footprint is also reducing as the process becomes easier and more refined. However, a financial commitment often demonstrates a stronger commitment to the sustainability agenda and therefore it is reasonable for an organisation to pay for an insight the ecological footprint offers.

To summarise the ingredients to successfully undertaking an ecological footprint study, these would be:

- Commitment by the organisation across all areas and not just one individual;
- Adopt the ecological footprint for monitoring meaning that it will be re-calculated on a regular basis;
- Integrate the ecological footprint into a meaningful strategy that is seen as one a guiding force within the organisation (such as the Community Strategy);
- Don't "over-sell" the ecological footprint always identifying limitations;
- Transparency and accountability are essential for both the data sources and calculations.

Most importantly, the ecological footprint is still one of the only indicators that can provide a comprehensive idea of the impact of consumption, making it an invaluable tool on the road to sustainability.

# Exploring the consumption and related environmental impacts of socio-economic groups within the UK

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## Keywords

Sustainable consumption, socio-economic analysis, household expenditure, ecological footprint, policy analysis.

## Abstract

Consumption is an important and pressing issue intrinsically intertwined within the framework for sustainable development. The North-South division of consumption, with high-income countries responsible for over 60 per cent of resource consumption whilst representing less than 15 per cent of the population (WWI, 2004), has been largely commented on in recent years. However, even within the North, a wide disparity exists between the consumption patterns of differing socio-economic groups.

This paper explores the differential that exists between high and low consumers in the UK. Specifically, it introduces a methodology that can be used to link socio-economic groups to the environmental impacts of their consumption. The approach used is a new and innovative model that combines highly detailed socio-economic profiles with expenditure data (organised by COICOP) to produce a consumption profile, Material Flow Analysis and associated Ecological Footprint (the amount of land used by an individual to sustain their consumption) for 55 individual socio-economic groups using the ACORN classification system. The model has the ability to identify the ecological footprint of local authorities based on their socio-economic make-up.

This model will help in answering a variety of important questions and issues: (1) Do people in lower socio-economic groups have lower environmental impacts? (2) How will changes in the distribution of socio-economic groups impact resource consumption? (3) Can economic gain be decoupled from environmental degradation?

This paper argues that an improved understanding of the varying impacts of socio-economic groups can help policy makers target high levels of resource consumption and ensure that strategies towards achieving sustainable development are coherent. Thus, the model can facilitate the creation of policies that are based on a greater understanding of resource consumption and consumer responsibility.

## **1. Introduction**

There is little dispute that levels of household expenditure, number of consumers, extraction of raw materials and the consumption of goods have increased in industrialised countries for many decades. Recent years have seen the spread of these patterns extending towards the developing world causing global levels of consumption to escalate at a higher rate than ever before. In total it has been calculated that expenditure on consumer items has risen from \$4.8 trillion in 1960 to \$20 trillion in 2000 (WWI, 2004). Although this vast and arguably unsustainable level of resource use is on the global increase it has been far from equally distributed, with the residents of North America and Western Europe, who constitute for only 12 per cent of the global population, accounting for over 60 per cent of global consumption.

A growing amount of research has begun to address these issues and started to explore these unequal consumption patterns between the North and South, an unquestionably important issue within today's society. One prominent methodology used to highlight the global consumption disparities has been the Ecological Footprint which has been increasing in popularity since its initial formation by Mathis Wackernagel and William Rees in 1996. The footprint is a means of measuring a populations level of consumption by calculating the notional and direct land area needed to support them. Previous work has focused on calculating consumption and its associated material flow and footprint using regional boundaries, for example studying a country, region within a country or, as has been done in the UK, a local authority area. One noticeable consequence of using such regional boundaries has been an array of footprint results that differ by only a very narrow margin. Although the study areas will contain people living very different lifestyles with individual consumption patterns and varied environmental impacts, these differing levels of consumption will be evened out in the results consequently deriving very similar results for different populations within a given country. This paper proposes to measure the consumption of different socio-economic groups, i.e. patterns of high and low levels of consumption, to determine the extent to which the environmental impacts of individuals lifestyle choices differ from one another. In this way different consumer habits can be disaggregated giving a detailed and informative picture of environmental impact within a given region.

This paper begins by taking a look at the issues surrounding consumption at the global and UK level and its links with both physical and social needs. It then follows on to discuss the need for assessing the different levels of consumption exhibited by different socio economic groups. The data and methodology is described in detail including descriptions of exactly how the sources will be combined to derive a detailed picture of consumption patterns across the UK. This is followed with a section explaining the methodologies relevance to policy application and is concluded with a description of future work that will be carried out and how the methodology is likely to change.

## **2. Global Consumption**

It is of wide global recognition that with present day consumption levels we are using the worlds resources faster that they can be replenished. Calculations for the Ecological Footprint on a global scale suggest that the consumption of resources already exceeds the Earth's capacity to regenerate by 20% (WWF, 2002). Unfortunately this cannot be ignored and at present there is a desperate need to construct a realistic way to deal with present and future resource demands. Already the effects can be both seen and felt globally. Every time we open the paper or turn on the television there are dramatic headlines detailing the plummeting fish stocks, a loss of half the worlds wet lands, sea levels rising, soil degradation and destruction of the tropical rainforests as well as pictures of the latest man-made disaster from forest fires and floods to famine and oil spills. Physically we are feeling the effects of global warming with 1998 being the hottest year ever recorded and seven out of the ten hottest years have fallen in the last decade (DEFRA, 2003).

Western economies have developed and expanded as a consequence of rapid increases in the flow of material products through the economy. These products have relied on the increased utilisation (and depletion) of natural resources as well as resulting in an increasing volume of emissions being released into the environment. This is in direct conflict with 'Sustainable Consumption', the philosophy whereby a reduction in the environmental impact of resource use is attained whilst addressing how we may have more equally distributed resource consumption to allow the global population to enjoy a more equitable quality of life. Recent years have come to recognise this as an important issue with serious environmental and social impacts and attempts are being made at both national and global levels to drive future resource use in a more sustainable direction. For example the European Commission have adopted a strategy aimed at Sustainable Resource Use within their 6<sup>th</sup> Environmental Action Programme. Their objective is to ensure that the consumption of resources and their associated impacts do not exceed the carrying capacity of the environment and to break the linkages between economic growth and resource use (EC, 2003). In the UK a commitment has been made by the national government to promote patterns of sustainable consumption and production where they have identified the need for policies to decouple economic growth from environmental degradation and to increase resource productivity (PIU 2001, DEFRA/DTI 2003). In order for such policies on sustainable consumption to achieve their goals it is important to gain a thorough insight into the way different people consume and why.

## **3. Consumption in the UK**

As typical for an industrialised country, consumption in the UK is associated with high levels of material flows and related environmental impacts (Wuppertal Institute, 2002). Consumable items can be classed into one of two categories. The first are those that are necessary for everyday life, the essential consumables such as clothing shelter, food and energy. However once these basic needs are satisfied people begin to spend money on a set of secondary consumables. This category includes everything from small treats, such as bars of chocolate and cans of beer to major acquisitions such as four wheel drives and holidays abroad.

Today, in the developed world, a large portion of consumer spending focuses on consumer items of the second category, those that are arguably unnecessary for comfort or survival but which make everyday life more enjoyable. A study conducted by Jackson and Marks (1999) concluded that whilst consumer expenditure in the UK had more than doubled in the past four to five decades, almost all could be attributed to an attempt to satisfy social and psychological needs (i.e. non material) rather than material needs such as food and shelter. The results, as shown in Figure 1, demonstrated that the single biggest percentage increase was that of recreation and entertainment category which grew more than 400%, this was closely followed by expenditure on domestic appliances at 385%, communications at 314% and travel at 293%.

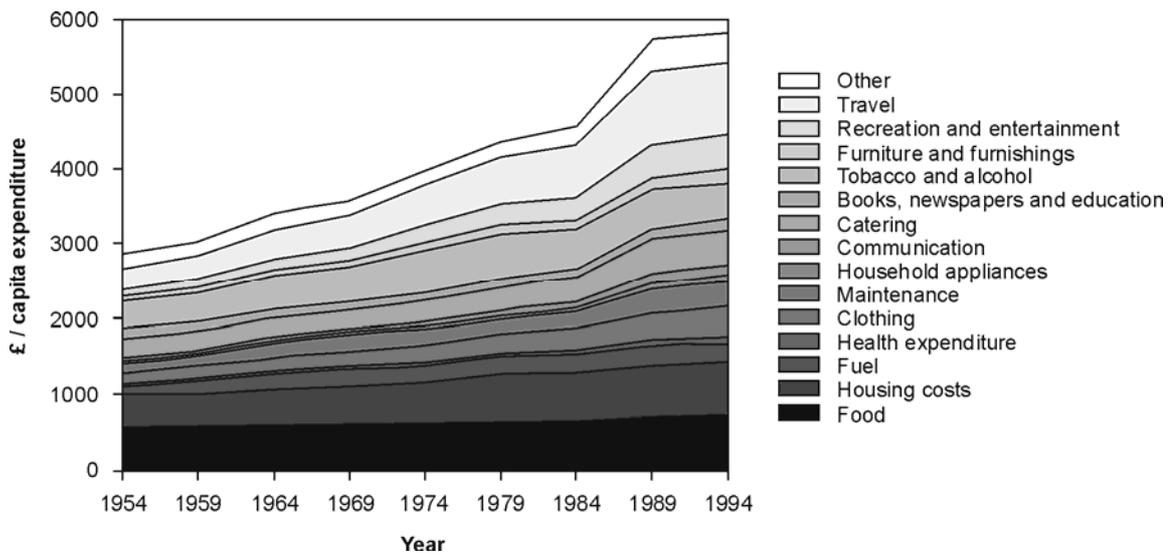


Figure 1: Consumer expenditure by category:1954-1994 (Source: Jackson and Marks, 1999)

The desire for goods and services often reflects the social needs of human beings. As with Maslow's Hierarchy of Needs we all have the desire to achieve more with the pre-notion that we will attain greater fulfilment. In fact it can be viewed that consumption habits have social roots. The purchase of an item is a act where people express their personal and group identity, such as choosing a newspaper of a particular political party or buying the latest gadgets to peruse a specific identity they want to portray to the outside world. A good example of this is the consumption of female clothing. Forty years ago the nation was undoubtedly sufficiently clothed in so far as material requirements are concerned, however since this time there has been more than a 200% increase in clothing expenditure and almost all of this is within the category of woman's clothing (see figure 2). The cause of this increase can be placed on the fact that over recent years clothing has become increasingly more important in relation to identity needs. As fashions change the advertising industry plays an important role in convincing individuals that they need to buy new items so that they can fit in with the rest of society. Social motives of consumption, i.e. consumption via desire, can be in-satisfiable and boundless in comparison to the desires for food, water and other such factors that are confined by capacity limits (Ropke, 1999).

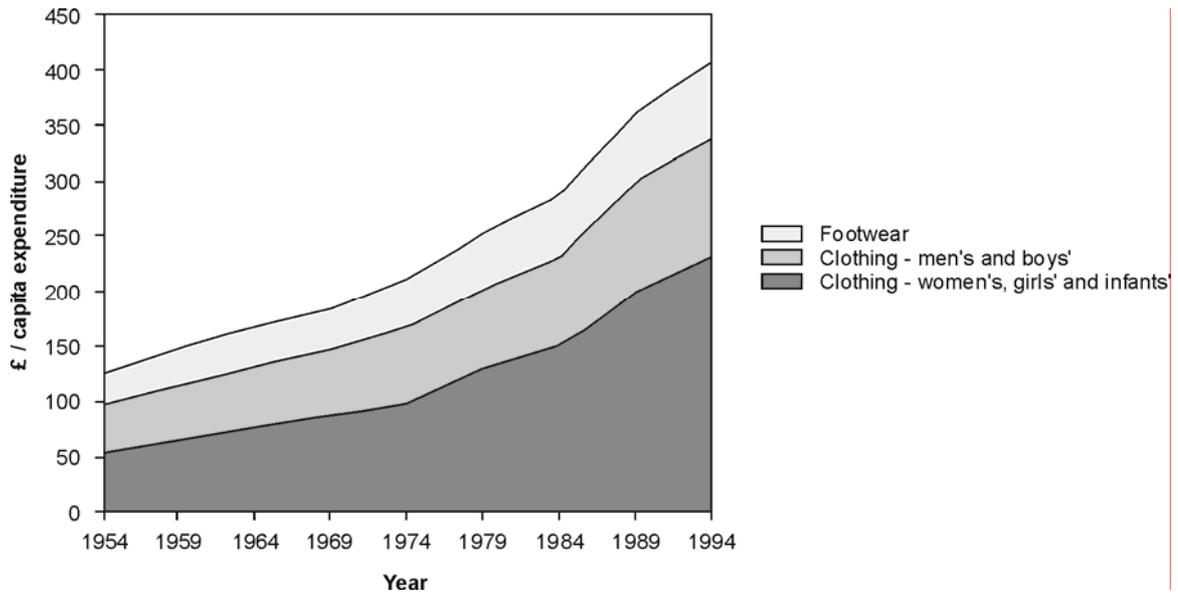


Figure 2: Consumer expenditure on clothing (Source: Jackson and Marks, 1999)

Although the responsibility for these higher levels of resource utilisation is to some extent held by all the residents of the UK there are in fact huge disparities in the way that different people consume. It is highly likely that levels of consumption can generally be associated with different socio-economic characteristics of a population, i.e. different lifestyles will have different associated environmental impacts.

It is imperative that when addressing issues of sustainable consumption a move is taken away from pipeline solutions and instead a bottom up approach is instigated. For this a true understanding of consumption patterns and the drivers behind them as well as an insight as to why this consumption is occurring and by whom is vital to identify the appropriate role of governments in promoting more sustainable resource utilisation, and for the choice and implementation of different policy instruments. However, to date, there has been little work on the variations that exist at the individual level of consumption leaving a large gap in the knowledge of existing patterns of resource utilisation. For example it is not known to what extent environmental impacts can vary between different socio economic groups as well as how these consumption habits are likely to change or be impacted under current and future policy.

#### 4. Methodology

The methodology involves determining the total material consumption of the entire UK population and attributing the responsibility to differing socio-economic groups based on a detailed analysis of their differing consumptive patterns. Data calculated by SEI-Y's Resource and Energy Analysis Programme (REAP) will determine the direct material consumption, total material consumption, 'embodied' carbon dioxide emissions and associated ecological footprint of the entire range of consumer and social services as well as calculating the entire consumption of all items within the UK (Barrett *et al* 2004). This data will then be linked to socio-economic groups using ACORN (A Classification Of

Residential Neighbourhoods) and COICOP (Classification of Individual Consumption According to Purpose) data to gain an insight into the variations in material consumption that are generated by different lifestyles.

#### **4.1. REAP Data**

REAP stands for 'Resource and Energy Analysis Programme' and is the first attempt at creating a model of physical accounts for the UK. REAP is based on Material Flow Analysis of resource consumption and provides several MFA indicators as well as Ecological Footprints as output indicators. Furthermore, the Y/e measure (a measure of how much economic output is obtained from a particular level of emissions) can be implemented at any time as the underlying data is available through the REAP database.

REAP considers consumption by households and public as well as commercial services, wherever the consumed products may come from and wherever environmental impacts may occur ("consumer responsibility"). Material Flow Analysis as the basic methodology provides a comprehensive picture of apparent and hidden flows of materials and energy carriers through the economy, thus providing a comprehensive physical account of the UK. Employing a hybrid "Input-Output" approach, resource consumption is allocated to industry, commercial services and households. This forms the basis of a simplified "Physical Input-Output Table" for the UK, broken down by devolved countries and regions.

By initially gaining an understanding of resource flows in the UK and total material consumption of services and industries, it allows the allocation of their impacts to be attributed to the user. In this methodology it is proposed that the impact is allocated to the user through the use of COICOP expenditure data employing the ACORN approach as described below.

#### **4.2. ACORN Data**

It is proposed that that the socio economic data produced yearly by CACI (a leading UK provider of marketing data based on consumer patterns) will form a detailed basis to map out the consumption patterns of varying lifestyles across the UK. This data set provides a socio-economic breakdown by ACORN types. ACORN stands for "A Classification Of Residential Neighbourhoods". There are 1.7 million postcodes in the United Kingdom, the average postcode being shared by around 15 addresses. CACI has produced this classification to include every street in the country, fitting them into 17 distinct Groups, which, in turn, contain 55 'typical' ACORN neighbourhood categories (called "types"). ACORN profiles by postcode can be viewed in the Internet via this site: <http://www.upmystreet.com>. The data reaches from ACORN Group 1 (Wealthy Achievers, Suburban Areas), Type 1 (Wealthy Suburbs, Large Detached Houses) to ACORN Group 17 (People in Multi-Ethnic, Low-Income Areas), Type 54 (Multi-Ethnic, High Unemployment, Overcrowding).

#### **4.3. COICOP Data**

COICOP is the "Classification of Individual Consumption According to Purpose". It is an international standard classification of types of individual expenditure, which breaks down household expenditure at the top level into twelve categories:

01 - Food and non-alcoholic beverages

- 02 - Alcoholic beverages, tobacco and narcotics
- 03 - Clothing and footwear
- 04 - Housing, water, electricity, gas and other fuels
- 05 - Furnishings, household equipment and routine household maintenance
- 06 - Health
- 07 - Transport
- 08 - Communication
- 09 - Recreation and culture
- 10 - Education
- 11 - Restaurants and hotels
- 12 - Miscellaneous goods and services

Each of these top level categories has two levels of further subdivision.

For example '03 - Clothing and footwear' is subdivided as

- 03.1 - Clothing
- 03.2 - Footwear

And '03.1 - Clothing' is then further subdivided as

- 03.1.1 - Clothing materials
- 03.1.2 - Garments
- 03.1.3 - Other articles of clothing and clothing accessories
- 03.1.4 - Cleaning, repair and hire of clothing

Full details can be found on the Internet at

<http://unstats.un.org/unsd/cr/registry/regcst.asp?Cl=5&Lg=1>

COICOP is also an international standard classification which will allow the potential for comparison between separate countries in the future.

#### **4.4. ACORN Expenditure Estimates.**

CACI produce estimates of current year spend for each of the 55 ACORN groups providing robust patterns of consumer spending consistent with the latest Government national statistics. These cover the entire spectrum of household expenditure across a range of detailed retail and service categories and correspond to **34 product groups** including Food, Alcohol, Clothing and Personal Goods. CACI's Expenditure Estimates are produced using the Office for National Statistics' Household Final Consumption Expenditure figures, published in Consumer Trends. These provide control year totals for 34 individual product groups (defined using the European Union's COICOP classification of consumer expenditure). The control year is normally about two years prior to the current year. CACI then use a combination of trend analysis and independent macro economic forecasts to project expenditure levels and prices in each product group to the current year. These models are based upon predictor variables such as income, age, home tenure, presence of children, ACORN and regionality. CACI's Expenditure Estimates are produced at enumeration district level (about 150 houses) for the UK and constrained in all cases to meet the constructed national control totals in Consumer Trends.

The CACI data covers expenditure data via socio-economic group over the whole spectrum of household consumption. It includes expenditure data on both products and services for each of the 55 ACORN groups providing useful information if the impacts of a product-based consumption is to be compared to the impacts of a service-based economy. From

this information it is possible to build up profiles of the consumption habits of each different ACORN group.

#### 4.5. Calculating the environmental impact of each ACORN group

To demonstrate the methodology proposed in this paper a worked example has been presented. It must be noted that this is only a **preliminary** calculation to demonstrate the type and range of data that may be produced when this study is conducted in full. The worked example focuses on the consumption component of private vehicle transportation and studies it in terms of the Ecological Footprint (EF). The Ecological Footprint measures an individual's consumption in terms of direct and indirect land appropriation wherever that land may lie on our planet. The footprint is measured in a standardised area unit equivalent to a world average productive hectare (abbreviated to global hectares or gha). For more information on EF methodology please refer to Barrett *et al*, 2002 which can be found at [www.regionalsustainability.org](http://www.regionalsustainability.org).

In this worked example the average UK Footprint for car and van travel of 0.401 gha per year is utilised (Weidmann *et al*, 2003). It must be pointed out that when the REAP software tool has been completed all UK data will be obtained directly from this source. Using the ACORN data it was possible to determine the average UK resident expenditure on car and van usage to be £11.60 per week. From this data and information regarding the spending habits for each of the 55 ACORN groups it is possible to make an assessment on the likely impact of each group. The results can be seen below in figure 3.

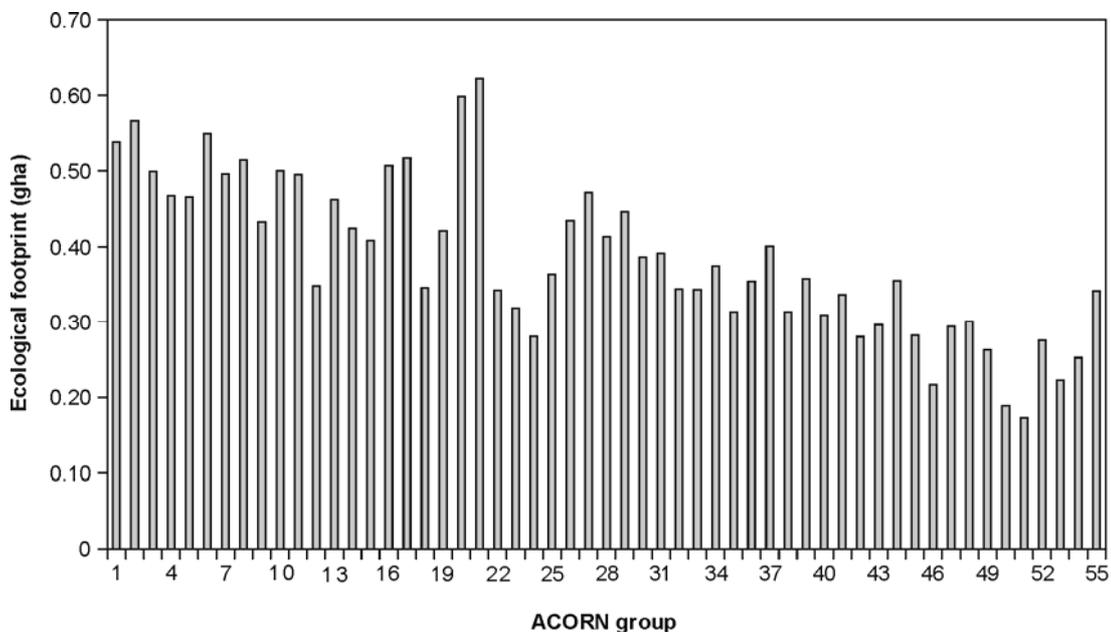


Figure 3: The Ecological Footprint of car and van use for 55 socio economic groups.

The main component of expenditure in this category is petrol thus the results give a clear representation of the range of impacts that exist between different socio economic groups. As can be seen there is a significant difference between the highest and lowest consumer with ACORN group 51 ‘Council Flats, Greatest hardship, Many lone parents’ having an EF of only 0.17 gha per year in comparison to ACORN group 21 ‘Prosperous Enclaves,

*Highly Qualified Executives*’ who have a Footprint over three and a half times larger totalling 0.62 gha. This clearly highlights the consumption characteristics that exist between different groups within the UK.

## 5. Application to Policy

It is not economic growth per se that is responsible for current environmental pressures, but the related material and energy flows mobilised by socio-economic activities. The following two types of perturbation can be adjusted to reduce environmental impact:

- **Preference change:** End users (household and government) evaluate goods differently and are satisfied with smaller amounts or different types of goods.
- **Efficiency Change:** Intermediate inputs are reduced due to technological improvement.

While the UK Government has a number of options such as economic, regulatory or information-based approaches, the issue has been partly, if not wholly, ignored. The only thrust from the UK Government has been the joint efforts of Dti and DEFRA, in producing the Sustainable Consumption and Production Framework. The focus is almost solely concerned with “Efficiency Change” by improving resource productivity. Resource productivity measures the efficiency of the economy in generating output without using up natural resources – including the resource provided by the capacity of the environment to absorb our waste and pollution. The UK Government’s Sustainable Consumption and Production (SCP) Framework “Changing Patterns” identifies what is required to achieve economic and social gain while respecting ecological limits (DEFRA/DTI 2003):

- Decoupling economic growth and environmental degradation
- Focusing policy on the most important environmental impact associated with the use of particular resources
- Increasing the productivity of material and energy use
- More informed individual and corporate consumers

To achieve these objectives it is acknowledged that a more holistic approach is required that explores the life cycle of products and services and integrating sustainable consumption and production issues into the policy arena while stimulating innovation. The information provided in the analysis provides a considerable proportion of this information.

The value of the approach highlighted in this paper is a clear insight into the issue of decoupling. Most importantly, many of the indicators are related to **domestic** consumption and production and do not take into account the environmental impacts in other countries that are created through the imports of goods (and the transfer of production capacity in other countries). This process – known as *burden shifting* – is not sufficiently reflected in the proposed basket of indicators (see figure 4). There is the danger that the current indicators show a decoupling that takes place only within the national boundaries. Thus some might be deluded into thinking that the trend is towards sustainability whereas in fact unsustainable production processes and emissions have merely been “exported”. The following indicator, adopted under the SCP Framework, highlights this issue clearly.

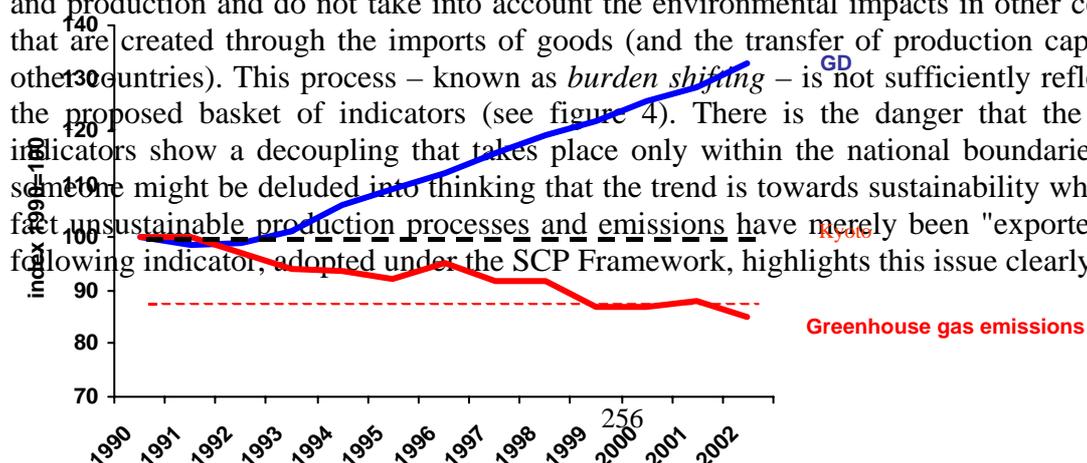


Figure 4: CO<sub>2</sub> Emissions in the UK (Source: DEFRA, 2003)

International trade, for example, has an impact on national CO<sub>2</sub> emissions and consequently on the ability to fulfil national CO<sub>2</sub> reduction targets. Through goods and services traded in a globally interdependent world, the consumption in each country is linked to greenhouse gas emissions in other countries. It has been argued that in order to achieve equitable reduction targets, international trade has to be taken into account when assessing a nations' responsibility for abating climate change. A consumption focus provides this information. Early results suggest that the CO<sub>2</sub> responsibility of the UK would culminate in an increase by 30 per cent compared to the current accounting method.

### **5.1. Modelling the Service Economy and Benchmarking**

As highlighted in section's 2 and 3, there has been an increase in the demand for services. This would suggest that it is not the ownership of products that is the primary aim of individuals but the services and functions that they provide. Individuals are seeking mobility, as opposed to travel and shelter as opposed to house ownership. The approach we have adopted offers the opportunity to model the provision of key functions (shelter, nutrition, mobility etc.) and assess the environmental impact of their provision. A comparison can be made between the environmental impact of ownership and through a service.

The methodology lends itself as a benchmarking tool, providing a co-efficient of environmental impact (i.e. Ecological Footprint per pound spent). This is where direct comparisons and choices can be made through the provision of a particular function. The results also provide an insight into the efficiency of key industrial and commercial sectors and can be used as part of an information-based policy initiative as a benchmarking tool.

### **5.2. You would be affected by taxation reform?**

An environmental tax reform (ETR) is widely accepted to be a policy with desirable environmental, economic and employment effects (Dahl *et al*, 2002). ETR could play a key role in promoting a sustainable economy by incentivising sustainable activities or by raising funds for progressive policies through taxation of environmentally-damaging activities. However, the sustainability agenda does not simply imply a reduction in environmental impact, but adopts the philosophy that all can achieve a decent quality of life. Therefore, an understanding of the environmental impact of various socio-economic groups highlights who in society would be affected by these fiscal changes.

The initial evidence points to a clear correlation between wealth and environmental impact. At present, many regressive taxes are in place in the UK, VAT being an excellent example. In other words, the more people earn the less the proportion of their income they pay in tax. While VAT is a tax on consumption it fails to address the excessive consumption of key socio-economic groups. The approach that we have adopted will give a clearer insight into where in society the environmental impact can be attributed, what products have a disproportionately high impact and would ETR affect individuals in a fair and just way.

## 6. Conclusions and future research

It is acknowledged that this paper outlines a preliminary insight into a methodology for exploring the environmental impact of different socio-economic groups. The next stage is to address many of these problems associated with the methodology. These are listed below:

- Spending levels are not necessarily proportional to physical flows of materials because average spending on products does not take into account WHAT products are bought. Potentially, environmentally aware consumers spend more money on more expensive organic or recycled products while at the same time consuming less material or energy.
- It is recognised that the current approach does not take into account the interactions between industrial sectors. In the future, the approach will adopt a “hybrid input-output” approach. This entails the combining a process analysis of products and the use of an economic input-output approach to provide allocation to services where precise information concerned with resource consumption is unknown. The methodology is based on a sound basis of a comprehensive material flow analysis of the UK. The main task is ensuring that the allocation to specific socio-economic groups is comprehensive.

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# **The REAP Tool – Creating Physical Accounts for the UK and Evaluating Policy Scenarios**

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## **Keywords**

sustainable consumption, material flow analysis, ecological footprint, physical accounts, policy analysis, policy scenarios

## **Introduction**

The paradigm of Sustainable Consumption has become an important issue in national and international research and policy agendas. There is wide global recognition that unsustainable patterns of consumption have serious social and environmental impacts. Understanding consumption patterns and the drivers behind them is seen as necessary to identify the appropriate role of governments in promoting more sustainable consumption patterns, and for the choice and implementation of different policy instruments (OECD 2002, UNEP 2002).

The European Commission has adopted a ‘Thematic Strategy on the Sustainable Use of Resources’ through the 6<sup>th</sup> Environmental Action Programme (EC 2003). The objective of this strategy is to ensure that the consumption of resources and their associated impacts do not exceed the carrying capacity of the environment and to break the linkages between economic growth and resource use. The UK Government has committed itself to promote more sustainable patterns of consumption and production through its ‘Framework for Sustainable Consumption and Production’ (DEFRA/DTI 2003). It identifies the need for policies to decouple economic growth from environmental degradation, and increasing the resource productivity of the UK economy is seen as one way to achieve this aim (PIU 2001).

In order to enable the implementation of sustainable consumption policies it is crucial to understand the associated physical flows of resources on global, regional and local levels

and to assess these flows in terms of their environmental impacts. Furthermore, there is a need to take into account the environmental impacts in other countries that are caused by the UK consumption of imported goods. This process – known as *burden shifting* – is currently not sufficiently included in national resource and emission accounting systems. Therefore, it has been argued that international trade has to be taken into account when assessing a nation's responsibility for abating climate change. Currently, new methods are being explored and developed to account for emissions and impacts related to the international trade of goods and the internationalisation of production. This notion of *consumer responsibility* (instead of *territorial responsibility*) has been introduced to the global warming debate for instance (e.g. Munksgaard and Pedersen 2001, Ahmad and Wyckoff 2003).

The objective of this paper is to present a methodology currently being developed by the Stockholm Environment Institute at York to assess material flows through the UK economy in terms of their environmental impacts. At the same time, the modelling tool REAP (Resource and Energy Analysis Programme) is introduced.

## Methodological Approach

### *Overview*

The Stockholm Environment Institute at York (SEI-Y), in collaboration with the Centre for Urban and Regional Ecology (Manchester University) and Cambridge Econometrics is currently developing the Resource and Energy Analysis Programme (REAP) – an integrated resource-environment modelling tool based on policy scenarios. REAP considers consumption by households and public as well as commercial services, wherever the consumed products may come from and wherever environmental impacts may occur (thus applying the principle of *consumer responsibility*). Material Flow Analysis as the basic methodology provides a comprehensive picture of apparent and hidden flows of materials and energy carriers through the economy, thus providing a complete physical account of the UK economy. Employing a hybrid Process Analysis / Input-Output approach, resource consumption is allocated to industry, commercial services and households. This forms the basis of a simplified “Physical Input-Output Table” for the UK, broken down by devolved countries and regions. The key environmental impacts associated with material flows can be expressed by calculating the corresponding greenhouse gas emissions and ecological footprints.

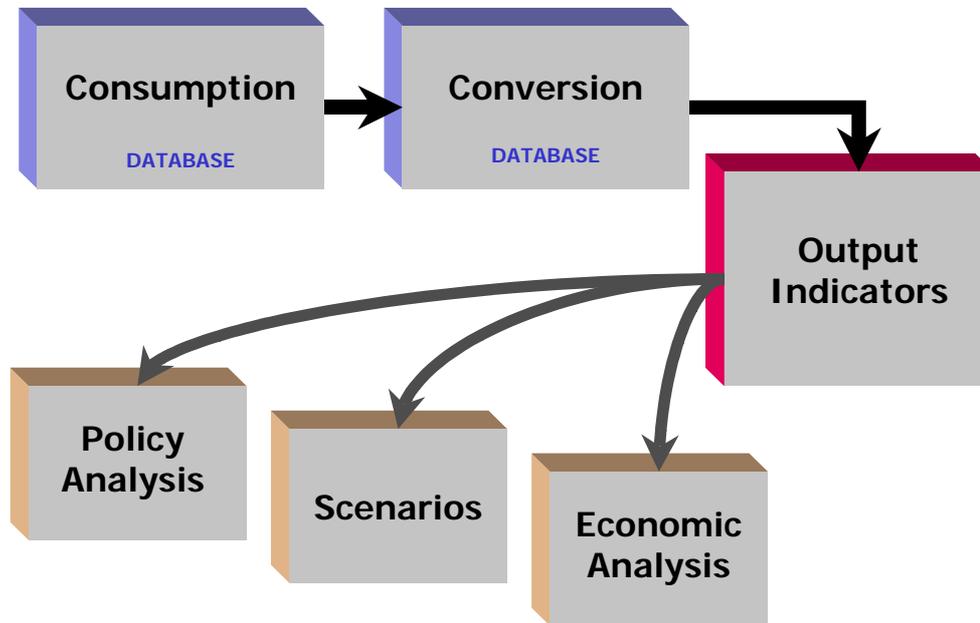
Final consumption patterns follow both SIC<sup>1</sup> and the COICOP<sup>2</sup> classification and are organised around key policy components such as food, energy, housing, infrastructure, consumer goods, transport and waste; featuring hundreds of different materials and products. Spatial disaggregation of national data is possible down to the local authority level. Main output indicators of REAP are direct and total material consumption (DMC, TMC), greenhouse gas emissions and ecological footprints.

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1 Standard Industrial Classification

2 Common Indexing Protocol Classification Of Individual Consumption by Purpose

REAP is also a scenario tool aimed at decision-makers at the regional and local level. It can be used to describe the impacts of individual policy measures and to combine these into integrated scenarios that capture their interactions. The Scenario Manager enables the creation of a wide range of scenarios for fashioning comprehensive strategies and for assessing the sensitivity of results to uncertainty in key variables.



**Figure 1: Basic modular structure of REAP**

The basic structure of the REAP tool is shown in Figure 1. The initial module ‘Consumption’ consists of tens of thousands of detailed data on production, consumption and imports of products, thus enabling a complete Material Flow Analysis (MFA) for the UK that is divided down to the regional level.

By using the ‘Conversion’ database, various ‘Output Indicators’ can be created including standard MFA indicators, greenhouse gas emissions and ecological footprints.

Finally, a number of different scenarios and analyses can be undertaken, creating user specific output data (‘Policy Analysis’, ‘Scenarios’, ‘Economic Analysis’). A detailed description of the REAP modules – together with the underlying methodology and the main data sources – has been given below.

### *Consumption Module*

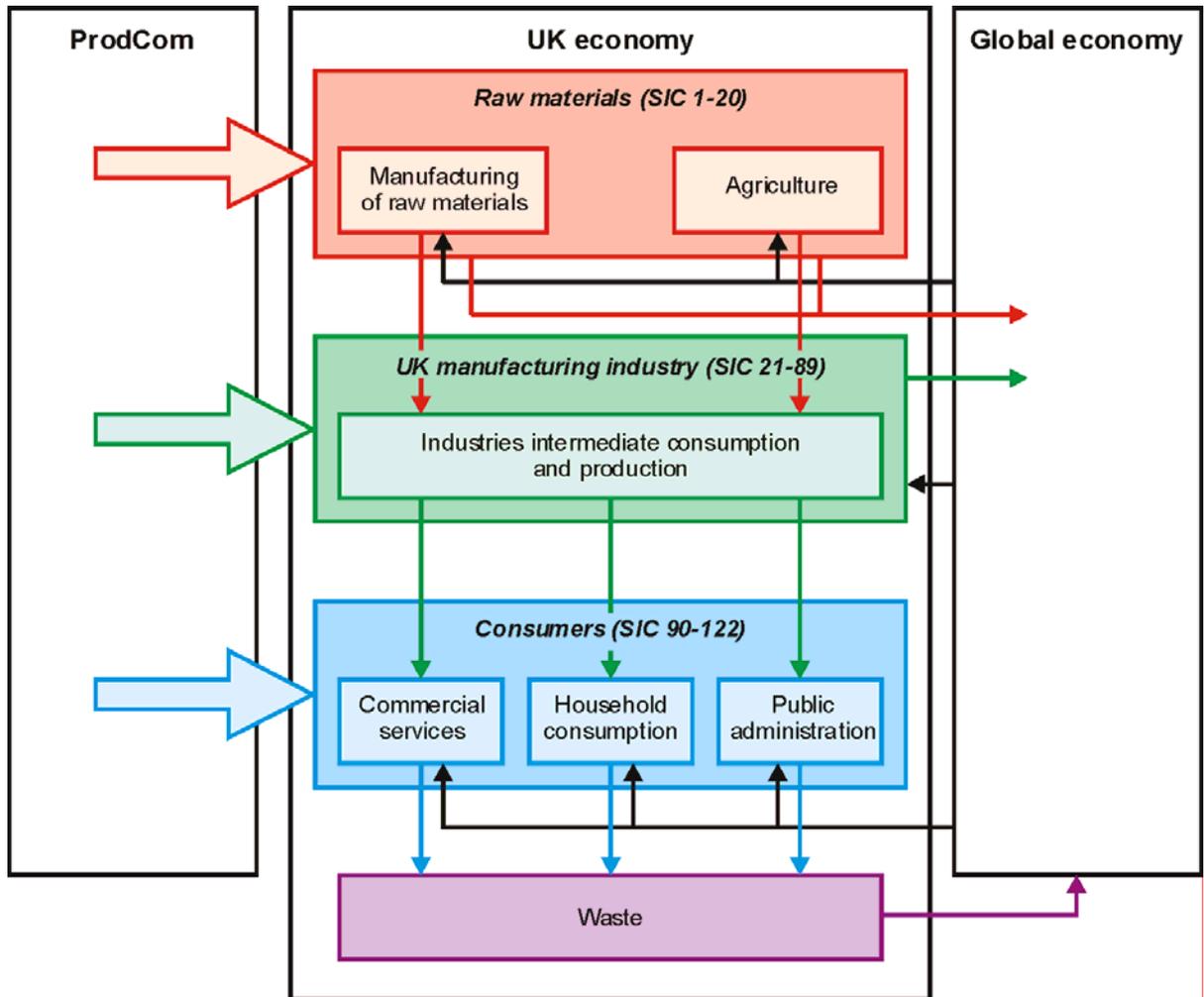
This module contains data on the annual consumption and production volumes of products on different levels from individual to national, following standard classifications. A physical trade model (described below) provides information on the amount and origin of imports.

The main database for the consumption module is the national PRODCOM statistic (classified by the Standard Industrial Classification, SIC)<sup>3</sup>. The term PRODCOM is

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3 PRODUcts of the European COMMunity (PRODCOM), PRODCOM Annual Industry Reports 2000, Office for National Statistics, <http://www.statistics.gov.uk/StatBase/Product.asp?vlnk=9660&Pos=1&ColRank=1&Rank=256>

derived from PRODCOM of the European COMMunity. This is a survey based on products whose definitions are standardised across the European Union to allow comparability between the member countries data. The PRODCOM annual reports (PRA) contain data on UK sales, imports and exports in both value and volume measure. Figure 2 indicates how these products are classified. PRODCOM covers some 4,800 products that are assigned to some 250 industries (subclasses) as defined by SIC and is available from the UK Office for National Statistics.



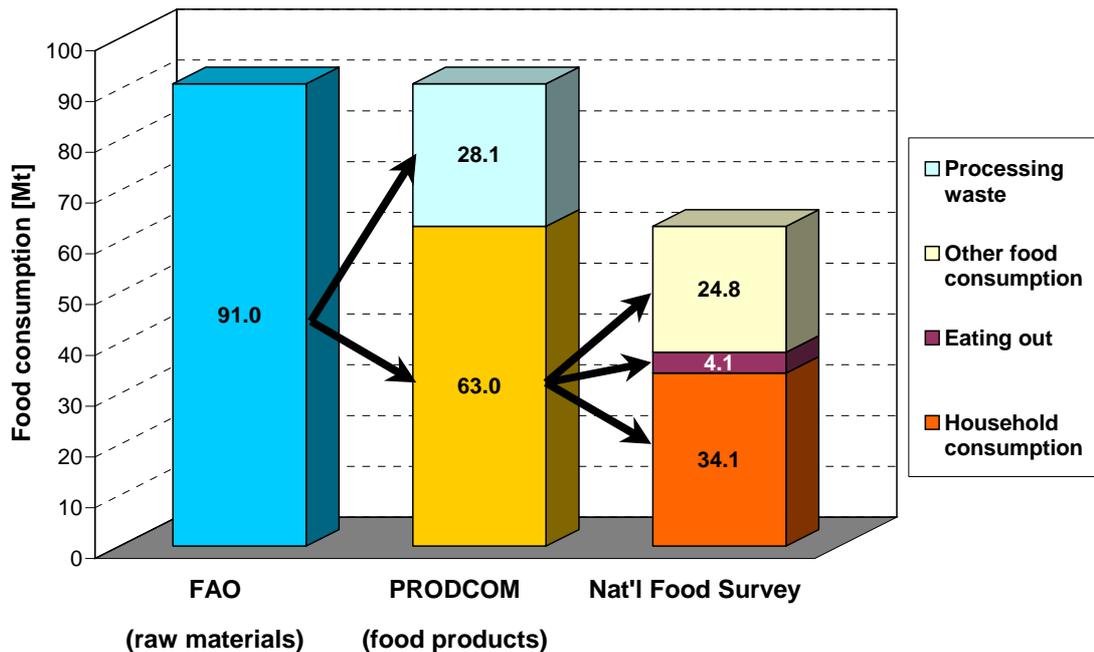
**Figure 2: The use of PRODCOM in determining material flows in the UK**

Items within PRODCOM can be divided into three main categories (raw materials, industries' intermediate consumption and final consumer products). To add the volumes of all the items within these three categories together would be double-counting as the raw materials will be used to make the final products. Therefore, the tonnage of materials from the consumers and manufacturing sections should add up to the raw materials, taking into account exports and imports at each stage. In essence, this will provide an understanding of material flows through various stages of the UK economy, thus creating physical accounts that can be seen as a simplified version of physical input-output tables (PIOT).

For the food component as an example, such a simplified physical input-output table was constructed to establish the link between raw agricultural goods (from FAO data) and food products (from PRODCOM). The difference of the total consumption of raw materials to

the raw materials consumed through products can be assumed to be the waste during manufacture. For example, wheat is the raw material and bread is the final product. There will be waste produced during the various manufacturing stages – harvesting, grinding, baking etc. (see also Figure 3).

By using data from the UK National Food Survey, the final consumption of food products is then broken down into three consumer groups: households, restaurants/take-aways (“eating out”) and other food consumption including public sector consumption (e.g. hospitals, catering, ...) and waste of food along the supply chains.



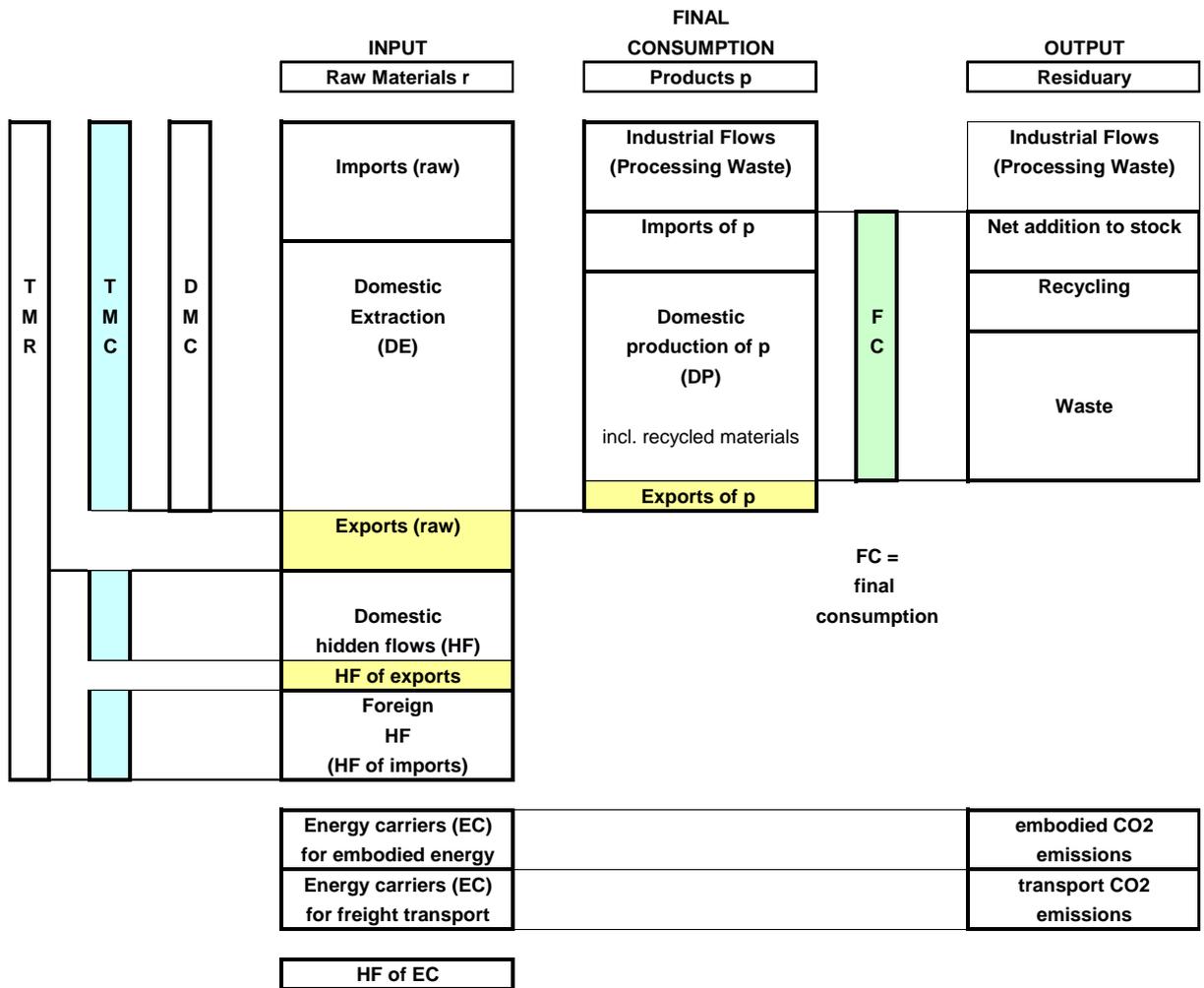
**Figure 3: Life cycle stages of UK food product manufacturing and allocation of amounts to different data sources and final consumption groups (numbers in million tonnes).**

In conclusion, the consumption module organises material flow data in terms of an economic structure approach:

- **Primary:** production / extraction of materials / commodities.
- **Secondary:** manufacturing / processing of materials into ‘products’.
- **Factors:** (factors in the economic sense), particularly construction and distribution.
- **Tertiary:** services (commercial & public) where material / products are secondary to the human activity which may distribute or enhance them, but where they are not the main item of significance.
- **Consumption:** final demand to households: this category may be more appropriate for the activities which are clearly focused on the point of final demand: e.g. passenger transport.
- **Residuary:** waste production & pollution control: the EF here can be based on the cumulative environmental impacts of the disposal method: it will also be possible

to add in the calculation for the resources or ‘material lost’ if this is not accounted for elsewhere.

A model of material flows and physical accounts adapted from standard MFA approaches is presented in Figure 4. For simplification, economic factors and the secondary sector are not shown here; the tertiary sector is included in ‘final consumption’.



**Figure 4: Physical account model of material flows through the UK economy employed in the REAP tool (adapted from ETC-WMF 2003).** See text for details.

The physical trade model of REAP provides a comprehensive breakdown of location of production for items consumed in the UK. For each product type (SITC classification<sup>4</sup>) the origin of the product by world region is calculated using international trade data from Customs and Excise. This data is of a sufficient quality to provide a comprehensive trade model for REAP. There is a possibility in the future to further disaggregate the import

4 Standard International Trade Classification

calculations down to country level. An example for some food items has been given in Table 1 below.

The approach allows the user to change levels of production, import and export of particular commodities by world region at different levels of complexity. This approach, combined with the global CO<sub>2</sub> and transport model allows a range of analyses to be undertaken.

**Table 1: Examples for food imports to the UK, broken down by world regions.**

Food product	Proportion of imports from total consumption	Origin of imports defined by world region:							
		European Union	Other Western Europe	Eastern Europe	Asia and Oceania	North America	Other America	Middle East and North Africa	Sub-Saharan Africa
<b>Cheese</b>	<b>33.0%</b>	86.2%	0.9%	0.1%	10.0%	2.1%	0.0%	0.4%	0.3%
<b>Fish</b>	<b>20.0%</b>	24.3%	27.9%	6.2%	20.0%	7.6%	3.0%	0.9%	10.1%
<b>Vegetables</b>	<b>42.1%</b>	78.8%	1.6%	1.0%	5.9%	6.9%	1.3%	1.6%	2.9%
<b>Fruit</b>	<b>89.3%</b>	49.1%	3.6%	0.3%	6.4%	3.8%	21.2%	4.6%	11.0%

The Material Flow Analysis has been calculated at the national and UK regional level. The methodology is consistent between all the regions. At present a specific year is being calculated (2001) but it is envisaged that this information will be updated yearly.

To allow the user to obtain the data in the most suitable format for their needs, the data can be organised using a range of recognised classifications systems. Primarily the data is organised by 93 “Economic Sectors” as recognised in the Environment Agency’s REWARD project<sup>5</sup>. The data can also be organised by COICOP. This basis of the analysis is built from the “Household Expenditure Survey” (HES). This employs the COICOP (Common Indexing Protocol Classification Of Individual Consumption by Purpose) classification system (4-digit). As well as being used for “Household Final Consumption Expenditure”, as published in Consumer Trends, COICOP is also used for household budget surveys, as adopted for the UK Expenditure & Food Survey, and international comparisons of Gross Domestic Product.

### *Conversion Module*

The conversion module contains all relevant co-efficients and conversion factors that are needed to calculate the output indicators. This includes co-efficients and factors for embodied energies, energy carriers, hidden flows, agricultural yields, CO<sub>2</sub> emissions and ecological footprints. Data sources and detailed descriptions of these factors are given below.

<sup>5</sup> REWARD stands for Regional and Welsh Appraisal of Resource Productivity and Development

### *Output Indicators – Results from REAP*

REAP will generate a range of different output indicators that are designed to provide decision-makers with useful, customised information. The whole methodology of REAP is based on consumption of households and the commercial sector (rather than production in the industrial sector). Main results from REAP calculations and scenarios will include Material Flow Analysis (MFA) indicators, greenhouse gas emissions and ecological footprints.

#### **Direct Material Consumption (DMC)**

DMC is defined as the total amount of raw materials directly used in a national economy (i.e. excluding indirect flows) and consumed by domestic actors (i.e. exports are subtracted)<sup>6</sup>. DMC equals domestic used extraction plus imports minus exports of raw materials (see Figure 4):

$$DMC = \sum_r DMC_r = \sum_r (DE_r + IMP_r - EXP_r)$$

DMC = direct material consumption [t]

r = raw material

DE<sub>r</sub> = domestic extraction of raw material r [t]

IMP<sub>r</sub> = import of raw material [t]

EXP<sub>r</sub> = export of raw material [t]

#### **Hidden Flows (HF)**

The ‘hidden flow’ is the portion of the total material requirements that never enter the economy. Hidden flows occur at the extraction or harvesting stage, for example when coal is being mined or forests are being cut down. Each item of material consumption has an associated hidden flow. Within this study, the hidden flow of most raw materials have been considered. Hidden flow factors for energy carriers and minerals were taken from an update of Douglas and Lawson 1997.

$$HF_{\text{domestic}, r} = (DE_r - EXP_r) \cdot HFF_{\text{domestic}, r}$$

$$HF_{\text{export}, r} = EXP_r \cdot HFF_{\text{domestic}, r}$$

$$HF_{\text{import}, r} = IMP_r \cdot HFF_{\text{import}, r}$$

HF<sub>domestic, r</sub> = hidden flow of raw material r consumed within the national boundaries [t]

HF<sub>export, r</sub> = hidden flow of raw material r exported [t]

HF<sub>import, r</sub> = hidden flow of raw material r extracted in other countries and imported  
= ‘foreign hidden flow’ [t]

DE<sub>r</sub> = domestic extraction of raw material r [t]

IMP<sub>r</sub> = import of raw material [t]

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6 ETC-WMF (2003) Zero Study: Resource Use in European Countries – An estimate of materials and waste streams in the Community, including imports and exports using the instrument of material flow analysis, European Topic Centre on Waste and Material Flows, Copenhagen

$EXP_r$  = export of raw material [t]

$HF_{\text{domestic}, r}$  = hidden flow factor for domestic extraction of raw material r  
(in tonnes of hidden flow per tonne of raw material) [-]

$HF_{\text{import}, r}$  = hidden flow factor for foreign extraction of raw material r  
(in tonnes of hidden flow per tonne of raw material) [-]

In some literature (e.g. Douglas and Lawson 1997) the total of raw material flows plus hidden flows is calculated by multiplying the raw material flow with a ‘hidden flow multiplier’. In this case the ‘hidden flow factor’ equals the ‘hidden flow multiplier’ minus 1.

### **Total Material Consumption (TMC)**

TMC is defined as the total (raw) material use associated with the domestic consumption activities, including indirect flows imported but minus exports and associated indirect flows.

$$TMC = \sum_r TMC_r = \sum_r (DMC_r + HF_{\text{domestic}, r} + HF_{\text{import}, r} - HF_{\text{export}, r})$$

$TMC$  = total material consumption [t]

$TMC_r$  = total material consumption of raw material r [t]

$DMC_r$  = direct material consumption of raw material r [t]

$HF_{\text{domestic}, r}$  = hidden flow of raw material r extracted within the national boundaries [t]

$HF_{\text{export}, r}$  = hidden flow of raw material r exported [t]

$HF_{\text{import}, r}$  = hidden flow of raw material r extracted in other countries and imported  
= ‘foreign hidden flow’ [t]

### **Total Material Requirement (TMR)**

TMR accounts for the domestic resource extraction and the resource extraction associated with the supply of the imports (all primary materials except water and air). TMR thus measures the physical basis of an economy in terms of primary materials. It comprises raw materials which are further processed (or exported) and which have an economic value (= “used extraction”), as well as the associated hidden flows.

$$TMR = \sum_r TMR_r = \sum_r (DE_r + IMP_r + HF_{\text{domestic}, r} + HF_{\text{import}, r})$$

$TMR$  = total material requirement [t]

$TMR_r$  = total material requirement of raw material r [t]

$DE_r$  = domestic extraction of raw material r [t]

$IMP_r$  = import of raw material [t]

$HF_{\text{domestic}, r}$  = hidden flow of raw material r extracted within the national boundaries [t]

$HF_{\text{import}, r}$  = hidden flow of raw material r extracted in other countries and imported  
= ‘foreign hidden flow’ [t]

### **Final Consumption (FC)**

Final Consumption is the total volume of all final products that are consumed by end consumers within national boundaries (= final demand by households, commercial and public consumers). This includes all products produced in the UK that are not exported plus all imported products.

$$FC = \sum_p FC_p = \sum_p (DP_p + IMP_p - EXP_p)$$

FC = total final consumption [t]

p = product

FC<sub>p</sub> = final consumption of product p [t]

DP<sub>p</sub> = domestic production of product p [t] (“sales” in PRODCOM)

IMP<sub>p</sub> = import of product p [t]

EXP<sub>p</sub> = export of product p [t]

### **Industrial Flow (IF)**

In this study, we preliminarily define ‘industrial flow’ as the amount of materials that occur (or are made redundant) when raw materials are processed into products (“processing waste”). Further research will be undertaken to study the flow of intermediate materials allocated to the second sector and economic factors in order to get a deeper understanding of those material flows.

$$IF = DMC - FC - \sum_p EXP_p$$

IF = Industrial Flow [t]

DMC = direct material consumption [t]

FC = total final consumption [t]

EXP<sub>p</sub> = export of product p [t]

### **Embodied Energy (EE)**

The Energy Analysis Programme (EAP)<sup>7</sup> software package is used to determine the direct and indirect energy requirements of an item of consumptive expenditure. There are, in principal, two methods to calculate the total life-cycle use of an item of consumptive expenditure. These are “Process Analysis” and “Input-Output Analysis”. Process analysis makes use of a description, in physical terms, of the processes involved in the production cycle of the consumptive expenditure under consideration (Boustead and Hancock 1979). The other approach, Input-Output analysis, uses I-O tables in which the transactions between the economic sectors are expressed in monetary terms. One of the results of

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7 EAP (Energy Analysis Program), Version 3.2 (November 2000), Center for Energy and Environmental Studies, University of Groningen, The Netherlands

energy input-output analysis is the cumulative energy intensity of a sector. This intensity depicts the amount of primary energy that the sector used per financial unit worth of supplies (Wilting 1999). The EAP approach combines both of these methods. This hybrid approach has the advantage of the accuracy of the process analysis while the input-output analysis provides the opportunity to calculate complete cycles. As a result, embodied energy figures and embodied CO<sub>2</sub> emissions are available from EAP for a wide range of food and consumer products.

$$EE_p = EE_{\text{domestic}, p} + EE_{\text{import}, p}$$

$$EE_{\text{domestic}, p} = (DP_p - EXP_p) \cdot EEF_p$$

$$EE_{\text{import}, p} = \sum_c EE_{\text{import}, p, c} = \sum_c (IMP_{p, c} \cdot EEF_{p, c})$$

$EE_p$  = total embodied energy associated with the final consumption of product p [GJ]

$EE_{\text{domestic}, p}$  = embodied energy associated with the final consumption of domestically produced product p [GJ]

$EE_{\text{import}, p}$  = total embodied energy associated with the final consumption of all imports of product p [GJ]

$EE_{\text{import}, p, c}$  = embodied energy associated with the final consumption of product p imported from country / world region c [GJ]

$DP_p$  = domestic production of product p [t] (“sales” in PRODCOM)

$EXP_p$  = export of product p [t]

$IMP_{p, c}$  = import of product p from country / world region c [t]

$EEF_p$  = embodied energy factor for product p produced in the UK (in Gigajoule per tonne of product) [GJ/t]

$EEF_{p, c}$  = embodied energy factor for product p and country / world region c [GJ/t]

At present the embodied energy of products has to be assumed to be the same for all world regions because of lack of data, i.e.  $EEF_p = EEF_{p, c}$ . There is a strong need for more research in this area as embodied energy data are crucial for all following calculations.

## Energy Carriers

To calculate the amount of fuels associated with the embodied energy of materials and manufactured products, energy carrier conversion factors have been derived for each industrial sector by assuming the fuel/energy mix given in the International Energy Agency energy statistics and balances for 2000, the latest year for which the data is available (IEA 2002). Where electrical energy formed part of the mix, this have been converted into energy carriers and added to the tonnages of fuel before calculating the direct and hidden flow conversion factors. As an example, the derivation of the energy carrier conversion factors for the UK food (and tobacco) industry are shown in Table 2.

**Table 2: Consumption of energy carriers (EC), related hidden flows and CO<sub>2</sub> emissions for the UK food (and tobacco) industry in the year 2000 as well as derived conversion factors for material flows.**

Consumption of energy carriers in the food sector	of Hard Coal	Natural Gas	Gas Diesel Oil	/ Heavy Fuel Oil	Other Energy Carriers	Electricity [GWh]	Total mass flows [kt]	Conversion factors [t/TJ]	
Direct EC flow [kt]	194	2,194	139	154		12,451	2,681		
EC flow via electricity [kt]	1,532	711	5.7	19	102		2,370		
<b>Total EC flow [kt]</b>	<b>1,726</b>	<b>2,905</b>	<b>145</b>	<b>173</b>	<b>102</b>		<b>5,051</b>	<b>ECF = 30.5</b>	
<b>Hidden mass flows [kt]</b>	<b>6,680</b>	<b>46</b>	<b>2.3</b>	<b>2.8</b>	<b>0.6</b>		<b>6,733</b>	<b>HFF = 40.6</b>	
<b>CO<sub>2</sub> emissions [kt]</b>	<b>3,580</b>	<b>7,253</b>	<b>435</b>	<b>503</b>	<b>21</b>		<b>11,793</b>	<b>CO<sub>2</sub>F = 71.2</b>	
<b>Total energy consumption of the food sector:</b>									
<b>3,957 ktoe</b>									
<b>165.7 PJ</b>									

The conversion factors have been calculated for the following industrial sectors: iron and steel, non-ferrous metals (e.g. aluminium), chemicals (including plastics), non-metallic minerals (including glass), machinery (including electrical appliances), mining and quarrying, food and tobacco, paper, pulp and printing, wood and wood products, construction, textiles and leather, and 'other industry' (e.g. rubber, batteries). Similar calculations have been conducted for all world regions presented in the physical trade model.

$$EC_p = EE_{\text{domestic, p}} \cdot ECF_s + \sum_c (EE_{\text{import, p, c}} \cdot ECF_{s, c})$$

$EC_p$  = energy carrier needed to deliver embodied energy of product p [t]

$EE_{\text{domestic, p}}$  = embodied energy associated with the final consumption of domestically produced product p [GJ]

$ECF_s$  = energy carrier factor for (UK) sector s (in tonnes of energy carrier per GJ of energy consumed in sector s) [t/GJ]

$EE_{\text{import, p, c}}$  = embodied energy associated with the final consumption of product p imported from country / world region c [GJ]

$ECF_{s, c}$  = energy carrier factor for sector s in country / world region c [t/GJ]

Without energy analysis the MFA would provide little meaning with regard to the impact of the different materials entering the economy. The inclusion of energy in the MFA can

also be used for the development of sustainability indicators. For example, MFA can be seen as an instrument for aggregating various environmental impacts into a few strategic indicators such as the total throughput of materials, energy intensity per unit or even the decoupling of material and energy use from economic growth. In some cases the material composition of a particular product will need to be known before it is possible to understand the energy carriers associated with this product.

### Hidden Flows of Energy Carriers

$$HF_{EC,p} = EE_{domestic,p} \cdot HFF_{EC,s} + \sum_c (EE_{import,p,c} \cdot HFF_{EC,s,c})$$

$HF_{EC,p}$  = hidden flow of energy carriers associated with the embodied energy of product p [t]

$EE_{domestic,p}$  = embodied energy associated with the final consumption of domestically produced product p [GJ]

$HFF_{EC,s}$  = hidden flow factor for energy carriers consumed in (UK) sector s (in tonnes of hidden flow per GJ of energy consumed in sector s) [t/GJ]

$EE_{import,p,c}$  = embodied energy associated with the final consumption of product p imported from country / world region c [GJ]

$HFF_{EC,s,c}$  = hidden flow factor for energy carriers consumed in sector s in country / world region c [t/GJ]

### Carbon Dioxide Emissions

There are three different sources of CO<sub>2</sub> emissions related to consumption:

- Direct emissions through the consumption of energy carriers and electricity
- Indirect emissions through the consumption of products ('embodied' emissions)
- Emissions caused by freight transport

By taking all three emission paths into account REAP is strictly following the 'consumer principle' as supply chains and the whole life cycle of products are considered. Emissions are included in the REAP analysis wherever a product is produced and wherever the emissions associated to the production and the transport of this product may occur, they have been. This is in contradiction to the 'territorial principle' of the UN Framework Convention on Climate Change where emissions are recorded within national boundaries (UNFCCC 1997).

In the future REAP will take into account other greenhouse gases (methane and nitrous oxide) as well as further air pollutants.

The embodied CO<sub>2</sub> emissions associated with the consumption of products is calculated as follows:

$$CO2_p = EE_{domestic,p} \cdot CO2F_s + \sum_c (EE_{import,p,c} \cdot CO2F_{s,c})$$

$CO2_p$  = carbon dioxide emissions associated with the embodied energy of product p [t]

$EE_{\text{domestic}, p}$  = embodied energy associated with the final consumption of domestically produced product p [GJ]

$CO2F_s$  = factor for  $CO_2$  emissions from energy carriers consumed in (UK) sector s (in tonnes of carbon dioxide per GJ of energy consumed in sector s) [t/GJ]

$EE_{\text{import}, p, c}$  = embodied energy associated with the final consumption of product p imported from country / world region c [GJ]

$CO2F_{s, c}$  = factor for  $CO_2$  emissions from energy carriers consumed in sector s in country / world region c [t/GJ]

## Yield Factors

Yield factors inform about the yields of different agricultural products per hectare of cropland, pasture or forest. They are used to determine the real land requirements to grow each individual product (FAO Statistical Databases, <http://apps.fao.org>).

For calculations of national/regional biocapacity, local yield factors are introduced (data source: UK Agricultural Census 2000). These factors represent the bioproductivity of local areas in comparison to the global average.

## Ecological Footprint

The ecological footprint (EF) provides an aggregated indicator of the environmental impacts of natural resource consumption (energy and materials) in much the same way that economic indicators (such as Gross Domestic Product or the Retail Prices Index) have been adopted to represent the dimensions of the financial economy.

Its application includes analysis of policy, benchmarking performance, education and awareness raising and scenario development. The European Commission's Common Indicators Programme (ECIP, see [www.sustainable-cities.org](http://www.sustainable-cities.org)) has adopted the ecological footprint as an indicator of regional environmental sustainability and the methodology has support from many individuals in the public, private and civil sectors worldwide. The 'National Footprint Accounts' study, summarised as part of the Living Planet Report (WWF 2002), sets a standard framework of calculating and comparing ecological footprints on a national level.

The EF of a region or community is defined as the bioproductive area (land and sea) that would be required to sustainably maintain current consumption, using prevailing technology. The footprint deals only with demands placed on the environment. It does not attempt to include the social or economic dimensions of sustainability. Probably the most important dimension of the ecological footprint is the fact that impact is related to the population of the city or region that consumes the goods and services. The footprint is measured in a standardised area unit equivalent to a world average productive hectare (abbreviated to global hectares or gha). This permits comparisons between countries and regions.

The calculations are as follows:

$$EF_p = EF_{\text{real land}, p} + EF_{\text{energy land}, p}$$

$$EF_{\text{real land}, p} = (DP_p - EXP_p) \div YF_p \cdot EQF_{\text{real land}, p} + \sum_c (IMP_p \div YF_{p, c} \cdot EQF_{\text{real land}, p})$$

$$EF_{\text{energy land}, p} = CO2_{\text{domestic}, p} \div SR \cdot EQF_{\text{energy land}} + \sum_c (CO2_{\text{import}, p, c} \div SR_c \cdot EQF_{\text{energy land}})$$

$EF_p$  = total ecological footprint for the final consumption of product p [gha]

$EF_{\text{real land}, p}$  = real land ecological footprint for the final consumption of product p [gha]

$EF_{\text{energy land}, p}$  = energy land ecological footprint for the final consumption of product p [gha]

$DP_p$  = domestic production of product p [t] (“sales” in PRODCOM)

$EXP_p$  = export of product p [t]

$YF_p$  = UK yield factor for product p [t/ha]

$EQF_{\text{real land}, p}$  = equivalence factor for different types of real land relevant to product p [gha/ha]

$IMP_p$  = import of product p [t]

$YF_{p, c}$  = yield factor for product p in country / world region c [t/ha]

$CO2_{\text{domestic}, p}$  = carbon dioxide emissions from the consumption of embodied energy associated with the final consumption of domestically produced product p [t]  
 $= EE_{\text{domestic}, p} \cdot CO2F_s$  (see above)

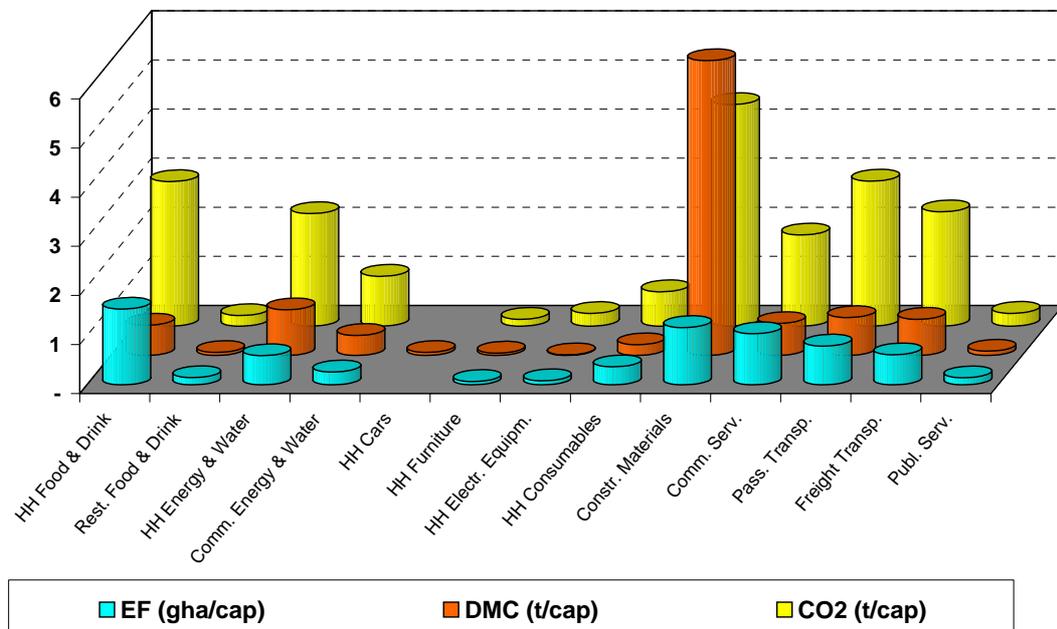
$SR$  = UK sequestration rate of carbon dioxide [t/ha]

$EQF_{\text{energy land}}$  = equivalence factor for energy land (= forest) [gha/ha]

$CO2_{\text{import}, p, c}$  = carbon dioxide emissions from the consumption of embodied energy associated with the final consumption of product p imported from country / world region c [t]

$SR_c$  = sequestration rate of carbon dioxide in country / world region c [t/ha]

In order to illustrate one possible presentation of results Figure 5 shows three different impact indicators for resource consumption in South East England.<sup>8</sup>



<sup>8</sup> Results from the Taking Stock project: “Material Flow Analysis and Ecological Footprint of the South East region” ([www.takingstock.org](http://www.takingstock.org))

**Figure 5: Direct Material Consumption (DMC), ecological footprint (EF) and CO<sub>2</sub> emissions of household and service sector consumption in the South East in 2000 (in global hectares or tonnes per capita)**

### **Freight Transport Model**

Finally, REAP will provide a comprehensive analysis of the impacts of national as well as international freight transport associated with the consumption of goods in the UK. Specific transport information like distances, total tonne-kilometres or CO<sub>2</sub> emissions can be extracted separately from REAP's database.

Internationally, freight is transported mainly by three different modes of transport – sea, rail and air. The origin and the mode of transport for each product type has been worked out using the Origins and Destinations Survey of UK International Trade 1996<sup>9</sup> Report. Again, the world regions from the physical trade model were used to break down the origin of imports. Distances for imports have been worked out separately for the three modes of transport.

The inland modes of freight transport have been taken from the same data source. The national distribution distances of the food products have been derived from the ONS Transport Statistics Bulletin – Transport of Goods by Road in Great Britain 2001. It was assumed that the distance by rail, sea and air is the same as the distance by road.

Using this information, the tonne-kilometres for each food item were calculated depending on their origin. This is a measure of freight moved which takes into account the weight of the load and the distance through which it is hauled. Finally, the greenhouse gas emissions caused by freight transport were calculated using mode specific emission factors from the EAP database<sup>10</sup>. At this stage the greenhouse gases CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O are included but it is intended to add other emissions (like NO<sub>x</sub>, SO<sub>2</sub>, particulate matter, etc.) in the future. The calculations also take into account the percentage of products that have to be cooled during transport and the related emissions of cooling transport lorries.

Ecological footprints of freight transport have been calculated and analysed separately within REAP.

### **Applications**

REAP is designed for policy makers to use at the national, regional and local level organised around key policy components. As a policy analysis tool it can be used to describe individual policy measures and to combine these into integrated scenarios that capture their interactions. The uniqueness of REAP is the combination of a scientifically valid resource accounting and impact assessment methodology with a day-to-day tool that meets the needs of decision-makers in the field of sustainable development.

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9 Origins and Destination Survey of UK International Trade 1996, Department of Transport

10 EAP (Energy Analysis Program), Version 3.2 (November 2000), Center for Energy and Environmental Studies, University of Groningen, The Netherlands

The main applications of the REAP tool include<sup>11</sup>:

- Policy Analysis
- Scenarios, Projections and Forecasting

REAP allows for analysis of various policies initiatives. For example, a policy concerned with waste management could be explored where only a couple of variables are adjusted. At the same time, the interaction between a range of policies connected to domestic energy consumption, housing policy and waste management could be undertaken. The following list highlights some of the potential policy areas where REAP would be able to provide meaningful information:

- Strategic environmental assessment
- Sustainability appraisal
- Regional indicators & information frameworks
- Regional waste policy
- Sourcing of products
- Housing and energy policy
- Environmental impacts - generated by the production and consumption of consumer products
- Integrated policies - to look at the impacts of products across their whole life cycle
- Measures or tools - for increasing the demand for and supply of 'greener' products
- Information tools consumers need - to make greener choices (communication)

The 'Scenario Manager' within the REAP tool is a policy scenario framework used to describe individual policy measures and to combine these into alternative scenarios. A series of individual measures have been developed including a renewable energy, waste minimisation, appliance efficiency standards, and low-emission vehicles, just to name a few. These and other measures can be examined individually and then combined into integrated scenarios that capture their interactions (for example, the benefits of appliance efficiency standards combined with a renewable energy will be less than the sum of the benefits of the two scenarios considered separately).

In the future, the combination of REAP with econometric models will allow future projections of a wide range of variables and indicators for fashioning comprehensive strategies and for assessing the sensitivity of results to uncertainty in key variables.

## **Conclusions**

The methodological approach described above and the REAP tool will allow the exploration of a number of important issues related to sustainable consumption. It

- improves the understanding of resource consumption and environmental impacts by industrial sectors and products

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<sup>11</sup> For applications of the ecological footprint concept (which forms part of REAP) please see Barrett and Scott 2001, Barrett and Scott 2003 and Barrett 2001.

- provides valuable information concerning the resource productivity of UK industry
- allows the user to explore whether “decoupling” between the economy and the environment is occurring
- adopts a holistic view of products identifying the environmental impact of supply chains
- takes into account issues of “burden shifting” and provides a different perspective of CO<sub>2</sub> emissions by adopting the “consumer principle”
- allows the construction of detailed scenarios based on changes in technology, policies, markets and consumption
- supports regional and local decision-makers by providing relevant information for sustainability strategies
- provides information to help communicate sustainable consumption and production issues for businesses and the general public.

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# Using Life-cycle Assessment for Sustainable Consumption

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## ABSTRACT

The 2002 World Summit for Sustainable Development in Johannesburg called for a comprehensive set of programs focusing on sustainable consumption and production. According to world leaders, these programs should rely on life cycle analysis (LCA) to promote sustainable patterns of production and consumption. Cleaner production is a well-established activity and it uses LCA. UNEP, the European Union, and a number of national organizations have now begun to work on sustainable consumption. In developing sustainable consumption policies and activities, the use of LCA presents interesting opportunities which are not yet well understood by policy makers. This paper outlines how life cycle approaches can be used in the area of sustainable consumption, to inform policy making, select areas of action, identify which lifestyles are more sustainable, advise consumers, and evaluate the effectiveness of sustainable consumption measures. The investigations necessary need to go beyond product life-cycle assessments and integrate LCA with input-output analysis, consumer expenditure surveys, time-use studies and panel methods. This paper describes for the use of LCA in the form of simple matrix equations and then discusses the current state-of-the-art. These approaches still need to be developed and tested and require additional efforts to collect data. Current research is mostly descriptive; policy makers, however, require more strategic analysis addressing their decision options.

**KEYWORDS:** Life-cycle assessment, sustainable consumption, rebound effect

### *Introduction*

At the World Summit for Sustainable Development (WSSD) in Johannesburg, world leaders recognized that it is necessary to "chang[e] unsustainable patterns of consumption and production". In the "Plan of Implementation", the main document to emerge from the WSSD, world leaders call for "fundamental changes in the way societies produce and consume" (United Nations General Assembly 2002, §13). They resolve to "encourage and promote the development of a 10-year framework of programmes in support of regional and national

initiatives to accelerate the shift towards sustainable consumption and production [...]" (§ 14). This 10-year program will be set in motion at the 12<sup>th</sup> meeting of the UN Commission on Sustainable Development in April 2004.

The Johannesburg Plan of Implementation calls for the adoption of tools, policies and assessment mechanisms based on life-cycle analysis to promote sustainable patterns of production and consumption and to increase the eco-efficiency of products and services (United Nations General Assembly 2002, §13). It is remarkable that the UN General Assembly singles out Life Cycle Assessment (LCA) as the tool that will help achieve sustainable consumption and production. One needs to ask: Is LCA up to the task? And how will it be able to make such a significant contribution? LCA has long been used in cleaner production, but not in sustainable consumption. This paper outlines and discusses different ways in which LCA, alone or in combination with other scientific methods and tools, can be used to promote sustainable consumption.

LCA is a tool to assess the environmental impacts of product systems and services, accounting for the emissions and resource uses during the production, distribution, use and disposal of a product (ISO 1997). Methods have been developed to aggregate different stressors to impact indicators, taking into account environmental mechanisms and human values (Udo de Haes et al. 2002). This type of assessment can help producers reduce the environmental impact of a product during its life-cycle, e.g. taking into account the energy and detergent consumption during the use of a washing machine, or the environmental load associated with the disposal of mobile phones. LCAs can, in principle, also inform consumer decisions. Environmental product declarations, which list the environmental impact indicators of specific products or product lines, are one information tool based on LCA which is supposed to help the consumer make decisions (Bogeskär et al. 2002). As the practice in Nordic countries shows, the label often informs the purchasing departments of institutional customers; private consumers are often at loss as what to do with this information. Even if the feat of producing life-cycle information for all products on the market could be achieved, consumers would most likely feel overwhelmed and disempowered by this information. While environmental product declarations are useful for some purposes, other ways need to be found to inform policy makers and influence consumers if one wants to achieve sustainable consumption.

We define sustainable consumption patterns as patterns of consumption that satisfy basic needs, offer humans the freedom to develop their potential, and are replicable across the whole globe without compromising the Earth's carrying capacity. Sustainable consumption policy consists of measures to reduce impacts that affect the behavior of the consumer or require her actions (Hertwich and Katzmayr 2003). The state of sustainable consumption can hence be seen as the aim of sustainable consumption policies.

In this paper, we describe how life-cycle approaches can be used in a sustainable consumption program. We argue that, to be useful for sustainable consumption, life-cycle investigations need to go beyond traditional product LCA to answer the following types of questions.

1. What are the environmental and social impacts of households, including upstream and downstream impacts? How do they develop over time?
2. What are the social, technical, institutional factors that influence the level of these impacts? What are the differences between different social groups? Which lifestyles cause fewer impacts?
3. What are the important consumer activities, "functions," and items that produce the largest impacts? What are the trends in these activities?

4. Where do consumers have the largest leverage to change impacts, where producers, retailers, or policy makers at different levels?
5. How can we know that a policy measure or consumer initiative in fact reduces impacts? The "rebound effect" has been shown to eat up a significant portion of energy savings, and that may be true also for other measures. How can we thus measure the effectiveness of policy measures, taking the "rebound" into account?

Some of these questions have already been asked, and answered, in energy analysis, especially in the investigation of energy efficiency or conservation. Since the combustion of fossil fuels is maybe the most important source of emissions, both the methods and results of energy analysis have some bearing on the questions of sustainable consumption. We will cite key literature sources when discussing each question, without trying to present a comprehensive review.

We will systematically go through the different uses of life-cycle approaches in sustainable consumption. First we outline how LCA-type investigations can be used and for what, and then we analyze what has been achieved already and how the field needs to develop further to achieve the goals set by policy makers.

### *The Conceptual Basis*

#### **Life-cycle Assessment**

Life-cycle assessment consists of three distinct analytical steps: the determination of processes involved in the life-cycle of a product, the determination of environmental pressures (emissions, resource uses etc) produced in each of those processes, and the evaluation of environmental pressures and aggregation to impact indicators. The ISO 14040 standard for LCA define the first two steps as inventory analysis and the third step as impact assessment. ISO defines two additional, procedural steps, goal and scope definition (i.e., planning the LCA) and interpretation (i.e. discussion and conclusions). It is not always straight-forward to attribute e.g. an investment to the production of a specific piece of product. LCA can be seen as constructing a causal link between production processes, the associated environmental stresses, and the produced products. The causal link can be constructed in different manners: (1) One can divide all the existing emissions by the total number of products produced over a period. This is the more common, attributional mode, which attributes responsibility for the existing emissions evenly across the produced products. (2) One can ask what happens when one additional products gets produced. This marginal perspective is relevant, for example, when looking at electricity production, where the existing base load of coal or hydropower stations has significantly different emissions from the newly built gas fired or wind power plants. In this paper, we are most interested in attributional analysis.

In the attributional mode, LCA is a linear exercise. It can be represented by a set of linear equations which can be written in matrix form.

$$I_{LC} = \mathbf{C} \mathbf{S} (\mathbf{I} - \mathbf{A})^{-1} \mathbf{y}$$

(1)

Where  $I_{LC}$  is the life-cycle impact, expressed as a vector of impact indicators for different impact categories;  $\mathbf{y}$  is the vector representing the functional unit;  $\mathbf{I}-\mathbf{A}$  represents the matrix of

production, use and disposal processes that contributes to the product life-cycle;  $S$  represents the table of emissions factors per unit process; and  $C$  the table of characterization factors per impact category. All attributional LCAs can be represented in this general manner. The matrix representing the production processes can be a physical process matrix, representing e.g. how many kg of iron and coal are used for producing  $x$  kg steel, or an economic input-output table, representing the trade between industry sectors in monetary terms.

The notation we have chosen for this presentation is that of input-output analysis. One should note that despite the notational and mathematical similarity (Heijungs and Suh 2002), there are significant differences between input-output economics and engineering-based LCA analysis. Input-output analysis presents the trade between industry sectors, LCA presents the flow of specific, physical products between production, use and disposal processes. LCA is therefore very technology-specific and can resolve differences e.g. between different alloys of steel or different colors of paint. Input-output analysis, on the other hand, deals better with non-physical inputs like "overhead", it can calculate value-added and employment, and it has a more complete coverage of the economy. Input-output analysis is hence being integrated into LCA (van Engelenburg et al. 1994; Suh et al. 2004).  $I-A$  includes representations of use and disposal processes, not just relationships on the production side.  $y$  represents the functional unit, and it includes commonly only one non-zero item. The functional unit is delivered by a process in  $I-A$  and  $y$  calls that process. It is common to operate with larger functional units in LCA, such as 1 million hours of watching TV or the washing of 1000 kg of cotton clothes.

LCA practice today can build on the cumulative effort of data collection. Standard LCA software usually already includes databases for many basic materials and a number of important commodities. More extensive databases, such as EcoInvent, are available for purchase. Some industry associations have produced their own data. SimaPro, the most widely used software tool, now also contains limited data from input-output analysis, so that hybrid assessments can be constructed. The data bases represent conditions in industrialized countries. Data from developing and emerging countries, however, is still lacking. There is hence a lack of data especially on a number of agricultural products, and the available data may be biased.

Life-cycle impact assessment methods have been developed for a large number of stressors, including for minerals, different land use classes, and several hundreds of toxic chemicals. There are competing methods, which means that the modeler or decision maker needs to select one method. The Society for Environmental Toxicology and Chemistry (SETAC) and the United Nations Environment Programme (UNEP) have formed the Life-Cycle Initiative (UNEP 2004), with the aim to promote the creation, publication, and exchange of life-cycle inventory data and the improvement and standardization of LCA methods.

### **The Impacts of a Country's Consumption**

In order to determine the environmental pressures caused by a country, region, city or whatever geographical unit, the analysis needs to include all the goods purchased in this region, as well as their use and disposal. This means that the inventory  $S(I-A)^{-1}$  needs to be so comprehensive as to include all processes needed to produce, use and dispose of these goods. Instead of having a functional unit that calls on a single process, we need to call on all the goods purchased and their use and disposal. This means that  $y$  needs to represent all the goods used in a region. The consumption vector of a region can be seen to be made up of the per-capita consumption patterns of different socioeconomic or demographic groups  $H$  and the size of these populations  $p$ . The advantage of this decomposition of the consumption vector is that we can then ask how much impact is caused by which products. We arrive hence at an equation for the impact connected to a region's consumption,

$$\mathbf{I} = \mathbf{CS}(\mathbf{I} - \mathbf{A})^{-1} \mathbf{H}\mathbf{p} \quad (2)$$

This treatment is similar but not identical to the use of a social accounting matrix for representing household demand, suggested by Duchin (Duchin 1998; Duchin and Hubacek 2003). Decomposition analysis can be used to analyze historical changes in the overall impacts and attribute them to changes in population size, household composition, consumption patterns, economic structure, and emissions factors.

### **The Impacts of a Household**

For a household, it is interesting to know which products and services contribute how much to the total household environmental impact. If the household consumption vector  $\mathbf{h}$  is diagonalized and used instead of  $\mathbf{y}$  in equation 1, we can see the environmental impact per product used in a household. This allows the household to pinpoint the areas where the most significant gain can be achieved. Different goods and services, however, are purchased for different purposes. It may also be interesting to know how much different activities, such as nutrition, housing, leisure, education, getting to and from work, contribute to the overall impact of the household. In this case, a demand matrix containing products purchased for different activities would be used instead of  $\mathbf{y}$  in equation 1. Different experiences that are produced in the household from goods and services purchased, such as a ski trip or a dinner party, can be assessed in a similar manner.

An important aspect in evaluating the environmental impact of households or individual consumers is that they have a resource constraint. Nobody has more than 24 hours per day, and most households also have a limited budget. It is therefore also interesting to look at the emissions intensity (emissions per hour, emissions per dollar) of different activities. The emissions intensity of expenditures of all products used can be calculated as

$$\mathbf{M}_M = \boldsymbol{\pi}^{\$} \mathbf{CS}(\mathbf{I} - \mathbf{A})^{-1} \quad (3)$$

where  $\boldsymbol{\pi}$  is the price vector (i.e. the identity vector if a monetary input-output matrix is used for  $\mathbf{I}-\mathbf{A}$ ). The emissions intensity of time use is

$$\mathbf{M}_T = \boldsymbol{\tau}^{\$} \mathbf{CS}(\mathbf{I} - \mathbf{A})^{-1} \mathbf{F} \quad (4)$$

where  $\mathbf{F}$  is the table goods or services required for each activity and  $\boldsymbol{\tau}$  represents the time use for each of these activities. The problem with using time intensities is the question of what to do with fixed costs. Should the emissions associated with housing be allocated to the activities conducted in the house, e.g. sleeping, eating etc? Or should it just be seen as a fixed cost and not be counted?

In any case, it is obvious that when a household shifts expenditures from items that are more emissions intensive to those that are less intensive, the overall household environmental impact will decrease. The same can be seen from the perspective of time use.

### **Evaluation of Sustainable Consumption Measures**

It is clear that a sustainable consumption policy, beyond general approaches such as internalizing external costs and extended producer responsibility, needs to consider specific

sustainable consumption measures (Hertwich 2003). Similarly, citizens who are concerned about the environment may want to take specific actions to reduce their environmental footprint. The question is whether these measures are successful in achieving their aim. This is something that should be evaluated before the measure is taken, and controlled after it has been implemented. Car sharing is a much cited example of sustainable consumption: individuals who participate in a car sharing organizations drive less, walk and bike more, and use more public transport than those who own a car. The day-to-day mobility of car sharers therefore causes less impact, but it usually also costs less. Here we have a classic rebound effect: the environmental thing to do is cheaper, and the money saved will likely be spent on something else.

When evaluating the environmental effect of car sharing, we need to compare both the emissions associated with mobility and the emissions associated with spending the money saved with car sharing. This can be done as a predictive exercise by looking at what the marginal expenditure is and assessing its impact. It can be done retrospectively by comparing the total household environmental impact of a car-sharer with a regular motorist in a case-control or intervention study. For the predictive exercise, econometric research is required to determine the marginal expenditure, while for the ex-post evaluation, a panel study with an adequate statistical design is needed. The achieved reduction in environmental impacts can be quantified with the following equation.

$$\Delta \mathbf{I} = \mathbf{CS}(\mathbf{I} - \mathbf{A})^{-1} (\mathbf{h}_1^m - \mathbf{h}_2^m + \Delta \mathbf{h}^{mm}) \quad (5)$$

The reduction in environmental impacts is the result of the difference in the mobility-associated activity pattern between the car-owning household  $\mathbf{h}_1^m$  and the car-sharing household  $\mathbf{h}_2^m$ , plus the difference between the non-mobility associated activities of the two households,  $\mathbf{h}^{mm}$ . The latter term is written as a single item because, in predictive studies, it may be derived from the incremental spending patterns as households get richer, i.e. through an analysis of consumer expenditure surveys.

### **Evaluation of Sustainable Production Measures**

Sustainable production commonly looks at reducing the life-cycle impacts of a specific product. Sustainable production measures affect the production structure  $\mathbf{A}$  or the emissions factors  $\mathbf{S}$ . Today, LCA is used to compare a potentially improved product with the currently available alternative. The improvement can be in the design of the product or in the production methods. The comparison is based on the concept of a functional unit: it is important that the function is the same. Improvements may, however, also affect the costs and - as a result - the demand for this and other products. While the evaluation of the direct effects just requires a before-after evaluation of the product(s) under question, the evaluation of the rebound effects needs to also look at shifts in expenditure. Both predictive and ex-post evaluations can be relevant and can be designed in about the same manner described in the previous section.

### ***Practical challenges***

### **Modeling the Impacts of a Country's Consumption**

It is clearly a tremendous challenge to model all the stressors that are connected to all the products consumed in a country. The EcoInvent database has LCA data on 2500 products (ecoinvent 2003). This covers a significant fraction of the typical household consumption in terms of household impacts, especially energy and food (Frischknecht et al. 2002). Many manufacturing goods, however, are not included. To surmount this challenge, several simplifications have been taken: products have been aggregated to larger classes of products and calculated by input-output analysis, only a single proxy indicator (energy consumption, land use) or pollutant (CO<sub>2</sub>) is modeled, and domestically produced products are used to represent imported products as well. Lenzen (1998) presents an analysis of the energy and greenhouse gases embodied in Australia's final consumption. He follows the national accounting convention of presenting private and public final consumption, as well as a trade balance. This investigation showed that 59% of the CO<sub>2</sub> emissions were associated with private final consumption, 10% with public final consumption, and 31% with export. 81% of the CO<sub>2</sub> emissions occurred in Australia, while 19% were embodied in the imports.

Most analyses that address a country's consumption also look at the distribution of the private consumption across the population, i.e. at the emissions of different household types. They are therefore included in the following section.

### **The Impacts of a Household**

There has been a fair amount of descriptive work on household environmental impacts. Herendeen and Bullard (Bullard III and Herendeen 1975; Herendeen and Tanaka 1976; Herendeen 1978) presented the calculations of household direct and indirect energy consumption. They used national input-output models with data on the energy consumption of different industry sectors and the direct consumption by households. The household expenditure for different items came from consumer expenditure surveys. Their investigation already included an analysis of the variation of energy consumption with household income. Direct energy consumption flattens out with rising income, while indirect energy consumption continues to rise. As a result, a large share of the total "energy cost of living" for poor households is related to the combustions of fuels in the household, while for rich people two thirds of these energy costs are related to the purchase of goods. In the input-output models used, products are commonly represented by output of domestic industry sectors. There are commonly 50-400 sectors in an input-output table. This resolution is sufficient for aggregate analysis, but it does not capture differences in product qualities. Vringer and Block (1995; 2000) and Wilting (Wilting 1996; Wilting and Biesiot 1998) therefore developed a more detailed hybrid model in which process analysis, in physical units, is combined with input-output analysis, in monetary units, to better represent the direct and indirect household energy consumption. They conducted a detailed analysis of household energy consumption based on the Dutch consumer expenditure survey. They found that the level of consumer expenditure accounted for much of the variance in per capita energy consumption, as indicated in Figure 1. Other significant explanatory variables were the number of household members, car ownership, and urban or rural households. In general, singles consume more energy than larger families, urban households consume less than rural or suburban households, and the ownership of a first and second car lead to increases in energy consumption, all assuming the same expenditure level. While these items were not found to be sufficient to explain all the variance, no other items were identified to be significant explanatory variables. Vringer and Block (Vringer and Blok 1995) also notice a number of limitations of the analysis. One of the more interesting one – from the perspective of using this data as a basis for scenario analysis – is that the method assume the same energy intensity per unit expenditure and does therefore

not systematically address what might be called luxury consumption: the purchase of hand-made chairs or designer watches, for example, which potentially have a lower intensity *per unit expenditure* than mass-produced chairs or watches. A more extensive review of studies of household energy and CO<sub>2</sub> consumption on the national level is provided by Munksgaard et al. (Munksgaard et al. forthcoming).

There are very few studies considering impacts other than energy consumption and CO<sub>2</sub> emissions. Weber and Perrels (2000) include NO<sub>x</sub>, which is also a combustion-related pollutant, in their calculations. Most studies also use domestic emissions intensities for imported products. A notable exception to both limitations is the work by Nijdam et al. (Goedkoop et al. 2002; forthcoming), which for the Netherlands includes imports from OECD Europe, other OECD countries, and the rest of the world, modeled in a 30 by 30 input-output model for each of the three exporting regions. The model also includes data on many types of pollutants and resource uses. While there are limitations in the low resolution and the uncertainty in the data especially for developing countries, this study points in the direction this field needs to develop to provide a richer and more reliable picture of the environmental pressures caused by household consumption. Hertwich et al. (2002) have evaluated the effect of the imports to Norway on the emissions of acidifying substances and greenhouse gases, taking the emissions intensities of Japan, the US, and China as representative for different trading partners.

We need to use the ability to model the impact of households on a national or regional level as a tool to track developments, to project trends and develop policy scenarios, and as an element in the empirical analysis of household environmental impacts. Empirical analysis should combine consumer expenditure surveys and household impact models to identify how differences in household characteristics, such as household size, housing type, income, education etc correlate with environmental impacts. One option is to use lifestyle classes as developed in marketing research as a way of classifying consumers and studying their environmental impacts (Duchin 1998; Duchin and Hubacek 2003).

A better analysis of the impacts of consumption is clearly needed. This analysis needs to cover more pollutants and realistically reflect production conditions in a global economy. Research is needed to determine the degree of resolution (i.e. product specificity) that is required for different purposes. While it is in general clear that a combination of traditional process LCA and input-output analysis can provide results that are both specific and cover the complete product range, it remains an open methodological question of how to best integrate the two tools. Depending on the purpose of the analysis, different processes will require a detailed modeling through process analysis. These basic modeling questions need to be solved to improve the quality of the models. There are further significant challenges to develop data from many impact categories, to model global value chains, and understand the uncertainty in the models. There is a need for more empirical research and a systematic evaluation of regional and inter-country variability, for example for food. The improvement of the modeling tools and the underlying data should occur in parallel with the development of new research approaches and applications.

### **Evaluation of Sustainable Consumption Measures**

So far research has focused on empirical investigations of the environmental impacts of existing, average consumption patterns. To formulate an effective sustainable consumption policy and to stimulate effective action, more strategic analysis is needed. This analysis should

identify promising courses of action, evaluate specific activities and measures to see which ones should be implemented, and provide feedback about measures that have been taken.

It is clear that the analysis of household environmental impacts described in the previous section identifies the activities and purchases which cause the largest overall environmental impacts. They also allow for an identification of the activities with the highest impact intensities. This analysis can hence be used to identify promising measures for sustainable consumption policy and develop suggestions for consumer action. In the "consumer's guide to effective environmental choices", Brower and Leon (1999) present recommendations to consumers based on an analysis of what environmental impacts are associated with which products and household activities. They used impact intensities of the type calculated by eq. (3). Similar recommendations are derived from ecological footprint calculations (Wackernagel and Rees 1996) and footprint calculators. On-line or downloadable calculators for environmental impacts, such as CO<sub>2</sub> emissions, have also been tried as a tool to raise awareness and inform consumer choices. They have, however, not yet had a larger impact (Hertwich and Katzmayr 2003).

Equations (2) and (5) can be used for scenario analysis, which should systematically explore different courses of action. Specific sustainable consumption measures can be evaluated using equation (5). So if a measure has been identified, maybe based on the analysis of environmental impacts of a household, we can either predict the expected changes in household environmental impacts, or we can measure the changes through a before-after comparison. Backcasting exercises can be used to find out how much lifestyle changes and expected technological changes can contribute to reducing environmental impacts to a specific level.

A comprehensive evaluation of sustainable consumption measures, as suggested in this paper, has to our knowledge not yet been conducted. Hubacek et al. (2003) describe an ongoing project in which the effect, and rebound, of a car-free housing project in Vienna is being evaluated. Fritsche et al. (2002) evaluated two city-quarter developments in Germany that were guided and followed up by an LCA-type evaluation. This project is very interesting, but it did not include a complete assessment of the households' environmental impact.

### **Evaluation of the rebound effect for sustainable production measures**

It is common to use LCA in sustainable production, so its basic use does not need to be elaborated here. What is of interest to sustainable consumption is that technical progress and specific sustainable production measures may reduce the environmental impacts of specific products and activities, and this will occur at the same time as sustainable consumption measures. More importantly, however, there may be a behavioral response to sustainable production measures, something discussed in the literature under the inaccurate term "rebound effect."

The concept of the rebound effect has been suggested in response to energy efficiency measures. In the policy debate, the general notion of the rebound effect is that a technical or policy measure produces secondary effects which at least in part off-set the initial, positive effect of the primary measure, so that the measure is less effective in achieving the primary policy goal. The rebound effect is often understood as the behavioral response to a technical improvement. The behavioral response, for economists, covers changes in purchasing behavior as a result of changes in market prices. The discussion addresses both cost reductions as a result of improvements in technical energy efficiency (Khazzoom 1980) and economy-wide effects (Brookes 1978). Greening et al. (2000) distinguish between following effects:

pure price effect, income effect, secondary effects on the cost of producing other products, effects on the fuel supply (and the market power of OPEC) and transformational effects.

Numerous empirical studies have focused on the price and income effects. Greening et al. (Greening et al. 2000) present a survey of studies in the United States which indicates that the rebound effect is somewhere between 0 (for white goods) and 50% (for space cooling), but typically less than 30% (space heating, lighting, automotive transport). Schipper and Grubb (2000) review studies covering 80-90% of energy use in OECD countries and find that the rebound is on the order of 5-15%. They also review the issue of economy-wide effects and find no evidence for *substantial* macro effects.

Interestingly, the discussion of the rebound effect in energy economics focuses on reductions in the price of energy services as a result of energy efficiency measures, and the effect this has on demand. As Binswanger (2001) has pointed out, the cost of an energy service also includes capital costs and time spent on part of the consumer. Discussions of a *time rebound* have recently appeared in the sustainable consumption literature (Jalas 2002; Hofstetter and Madjar 2003). This effect results when the time-saving due to technical progress leads to increased consumption. For example, transportation research has shown that faster transport implies that people expand their radius of action but keep total travel time constant.

LCA traditionally focuses on the functional unit and neglects cost and thereby also the rebound effect. Goedkoop et al. (Goedkoop et al. 1999), however, developed the E2-vector, which consists of the environmental impacts and value added, as a way to display the impact intensity or eco-efficiency of a specific function. This concept allows for a graphical representation at least of the rebound effect, which is presented as a vector with the slope of average or marginal expenditure. In other words, a specific impact intensity of spending the money saved is used to calculate the overall impact of a product service systems. They used the E2 vector to quantify the effect of three "product-service systems", car sharing, vegetables by subscription, and laundry-services.

### ***Conclusions***

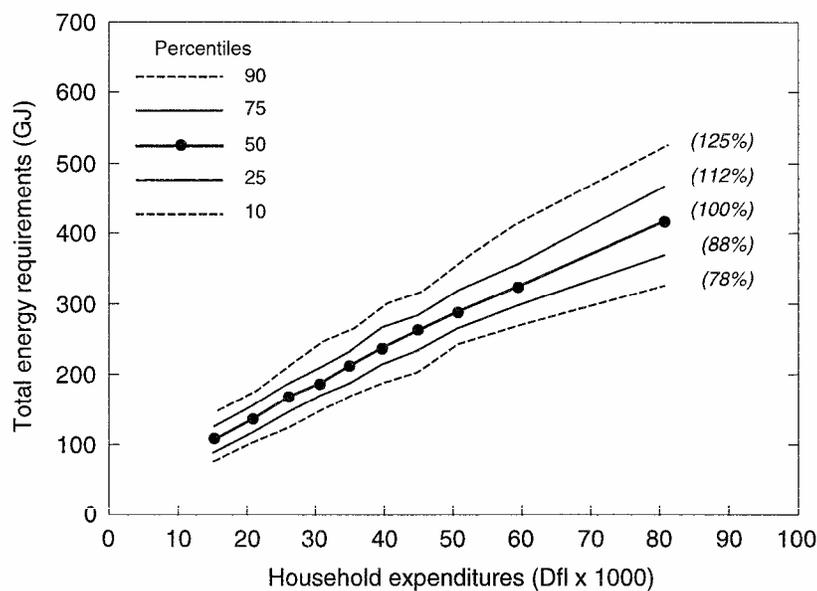
The Johannesburg Plan for Implementation calls for the use of life-cycle analysis to promote and achieve sustainable consumption and production. LCA has proven useful in the context of sustainable production. It has been little used in sustainable consumption. Questions that one needs to answer when addressing sustainable consumption – who causes how much of which impact and how can consumption patterns be changed to reduce these impacts – require an analysis that extends beyond traditional LCA. Previous research on direct and indirect household energy consumption indicates how life-cycle methods can be extended to answer questions relevant for sustainable consumption. This includes the combination with input-output analysis, the use of consumer expenditure data, and the analysis of trade. A systematic extension in this direction, however, can go further than energy analysis has gone: changes or differences in consumer expenditure can be observed in panel studies of sustainable consumption measures; price and income elasticities can be measured and used in scenario analysis. We have also described how life-cycle methods can be used to conduct prospective and ex-post evaluation of sustainable consumption and production measures, something that is obviously of relevance to the 10-year set of activities in sustainable consumption and production called for by Johannesburg. The methods described in this paper have been used for some of the research questions outlined. Other research designs have not yet been tested. The indications are, however, that LCA needs to be combined with economic and sociological investigations to be useful as a tool for sustainable consumption. While a further method

development and data collection is advisable, efforts should focus on developing and testing new research designs that are directly relevant to policy making.

#### ACKNOWLEDGMENT

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FIGURE



Total household energy requirements vs. household expenditures (in Dutch guilders) based on the Dutch consumer expenditure survey from 1990 (Vringer and Blok 1995).

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# **Economy-wide Model of Rebound Effect for Environmental Efficiency**

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## **1. Introduction**

Rebound effects for environmental efficiency mean that improvements for the efficiency cause unintentional reactions and reduce the effects of those improvements. Many papers on rebound effects have been published in the research field of energy economics since 80's. Kazzoom(1980) stimulated researchers and generated many papers (e.g. Lovins 1988, Greene 1992, 1999, Shipper 2000, Binswanger 2001, Jalas 2002, Hofstetter 2003). Empirical studies were also accumulated. The summary by Greening(2000) pointed out an interesting features that empirical works had been concentrated on the subjects for partial equilibrium, which means that they targeted one or a few goods or services. Greening(2000)'s summary picked up over 74 papers. However, only one paper (Kydes 1992) used economy-wide model for analysis of the rebound effects. Besides that, Although Saunders(1992) discussed about the rebound effects within the framework of the macroscopic neoclassical growth theory, there existed no prices and could not capture the economy-wide interrelations.

This paper presents the estimation of the rebound effects of Japanese economy with the applied general equilibrium model for the appraisal of environmental policies (hereinafter, we call it EPAM). EPAM disaggregate the economy into 33 industrial sectors inclusive of energy sectors (Coal products, Oil products, Electricity and Gas supply). EPAM can simulate the impact of the improvements of energy efficiencies on the total CO2 emission of Japanese economy. We will show the rebound effects depend upon the elasticity of substitution in industrial technology and in consumer's utility functions and the size of rebound effects are estimated 35% to 70%.

The structure of this paper is as follows. The second section describes the framework of EPAM. The third section includes the theoretical contents. The fourth section describes the simulations and the results. The sixth section is the conclusion.

## **2. Structure of EPAM**

The features of EPAM are summarized as follows.

- (1) EPAM is an applied general equilibrium model targeted Japanese economy.
- (2) The dataset was created based upon the 1995 Input-Output Tables and will be updated to that of the year 2000 version after the publication (may be Spring, 2004).
- (3) EPAM can simulate the influences of the improvement energy efficiency and the

imposition of tax on CO2 emission.

(4) Industries are disaggregated into 33 sectors that include the sectors of energy production, (Coal products, Oil products, Electricity and Gas supply).

(5) Trade balance is adjusted by exchange rate, which is included in the equilibrium prices.

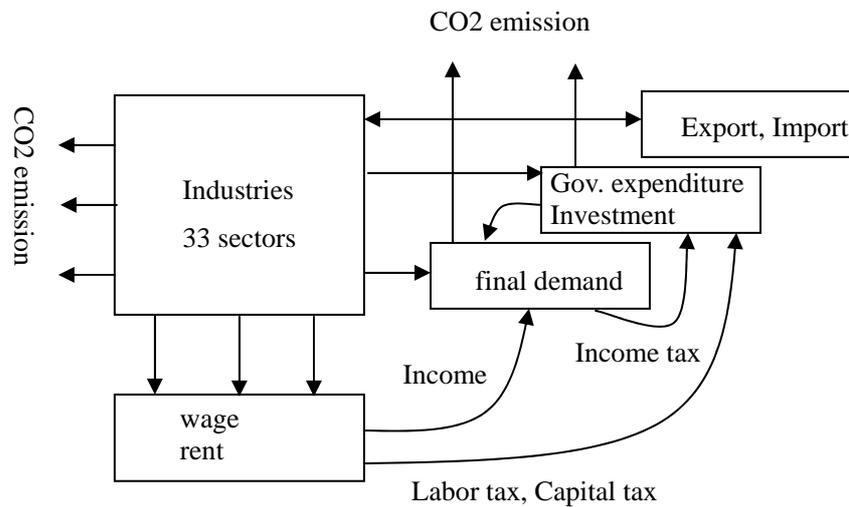
(6) Every substitutable production function and utility function is quasi-separable and a type of CES functions.

(7) Equilibrium prices are calculated by Merrill's fixed-point algorithm.

(8) Depend upon Hicks's equivalent variation calculated for each simulation, we can evaluate the welfare change due to the policy.

(9) CO2 emission factors for products are calculated. Using them, gross CO2 emissions are imputed to each category of final demands.

The Following figure shows the basic structure of EPAM.



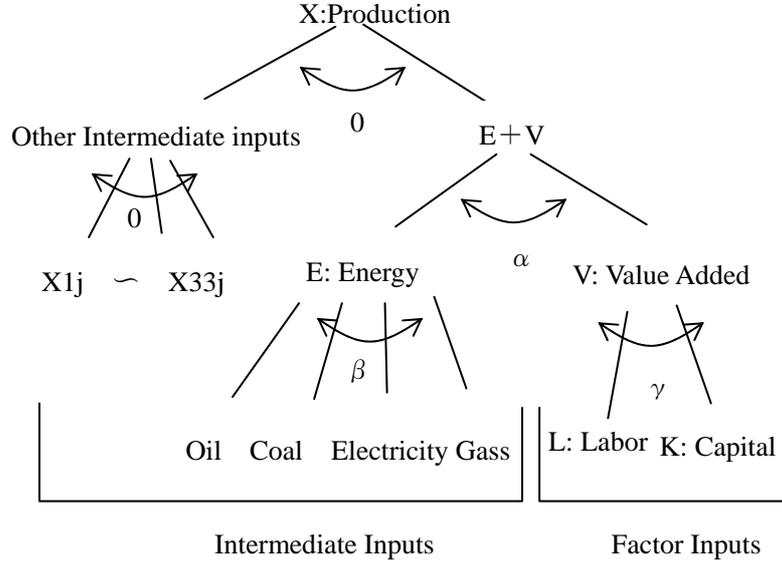
EPAM includes following sectors.

1.Agriculture and Fishery	12.Electric Machinery	23.Public Service
2.Mining	13.Transport Machinery	24.Education and Research
3.Food Products	14.Precision Instrument	25.Medicine, Health Care and Social Insurance
4.Apparel	15.Other Industrial Products	26.Other Public Services
5.Pulp, Paper, Wood Products	16.Construction	27.Services for Industries
6.Chemical Products	17.Water Supply and Wastes Material Processing	28.Services for Individual
7.Ceramics, Soil and Stone Products	18.Comerce	29.Unclassified
8.Steel	19.Finance and Insurance	30.Oil Products
9.Nonsteal Metal	20.Real Estate	31.Coal Products
	21.Transport	32.Electricity

### 3. Theoretical Framework

For understanding of EPAM, mathematical explanations are inevitable.

#### (1) Production functions and Coefficients



Structure of production functions is shown in the figure. Greek letters and number in arrows are the values of elasticity substitution. The elasticity of substitution between intermediate inputs and the compound factor of total value added and total energy input is zero. This relationship can be expressed as follows.

$$X_j = \min \left\{ \frac{V_j^e}{a_{0j}}, \frac{X_{1j}}{a_{1j}}, \dots, \frac{X_{29,j}}{a_{29,j}} \right\} \quad (j=1,2,L,33),$$

where  $a_{0j}, a_{1j}, \dots, a_{29,j}$  are constant.  $X_j$ 's are real output for  $j$ th industry. If we assume the quasi separability, the compound factor  $V_j^e$ 's are produced by the real net value added  $V_j^f$  and the compound energy input  $E_j^H$ . The relationship can be expressed by the following CES type of production function.

$$V_j^e = \Phi_j \left\{ \alpha_j (V_j^f)^{\frac{\sigma_j-1}{\sigma_j}} + (1-\alpha_j) (\varepsilon_j E_j^H)^{\frac{\sigma_j-1}{\sigma_j}} \right\}^{\frac{\sigma_j}{\sigma_j-1}} \quad (j=1,2,L,33),$$

where  $\Phi_j$  is a scale parameter  $\alpha_j$  is share a parameter,  $\sigma_j$  is an elasticity of substitution and  $\varepsilon_j$  efficiency parameter.  $V_j^f$ 's are produced by Labor and Capital as follows.

$$V_j^f = \theta_j \left\{ \beta_j K_j^{\frac{\rho_j-1}{\rho_j}} + (1-\beta_j) L_j^{\frac{\rho_j-1}{\rho_j}} \right\}^{\frac{\rho_j}{\rho_j-1}} \quad (j=1,2,L,33),$$

where  $\theta_j$  is a scale parameter,  $\beta_j$  is a share parameter and  $\rho_j$  is an elasticity of substitution. The production function for  $E_j^H$  is as follows.

$$E_j^H = \pi_j \left\{ \sum_{i=1}^4 \gamma_{ij} E_{ij}^{\frac{\mu_j}{\mu_j-1}} \right\}^{\frac{\mu_j-1}{\mu_j}} \quad (j=1,2,L, 33)$$

$\pi_j$  is a scale parameter,  $\gamma_{ij}$  is a share parameter which makes  $\sum_{i=1}^4 \gamma_{ij} = 1$ ,  $\mu_j$  is an elasticity of substitution.  $E_{1j}, E_{2j}, E_{3j}, E_{4j}$  denote oil products, coal products, electricity and gasses respectively.

Since all those functions are homogeneous of degree one, the optimal behavior of the firm is to minimize the total production cost subject to those production functions. Then we have the production coefficients as the function of relative prices.

$$\frac{E_{ij}}{E_j^H} = e_{ij}(P_1^e, P_2^e, P_3^e, P_4^e) \quad (i=1,L, 4; j=1,2,L, 33)$$

$$\frac{L_j}{V_j^f} = v_{jj}^l(r, w) \quad (j=1,2,L, 33)$$

$$\frac{K_j}{V_j^f} = v_{jj}^k(r, w) \quad (j=1,2,L, 33)$$

$$\frac{V_j^f}{V_j^e} = v_{ej}^f(P_j^{eH}, P_{vj}^f) \quad (j=1,2,L, 33)$$

$$\frac{E_j^H}{V_j^e} = v_{ej}^e(P_j^{eH}, P_{vj}^f) \quad (j=1,2,L, 33)$$

where  $P_1^e, P_2^e, P_3^e, P_4^e$  are energy prices,  $r, w$  are capital rent and wage rate respectively, and the compound price  $P_j^{eH}, P_{vj}^f$  are defined as follows.

$$P_j^{eH} = (P_1^e + \tau^e h_j^m) e_{1j} + P_2^e e_{2j} + P_3^e e_{3j} + P_4^e e_{4j} \quad (j=1,2,L, 33)$$

$$P_{vj}^f = (1 + \tau_j^o) \{ (1 + \tau_j^l) w v_{jj}^l + (1 + \tau^k) r v_{jj}^k \} \quad (j=1,2,L, 33)$$

where  $h_j^m$  is the coefficient of CO2 emission caused by the usage of import energy materials in jth industry.  $\tau^e, \tau^k, \tau_j^o, \tau_j^l$  are the tax rate for CO2 emission, capital, products and labor respectively.

## (2) Behavior of Household

We assume that there exists one representative consumer who takes charge of the final consumption demand. The income  $I$  of the consumer is expressed as follows.

$$I = \{ (w\bar{L} + r\bar{K})(1 - \tau^y - \tau^l) \} (1 - s) + B - \tau^e H_C^R$$

where  $\bar{L}$  and  $\bar{K}$  denote the amount of labor and capital supplied by the household.  $\tau^y$  and  $\tau^l$  are the income tax and the payment for social insurance respectively.  $s$  is the rate of saving, and is assumed to be constant.  $B$  is the transfer from Government.

Let assume the quasi separability of utility function and specify the following layered utility functions.

$$U = \left\{ \varphi_m C^{\frac{\zeta_m-1}{\zeta_m}} + (1 - \varphi_m)(\varepsilon_c E_c)^{\frac{\zeta_m-1}{\zeta_m}} \right\}^{\frac{\zeta_m}{\zeta_m-1}}$$

$$E_c = \left( \sum_{i=1}^4 \varphi_{ei} E_{ic}^{\frac{\zeta_e-1}{\zeta_e}} \right)^{\frac{\zeta_e}{\zeta_e-1}}$$

$$C = \left( \sum_{i=1}^{29} \varphi_{ci} C_i^{\frac{\zeta_c-1}{\zeta_c}} \right)^{\frac{\zeta_c}{\zeta_c-1}}$$

where  $E_c$  and  $C$  are compound energy goods and compound ordinary consumer goods. The household maximizes the utility subject to the budget constraint. Then the demand functions for those goods are given by relative prices.

For compound goods  $E_c$  and  $C$ , under the budget constraint  $I = P_c^e E_c + P_c C$  demand functions are given as follows (Prices for compound goods are given later).

$$E_c = E_c(P_c, P_c^e)$$

$$C = C(P_c, P_c^e)$$

For each commodity, the budget constraint is,

$$P_c C = \sum_{i=1}^{29} P_i C_i$$

$$P_c^e E_c = (P_1^e + \tau^e h_c^m) E_{1c} + \sum_{i=2}^4 P_i^e E_{ic},$$

where  $h_c^m$  is the coefficient for the CO2 emission by using imported goods. Then we have the demand functions.

$$C_j = C_j(P_1, P_2, L, P_{29}, P_c C) \quad (j = 1, 2, L, 29)$$

$$E_{jc} = E_{jc}(P_1^e, P_2^e, P_3^e, P_4^e, P_c^e E_c) \quad (j = 1, 2, 3, 4)$$

$P_c^e$  and  $P_c$  are given by the following equations.

$$P_c^e = \left( \varphi_{c1}^{\zeta_c} (P_1^e + \tau^e h_c^m)^{1-\zeta_c} + \sum_{i=2}^4 \varphi_{ei}^{\zeta_c} (P_i^e)^{1-\zeta_c} \right)^{\frac{1}{1-\zeta_c}}$$

$$P_c = \left( \sum_{i=1}^{29} \varphi_{ci}^{\zeta_c} P_i^{1-\zeta_c} \right)^{\frac{1}{1-\zeta_c}}$$

Since it may difficult to understand how the actual consumption demand is given, some explanations have to be useful. First, given the prices of ordinary goods and energy goods, then the above two equation give the priced for compound goods. Second, given the income for this household, the consumption demand for compound goods is determined. Finally, the demand for each commodity is given.

### (3) Government Expenditure and Investment Demand

It is not appropriate to describe those expenditures in detail. Therefore, it is one of rational choices to treat them at a fixed proportion. However, if we assume it, we would have only one subject to react to priced. The multi-dimensional response should play an important role from the viewpoint of total performance of the mode. Thus we have introduced the quasi consumer who act and decide this part of expenditure subject to the sum of Government expenditure and Investment expenditure. The revenue comes from savings and taxation. Let denote the total revenue  $G$ . A part of it is transferred as social insurance for the household. This part is denoted as  $B$ . The ratio for  $G$  is fixed as  $b$ , i.e.  $bG = B$ . The rest of it is used for the expenditure. Since the specifications are mostly equivalent to that of genuine consumer, we do not give them hear.

### (4) Export and Import

Goods for export and import are assumed to have same quality and to be substitutable perfectly. Export and import functions specified in Boadway and Treddennicck (1978) is adopted as follows.

$$F_j = \psi_j^f \left( \frac{P_j}{\chi} \right)^{\xi^f} \quad (j=1,2,L, 33)$$

$$M_j = \psi_j^m \left( \frac{P_j}{\chi} \right)^{\xi^m} \quad (j=1,2,L, 33)$$

where  $F_j$  and  $M_j$  are real export and real import of  $j$ th goods,  $\psi_j^f$  and  $\psi_j^m$  are scale parameters,  $\xi^f$  and  $\xi^m$  are elasticity for export and import., and  $\chi$  is a exchange rate. For simplicity, we denote prices as  $P_{i+29} = P_i^e$  ( $i=1,2,3,4$ ). We do not introduce any import tax.

## 4. Simulation and Results

Let us show four simulations where energy efficiencies for production and consumption are improved 1%. In the following table,  $\varepsilon$ ,  $\varepsilon_c$  and  $\varepsilon_g$  show the efficiency factors for

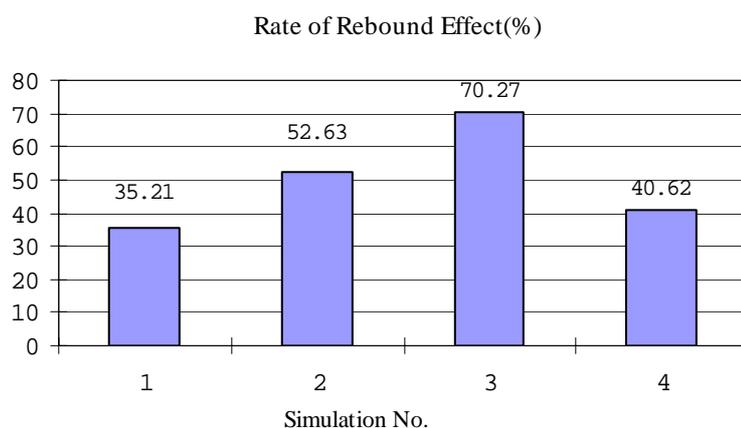
No.	$\varepsilon$	$\varepsilon_c$	$\varepsilon_g$	$\sigma$	$\rho$	$\mu$	$\zeta_m$	$\zeta_c$	$\zeta_e$	CO2Reduction (%)	Rebound Effect (%)
1	1.01	1.01	1.01	0.3	0.3	0.3	0.7	0.5	0.7	0.6479	35.21
2	1.01	1.01	1.01	0.5	0.5	0.5	0.7	0.5	0.7	0.4737	52.63
3	1.01	1.01	1.01	0.7	0.7	0.5	0.7	0.5	0.7	0.2973	70.27
4	1.01	1.01	1.01	0.5	0.5	0.5	0.3	0.3	0.3	0.5938	40.62

production, consumption, and Government Expenditure and Investment respectively. The

number 1.01 means that 1% improvement.  $\sigma$ ,  $\rho$ , and  $\mu$  are the elasticity parameters for production that have been shown in the production functions.  $\zeta_m$ ,  $\zeta_c$ , and  $\zeta_e$  are the elasticity parameters for consumption. The parameters in the area Embraced by double line are changed. CO2 reductions caused by the improvement of efficiency vary over the change of elasticity. The rate of rebound is defined as follows.

$$\text{Rate of rebound} = \text{Improvement rate of efficiency} - \text{Reduction rate of CO2}$$

The result is shown in the last column of the table and is graphically shown in the following figure.



The result tells us two important facts. First, the rebound effect measured by the economy-wide model has significant sizes. It shows that the size is 35% to 70%. If we compare this result with the summary of Greening (200), this feature is confirmed clearer.

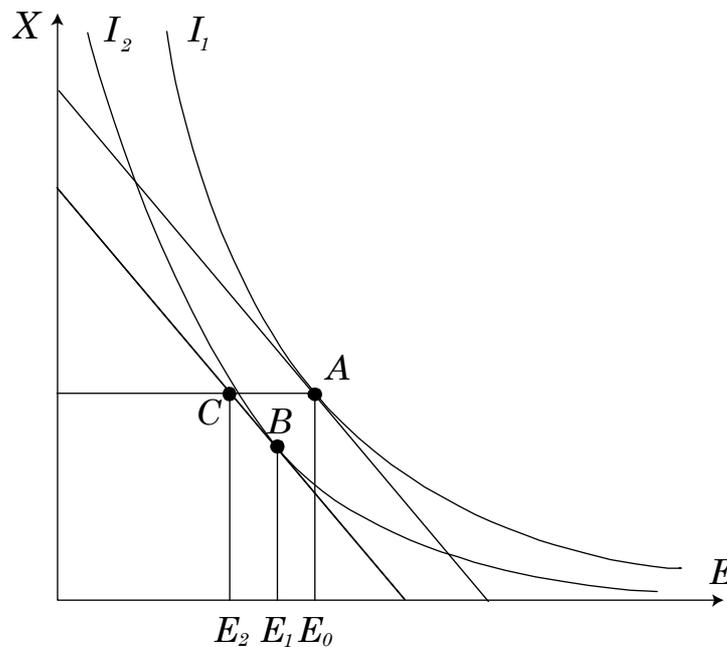
Economic actor	End use	Potential size of rebound	Number of Studies
Consumer	Space heating	10-30%	26
	Space cooling	0-50%	9
	Water heating	<10-40%	5
	Residential lighting	5-12%	4
	Automotive transport	10-30%	22
Firm	Process use	0-20%	1
	Lighting	0-2%	4
	Long run aggregate impact	<100-0%	
Economy Wide	Change in total output growth	0.48%(?)	1

The average is thought to be around 30%.

Second, the result also shows that it depends heavily upon the elasticity of substitution. The size of rebound effect increases with the increase of elasticity in production. Furthermore this tendency can be confirmed in the consumption as shown in the result of simulation 4.

As Shoven and Whalley (1992) pointed out, estimated values of elasticity are unstable and quite sensitive on data or methods. Although we have to consider this insight, it is worthwhile to examine some examples. The average of the elasticity estimated by Piggott and Whalley (1995) for ENgland, which is summarized in Shoven and Whalley (1992), is 0.821. If we employ this estimation, the size of rebound effect has to be over 70%. On the other hand, the estimation by Tokutsu (1992) for Japanese is 0.35 to 0.43. Then the size of the rebound effect may be about 35% to 40%.

The reason why the rebound effect depends upon the elasticity is described as follows. Let us see the following figure.



The horizontal axis shows the input of energy, and the vertical axis shows the input of the other goods or factors. The improvement of energy efficiency shifts the isoquant to the left. In the case of fixed coefficient production technology, i.e. Leontief types of technology, the elasticity of substitution is zero, and the improvement fully caused the reduction of energy input. This means in that figure, the point of the cost minimization shifts to the left paralleled with the horizontal axis. However, if the rate of elasticity is large, as the improvement of efficiency and the shift of isoquant, the point of cost minimization is to be B in the figure. The reduction of energy input is substituted by the reduction of the other goods or factors.

## 5. Concluding Remarks

We constructed a compact model of applied general equilibrium analysis for Japanese economy. The simulation results show the size of rebound effect is significant. This means that if we neglect the rebound effect, environmental policies are distorted.

For example, Japanese government pledged the 6% reduction of global warming gasses (e.g. CO<sub>2</sub>) compared with the emission level of 1990 in the Kyoto convention for global warming. However, the emission increased in 8% compared with the level of 1990. Therefore, the introduction of the emission tax for CO<sub>2</sub> is a controversial issue in Japan. People who opposed introduction of the tax insist that the most important way to reduction of CO<sub>2</sub> emission is not those types of regulations, but the voluntary actions. However, they do not pay attention to the rebound effect caused by those actions. On the other hand, people who insist the introduction the tax depend upon a special model that heavily depends upon the improvement of technology and say that the low level of taxation is sufficient for reduction of CO<sub>2</sub> emission.

Hereafter, inducing voluntary actions and economic methods for environmental policies compared with traditional regulations become increasingly important. Then, the consideration for rebound effect also become increasingly important. However, researches and attentions for economy-wide rebound effect is quite insufficient. We are required to develop a variety of models to estimate the size of this type of rebound effects.

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# Investigating household consumption: combining quantitative and qualitative methods<sup>1</sup>

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## *1 Understanding factors for sustainable consumption*

The World Summit for Sustainable Development (WSSD) in Johannesburg recognised the necessity of "changing unsustainable patterns of consumption and production". In the "Plan of Implementation", the main document to emerge from the WSSD, world leaders call for "fundamental changes in the way societies produce and consume" (§13). The challenge is to understand the extent of environmental pressures, as well as social and economic effects, of household consumption on the national level. This knowledge offers many insights for the discussion on sustainable consumption:

- What are the average consumer's expenditure items with the biggest threat to sustainability?
- How wide do consumption patterns differ concerning their environmental impacts on the national level?
- What are the reasons for the various consumption patterns (high, average and low environmental impact)?
- What are the employment and economic effects of the various consumption patterns?
- What are the most promising changes in consumption taking environmental impacts, employment and economic effects into account?
- What has to be done to promote these changes when assessing the attitudes, routines, social factors, and institutional framework conditions shaping the consumption patterns?

This contribution will outline the method used to answer these questions and will apply the method to identify the average Austrian's consumer expenditures with the highest environmental impacts. These expenditures will be discussed concerning their employment and economic effects. The results form a baseline for comparison with surveys in two settlements in Vienna representing different consumption patterns: the 'car-free settlement' and as a reference a 'standard settlement'.

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<sup>1</sup> This paper is based on research conducted for the Austrian National Bank – Jubilee Fonds and the research program "Lifecycle approaches to sustainable consumption" of the Society for Non-Traditional Technology (SNTT) and the National Institute for Applied Industrial Science and Technology (AIST) in Japan.

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## 2 Combining various data sources with input-output analysis

### 2.1 NAMEA and NACE

With NAMEA (National Accounting Matrix including Environmental Accounts) environmental data have been organized according to economic activities. This brings together data on economic activities and a wide range of consequences of that activity (NAMEAs for Air Emission, 2001). The classification used by NAMEA is NACE, the European Union's statistical classification of economic activities (Eurostat, 1996a). Both NAMEA and the input-output table use the two digits aggregation level of NACE. This provides a powerful fundament for analysis.

01	Agriculture, forestry, fishing (1)
10	Mining of coal and lignite
11	Extract. o. crude petrol. a. nat. gas, min. o. metal ores (2)
14	Other mining and quarrying
15	Manufacture of food products and beverages
16	Manufacture of tobacco products
17	Manufacture of textiles
18	Manufacture of wearing apparel
19	Manufacture of leather, leather products, footwear
20	Manufacture of wood and of products of wood

Table 1: The first 10 economic activities as examples of the 2-digit NACE classification.

NACE consists of 65 economic activities. However, NAMEA provides data just for 40 economic activities, because it aggregates certain sectors. This means that for further calculations the input-output table had to be adjusted to the aggregation level of NAMEA.

### 2.2 NAMEA data availability

NAMEA data at European level were first published by Eurostat in 1999 for the years 1990-1999. In the following years data have been put into this new and common framework to allow further analysis. In the case of Austria NAMEA data for the aggregation level of at least 40 economic activities are available for the following indicators:

Category	Indicator	Source
Air	CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O, SO <sub>2</sub> , NO <sub>x</sub> , NH <sub>3</sub> , NMVOC, CO	NAMEAs for air emissions – Results of pilot studies, European Communities 2001
Water	waste water, CSB, BSB5, TOC, N, NH <sub>4</sub> -N, P, AOX, Zn, Cu, Pb, Cr, Ni, Hg	NAMEA-Wasser (Water), Federal Environmental Agency, Vienna, 1999
Waste	Hazardous Waste, halogenated solvents, halogen free solvents, paints and laquers, waste oil, other hazardous waste, non-hazardous wate	Integrated NAMEA with air emissions, energy use, some material flows and expenditure; S. Gerhold, Statistik Austria, 2002
Energy use	Final energy consumption	Statistische Nachrichten 4/2000 (statistical news 4/2000)

Table 2: Available NAMEAs for an aggregation level of at least 40 economic activities

This adds up to 30 indicators. In order to keep the numbers at a manageable size for each category indicators have been selected that are

- fairly independent from each other and
- pointing at different environmental problem areas.

With these criteria the underlined indicators have been selected.

### 2.3 Matching Consumer Expenditure and Economic Activities (NACE)

Data on the level of national accounts are structured by economic activities while consumer expenditure classifications are structured by products and services. With COICOP (Classifications of Expenditure According to Purpose) a new classification has jointly been developed by the statistical office of the OECD and Eurostat and was first published in 1999. It covers all areas of individual consumption. It is the common standard for consumer expenditure surveys and is one of the classification schemes within a set that is used for generating national accounts.

#### **01-12 - Individual consumption expenditure of households**

01 - Food and non-alcoholic beverages

02 - Alcoholic beverages, tobacco and narcotics

03 - Clothing and footwear

04 - Housing, water, electricity, gas and other fuels

05 - Furnishings, household equipment and routine household maintenance

06 - Health

07 - Transport

08 - Communication

09 - Recreation and culture

10 - Education

11 - Restaurants and hotels

12 - Miscellaneous goods and services

13 - Individual consumption expenditure of non-profit institutions serving households (NPIS)

14 - Individual consumption expenditure of general government

*Table 3a: COICOP top level*

#### **04.5 - Electricity, gas and other fuels**

04.5.1 - Electricity (ND)

04.5.2 - Gas (ND)

04.5.3 - Liquid fuels (ND)

04.5.4 - Solid fuels (ND)

04.5.5 - Heat energy (ND)

*Table 3b: COICOP example for levels 2 and 3 (ND means non-durable goods)*

However, there is no direct link or correspondence table for the link between COICOP and NACE. A further classification is needed to establish the link between the two of them. The current national classification is named classification of products and services according to activities (CPA). CPA has on the 2-digit level the identical structure as NACE and at the lowest aggregation level the same products and services as COICOP.

This means that we can use the CPA classification for the development of surveys and questionnaires for investigating the consumption pattern in the two reference settlements: the standard and the car-free settlement. As soon as reference data from consumer

expenditure surveys are used the correspondence between COICOP and NACE via CPA is necessary. Therefore we have established these links for the focal areas food, transport, restaurants and hotels and energy use.

## 2.4 Upstream environmental pressures

NAMEA data show the environmental impacts directly caused by economic activities (e.g. manufacture of food products and beverages). With the input-output table and the Leontief inverse it is possible to calculate the overall upstream impacts of expenditures for economic activities.

The input-output table links, via the flow of money, all economic activities needed to provide a certain service in exchange for consumers' expenditures. When attaching environmental loads (environmental impact per unit of money) to the economic activities the formula can be used:

$$x = (\mathbf{I} - \mathbf{A})^{-1} y \quad (1)$$

where  $(I-A)^{-1}$  is the Leontief inverse –  $x$  is total output,  $I$  is the identity matrix,  $A$  is the coefficients matrix and  $y$  is final consumption.

The upstream environmental pressures of a demand vector  $y$  can be calculated combining the activities generated in different economic sectors with the matrix of stressors ( $S$ ) per sector (e.g.  $kgCO_2/x$ ).

$$P = \mathbf{S}(\mathbf{I} - \mathbf{A})^{-1} y \quad (2)$$

If  $y$  is omitted, the calculation produces the stressor multipliers or emissions intensities. If  $y$  is diagonalized, we can see the total emissions of different expenditure items.

## 3 *The consumer's expenditures and their environmental impacts*

### 3.1 NAMEA: The economic activities with the highest environmental impact

The above described method has been applied to the latest available data. Whereas the NAMEA data are generally available until 1999 the latest Austrian input-output table is from 1995. Therefore, all presented data are for the year 1995. The input-output table for 2000 can be expected by the end of February 2004.

NAMEA has been used to create the environmental profile for each economic activity.

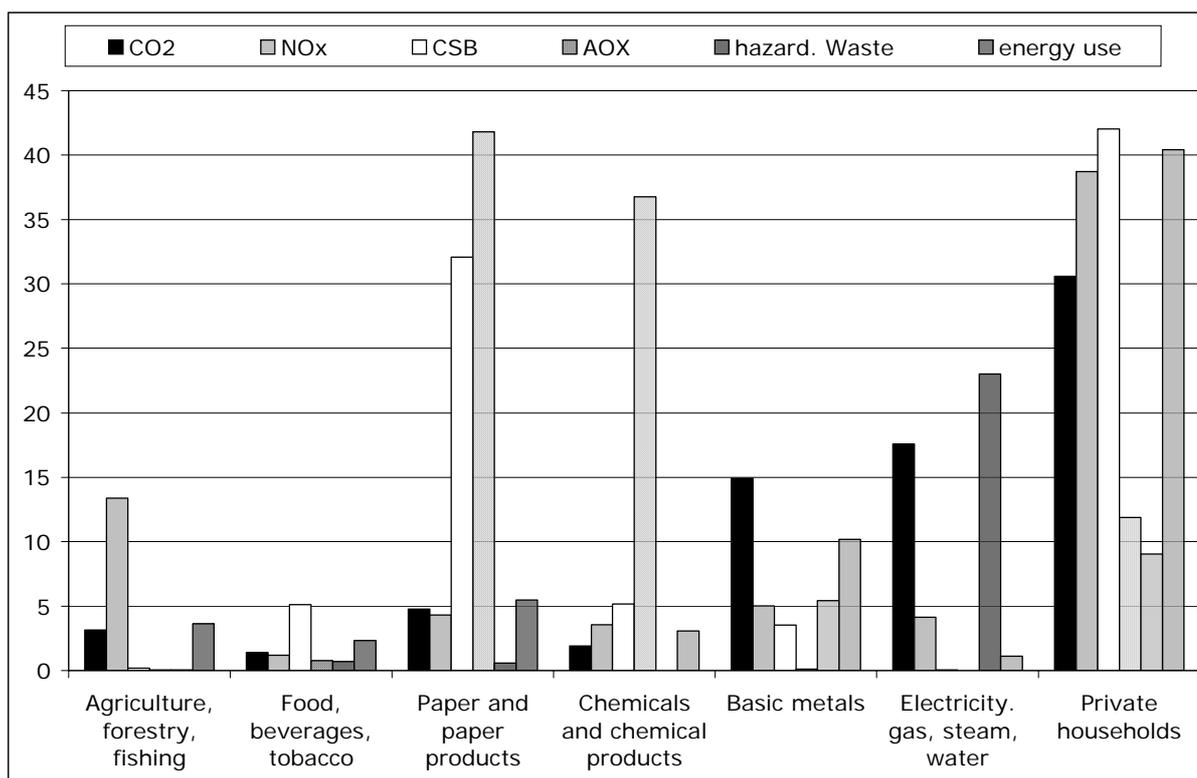


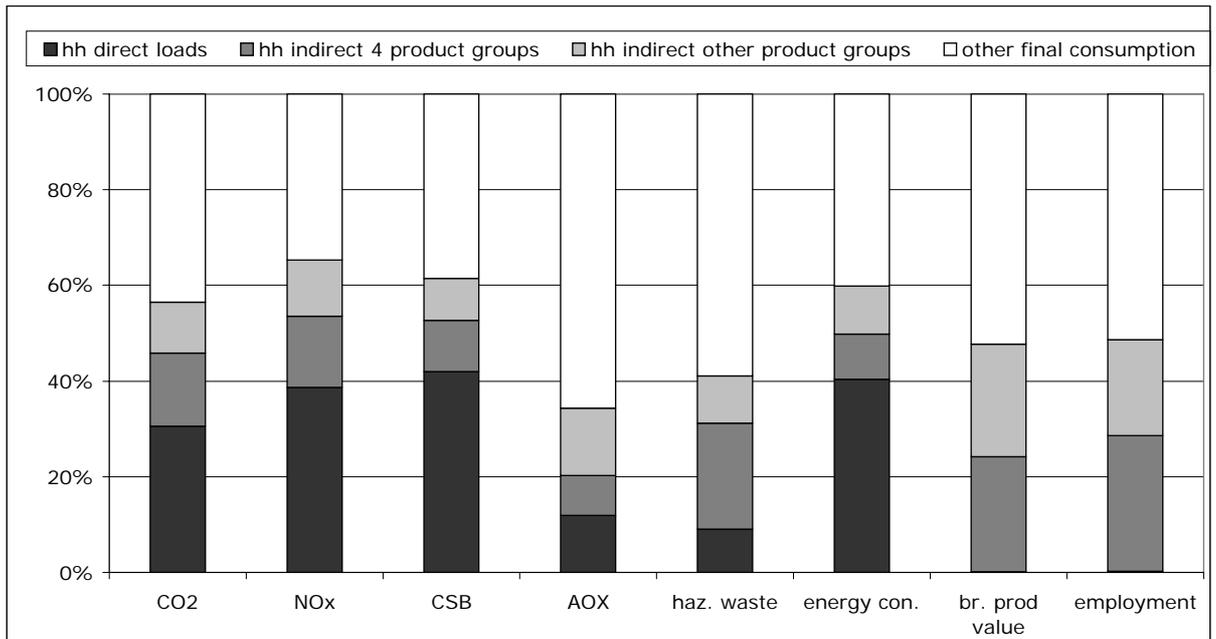
Figure 1: Some selected economic activities and their environmental impacts concerning 6 selected indicators. The numbers indicate the percentage of the total emission of this indicator (e.g. paper and paper products cause 42% of the AOX emission in Austria). Source: Own calculation based on 1995 NAMEA (see further information in section 2)

The overall profile looks quite heterogeneous. The only activity dominating regarding almost all indicators is the consumption in private households. Paper and paper products as well as chemicals and chemical products together with private households are causing most of the water pollution. NOx emissions are mainly caused by agriculture, forestry, fishing and private households. Basic metals and electricity, gas, steam, water as well as private households show the biggest share concerning hazardous waste.

### 3.2 Impacts attributed to private household consumption expenditures

After calculation of the upstream effects the following picture shows the impacts in private households and the impacts finally caused by consumer expenditures. Concerning the indicator CO<sub>2</sub> more than 50% of the Austrian CO<sub>2</sub> emissions are finally caused by households. Approximately 30% of the CO<sub>2</sub> emissions are caused by households directly like heating and private traffic. Another app. 20% are caused by economic activities that are necessary to satisfy private household consumption. When analysing the economic activities four activities can be identified to play a key role throughout the indicators. They cause more than 50% of the upstream pollution except in the case of AOX.

Private household consumption also causes more than 50% of the NOx and CSB emissions and more than 50% of the final energy consumption. Regarding AOX and hazardous waste private households cause less than 40%. The remaining part is caused by other final consumption like exports and government. It can be said that in general private household consumption is a crucial entry point for reducing environmental impacts.



*Figure 2: Household direct and indirect consumption's share of the total environmental impact by indicators. Source: Own calculation based on 1995 Namea data and Austrian Input-output table for 1995 (see further information in section 2)*

### 3.3 Four economic key activities

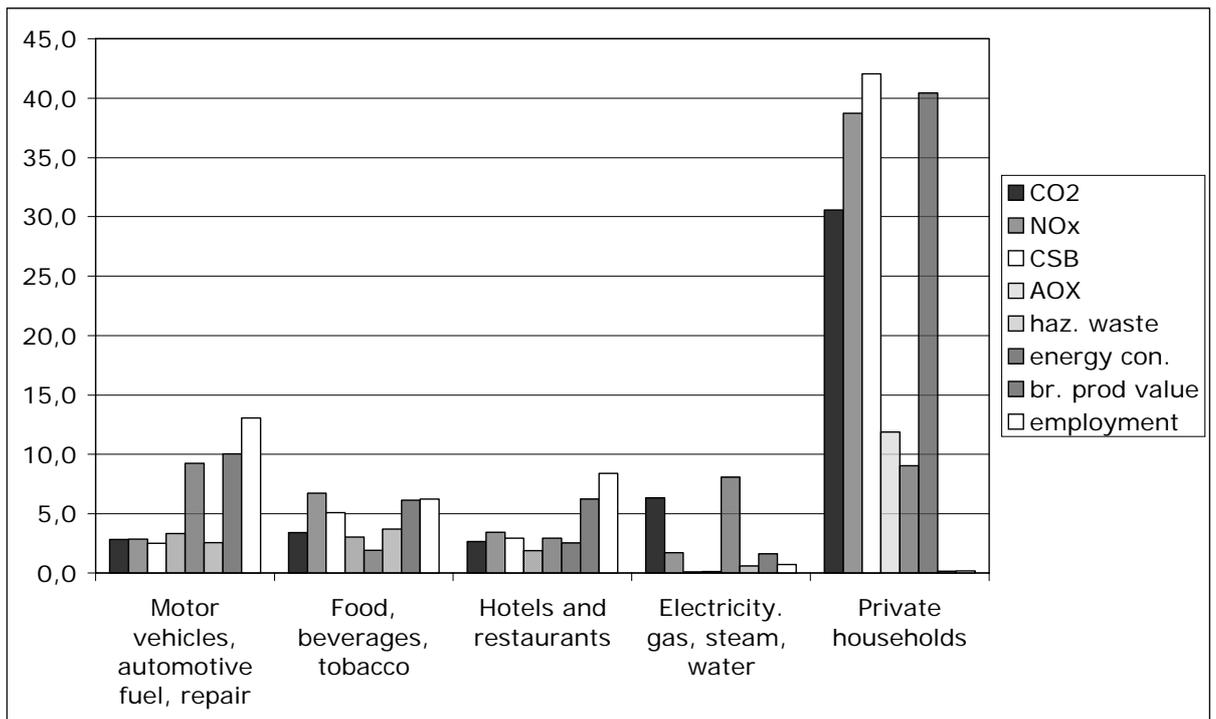
When analysing the environmental upstream effects we see that there are four economic activities with significantly higher environmental loads than others. These activities are:

- private transport meaning purchase of vehicles, repair and fuel
- manufactured food, alcoholic and non-alcoholic beverages and tobacco
- hotels and restaurants, and finally
- electricity, gas, steam and water.

This suggests that direct household emissions are left out. We may aggregate household's CO<sub>2</sub> and NO<sub>x</sub> emissions to economic activities<sup>7</sup>.

Some of the direct loads can be ascribed to economic activities as well. They would add on transport and on energy supply. This supports the selection of the four economic activities.

<sup>7</sup> This is possible due to technological emission factors in the case of private transport – the emission of private cars and in the case of private heating systems – the emission of burning gas, coal and fire wood.



*Figure 3: Household consumption's upstream effects plus direct effects at the household level. Source: Own calculation based on 1995 NAMEA data and Austrian input-output table for 1995*

The figure invites further discussion on environmental impacts and economic and employment effects. One example would be to discuss product or service alternatives concerning their environmental, economic and employment effects.

However, for the next steps the main results can be summarised as follows:

- Concerning environmental impacts consumer expenditures are the most significant for the four selected economic activities
- As a basis for analysing environmental effects of consumption patterns we need to develop the following areas:
  - overall expenditure per household,
  - expenditure for the four identified economic activities together, and
  - within these key-activities we have to distinguish between expenditure items with significantly different emission intensities (e.g. public transport and air travel)

## ***4 Survey Design***

The main purpose of the surveys is to find out what differences in consumption patterns occur in different residential settlements and what are the reasons for more or less sustainable consumption patterns.

The proposed methodological concept is based on the triangulation paradigm (Fielding & Schreier 2001). The general idea of triangulation is that if diverse kinds of data support the same conclusion, confidence in the conclusions is increased. Applied problems such as the factors influencing sustainable consumption are so various and complex that applied research is forced to use the different strengths that different methods offer. In our case qualitative and quantitative social research methods are employed within one study, although in different phases of the research process (sequencing). Contrary to the most common procedure we suggest that a quantitative phase of data analysis is followed by a qualitative phase of data collection. This is possible because the quantitative survey is rather focused on descriptions (e.g. of actual behaviour) than on hypothesis testing. Using such an approach allows us to complement findings on an aggregate (or sample) level with individual cases of consumption practices.

### **4.1 The two study sites**

Two settlements will be investigated at the household level to get the information needed. One settlement is the car-free settlement in Vienna, Floridsdorf. Future inhabitants could participate in the planning of the building and certain environmental features were included such as solar technologies and community space rather than parking lots. Thus we assume that inhabitants' environmental awareness is far above Austrian average. The assumption is that we will find consumption patterns that range in the upper end of sustainable consumption of modern urban societies. The second settlement will be an average Viennese settlement with a similar year of construction and similar demographic and income characteristics of the inhabitants.

In order to match these characteristics to the specifics of the Viennese settlements a set of investigation tools has been developed:

- a questionnaire in German – see the following brief translation
- the food expenditures will be estimated by the interviewees (see questionnaire) but in addition households will be asked to collect food bills from their shopping over a period of 14 days
- a guide of questions to be asked at the building administration
- a guide of questions to be asked at the tenants council (Mieterbeirat)
- a guide of questions for in-depths interviews with inhabitants of both settlements

In general, data will be investigated for one year, the year 2003. Data will be expenditures in Euro and physical data such as kg, km, and kWh. The information gathered should allow the identification of consumption patterns with general descriptors and should give indication on the degree of environmental behaviour of households.

### **4.2 Categories and tools for the quantitative survey**

In both settlements there are surveys planned to focus on the areas of consumption expenditures that matter the most concerning overall environmental impacts (see previous chapter). The following COICOP list is the appropriate selection for the identified economic activities.

- 01 - Food and non-alcoholic beverages
  - 01.1 - Food
  - 01.2 - Non-alcoholic beverages
- 02 - Alcoholic beverages, tobacco and narcotics
  - 02.1 - Alcoholic beverages
  - 02.2 - Tobacco
  - 02.3 - Narcotics
- 04 - Housing, water, electricity, gas and other fuels
  - 04.1 - Actual rentals for housing
  - 04.2 - Imputed rentals for housing
  - 04.3 - Maintenance and repair of the dwelling
  - 04.4 - Water supply and miscellaneous services
  - 04.5 - Electricity, gas and other fuels
- 07 - Transport
  - 07.1 - Purchase of vehicles
  - 07.2 - Operation of personal transport equipment
  - 07.3 - Transport services
- 11 - Restaurants and hotels
  - 11.1 - Catering services
  - 11.2 - Accommodation services

*Table 4: Selected COICOP categories that correspond with the identified economic activities of high environmental impact according to NACE*

In addition to those consumption related questions the quantitative survey will also cover a range of theory-related questions about the motivations, lifestyle, and structural conditions (see figure 7).

Introduction to the questionnaire	Information will be handled confidential
	Purpose of investigation
	Feedbacks to the settlements (summary report for the settlements (anonymous) and presentation)
General data	Number of questionnaire
	Address
	Persons permanently living in the household
	Age, Gender
	Occupation
Available household income	Persons earning money
	Net salaries
	Social aids and allowances
	Changes in debt and savings
	Rent and operating costs
Food, beverages and tobacco	Total expenditure
	Meat
	Biological products
	Alcoholic beverages
	Non-alcoholic beverages
	Food from gardening
	Purchases directly from producers
<b>Mobility (private trips only)</b>	
	Car (model, fuel consumption per 100km, annual km, frequency of use, purpose of use, maintenance, year of manufacture, year of purchase, purchase costs)
	Bicycle (annual km, operating costs, year of manufacture)
	Public transport within Vienna
	Public transport with destinations in Austria
	Public transport with destinations abroad
	Car sharing
Private trips	All-inclusive trips (expenditure, destination, duration of stay, number of persons)
Restaurants and hotels	Catering services
	Accommodation
Energy consumption	Electricity (expenditure and kWh)
	Hot water, steam (expenditure and kWh)
	Gas (expenditure and kWh)
Other products	Household appliances (multiple choice list with information on eco-efficiency)
	Audio-visual, photographic and information processing equipment
	Computer
	Internet access
	Phone (including mobile ones, year and cost of purchase, running costs)
Other important expenditures	e.g. Weekend house
Subjective information	Motivations (concerning: choosing this settlement, consumption patterns, mobility, etc.)
	Consumer satisfaction
	Life style indicators
	Well-being
	Ecological knowledge
	Ecological motivations (e.g. low-cost versus high-cost situations)
	Learning processes (changes over the years)
Structural/institutional conditions	Social control
	Social dynamic indicators
	Conditions/available offers for sustainable consumption

*Table5: English summary of the developed questionnaire*

The information gathered should allow the identification of consumption patterns with general descriptors and should give indication on the degree of environmental behaviour in the areas of interest.

The following descriptors will be used to compare the data between various households, between the settlements and with Austrian consumer expenditure surveys and the consumption data for households used for the analyses with the Austrian input-output table.

Total expenditure for the selected four economic activities
Expenditures for food, beverages and tobacco
Expenditure profile in this category concerning meat, biological food, own production and directly purchased from producers
Expenditures transport
Expenditure profile between modes of traffic
Expenditures Restaurants and Hotels
Expenditure profile concerning quality products
Expenditures for energy (excl. transport)
Expenditure profile for the various energy carriers

*Table 6: Descriptors of consumption patterns*

Most of the information gathered can be directly used with the developed method (extended input-output table with an interface for consumer expenditures).

### **4.3 Qualitative interviews**

So far we have developed a tool and survey design to enable the description of consumption patterns. Although we will try to collect some “subjective” data the methods described are limited to address the reasons for various degrees of sustainability of different consumption patterns. Therefore qualitative interviews are necessary to gain such insights.

At the core of the qualitative survey there are in-depths interviews with some of the interviewed households, which will be selected on the basis of the results of the quantitative survey. The qualitative interviews will be performed after the quantitative ones.

The following graph gives orientation for possible issues tackled in the interview. It is designed as an open interview starting with the present consumption pattern and focusing on main differences to reference consumption patterns. In some cases the interviewee’s consumption pattern might be significantly more environmentally friendly than the average. Then this would be the guideline for the first part of the interview. The second part would focus on possible changes of the present consumption pattern.

The interview should provide insights on individual and contextual reasons for specific types of consumption. One major idea is that consumption patterns are not a given thing but the result of individual “histories” embedded in and shaped by specific institutional contexts. The interviews should focus on those individual “histories” producing new insights on social learning of sustainable (or non-sustainable) consumption. The following figure is showing the whole variety of possible interview topics.

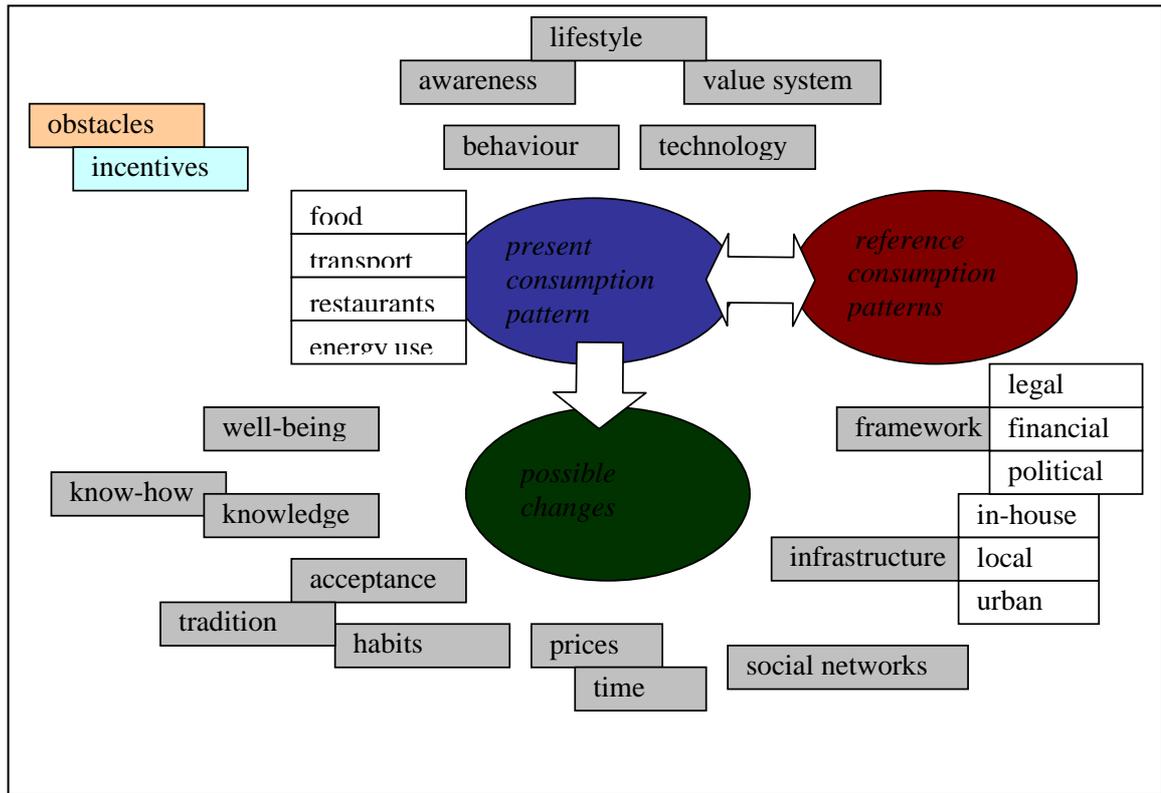


Figure 4: Guideline for qualitative interviews: starting point for the open interview is the present consumption pattern

The interview might start with a description of the household’s present consumption style followed by a narration on the individual (respective household) consumption-“history”. Further questions are the following: How much attention does the household pay to what type of food it buys? What is important when buying food? Where, when and how does the household obtain its food? How much time is used for cooking? What role does environmental consciousness play? How important are health issues? How well informed are the respondents concerning environmental pressures? Do they know about alternative products? What role do prices play when purchasing food? Does the existing infrastructure support environmentally friendly behaviour? How do the respondents assess the legal framework relevant to their consumption? A next step is then to discuss possible alternatives to and changes of their present consumption pattern. What changes in consumption would they desire? What are the reasons why consumers are not choosing a more environmentally friendly alternative? What would ease the switch to the alternative product? And finally, to summarize for each category: What would the respondents think are the most important explanations for their behaviour?

Interviews will be recorded and fully transcribed to allow for various methods of content analysis. The data analysis will be carried out by using a text retrieval computer program.

The idea of the interviews is that interviewees tell the interviewers in detail about their present consumption behaviour and about perceived reasons for the development of this pattern. This detailed information will be the bases to discuss the underlying factors influencing a variety of relevant variables. In some cases driving forces will explain why it is difficult to achieve higher levels of sustainable consumption or on the other hand, driving forces will explain why respondents do act environmentally sensitive.

## ***5 Combining different tools for sustainable consumption research***

In order to investigate environmental effects of various lifestyles and their underlying driving forces and barriers it is paramount to quantify environmental impacts at a micro level as well as on a regional or national level and to address issues of acceptability of lifestyles or environmental policies, well-being and happiness, and the socio-economic context in which purchase and consumption decisions take place. Such a holistic view is imperative if one strives for significant change in consumption of households

The proposed study and the described study design are being used to evaluate the reduction in environmental impacts (including the rebound effect) of household's consumption in the car-free housing project. Then, they are used for a case-control study comparison and evaluation of the environmental impacts of the consumption of tenants of this housing project with those of a conventional, otherwise similar project.

This necessitates a combination of various quantitative and qualitative methods. The discussed bottom-up approach should provide new data material and insights into the complexity of consumption processes on the household-level. We expect different consumption patterns not only between environmental friendly and less environmental friendly households but also within these two groups, dependent on socio-graphic attributes, private experiences and histories and income. An in-depth discussion amongst experts should finally provide insights why in day-to-day life consumption patterns differ and what are the crucial driving forces to be changed in order to achieve more sustainable consumption patterns. This micro and meso-level analysis is supported by input-output lifecycle analysis. This allows us not only to assess upstream effects of consumption behaviour but also to analyse and assess environmental and socio-economic effects on a macro level. Furthermore, we can develop and assess scenarios of demographic changes, effects of policies, changes in lifestyles and their effects on important physical and monetary indicators.

**Paper for the International Workshop on Sustainable Consumption**  
**Leeds Institute for Environmental Science and Management**  
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**Workshop Theme**

Measuring effects of lifestyle change

**Paper title**

“Developing and assessing scenarios for UK bioenergy using life cycle and multi-criteria approaches: policy context and preliminary methodological issues”<sup>1</sup>

**Keywords**

Life cycle analysis, multi-criteria evaluation, bioenergy, scenarios

**Abstract**

The Tyndall Centre for Climate Change Research at UMIST is undertaking an interdisciplinary life cycle socio-economic and environmental evaluation of bioenergy scenarios for the UK, to be integrated with a techno-economic evaluation undertaken elsewhere in the SuperGen consortium.<sup>2</sup> The first aim is to develop contrasting bioenergy scenarios in consultation with bioenergy experts and stakeholders for three UK regions. These will encompass different market penetrations for bioenergy and different levels of use of indigenous and imported biomass. Secondly, the scenarios will be both informed and assessed via an iterative process involving life cycle analysis (LCA) of the environmental and economic impacts and multi-criteria evaluation (MCE) of the social, environmental and economic impacts. Outputs will consist of a mix of quantitative and qualitative information that will assist in addressing some of the barriers to bioenergy implementation in the UK.

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<sup>1</sup>Based in the Tyndall Centre for Climate Change Research (North), Drs. Patricia Thornley and Paul Upham are funded under Work Package 1 of the Biomass consortium of the UK's EPSRC SuperGen (Sustainable Power Generation) programme. Dr. Simon Shackley is Principal Investigator and the project runs from late 2003-5.

<sup>2</sup> Techno-economic evaluation is by the Northern Ireland Centre for Energy Research and Technology, at the University of Ulster. Principal Investigator: Prof. John McMullan.

Policymakers will be provided with information on the likely scope and scale of the social, environmental and economic impacts of different, plausible bioenergy scenarios. The project is currently in its early stages. Using a 25MWe short rotation willow coppice combustion plant as a reference plant, a first techno-economic model run has been completed by partners in Ulster, while the Tyndall Centre has completed a review of the UK bioenergy policy context and UK operating plants, is organizing stakeholder consultation, defining the components and indicators of the LCAs, working on the detail of the proposed LCA/MCE coupling and developing the first LCA of willow production as the reference case.

### **Introduction**

Work package 1 of the EPSRC SuperGen's Biomass and Bioenergy research programme entails detailed study of what have been termed the 'non-technical' aspects of bioenergy production. These include environmental, economic and social factors, all of which will need to be articulated in any realistic scenarios of UK bio-energy use. As a means of developing and assessing regional UK bio-energy scenarios, this research project takes life cycle analysis (LCA) and multi-criteria evaluation (MCE) as central components of its method. MCE is particularly suited to revealing and investigating trade-offs among incommensurate factors. It has been successfully used for this purpose in other Tyndall Centre research, in particular to assess stakeholder views of geological carbon sequestration (notably, deep-well injection of carbon dioxide from fossil-fuelled power plants). MCE will enable a detailed investigation of stakeholder opinion of different bio-energy scenarios, in turn enabling inferences for policy and practice.

LCA is a well-established tool for profiling and assessing environmental impacts that are widely dispersed in time and space. With a framework standardised in the 1990s through international peer-review work by the Society for Environmental Toxicology and Chemistry and subsequently ISO 14001, it is more commonly used in policy analysis than MCE. Used as complements, both tools have much to offer in scenario development and assessment.

### **Bioenergy policy framework and drivers**

While this research project focuses on the UK, biomass has been a vital fuel source through the history of human civilizations and remains particularly important in less industrialized countries. In industrialized countries, increasing evidence of climate change is gradually (if slowly) driving efforts to make more intensive use of bioenergy in place of fossil fuels. At the international level, the Clean Development Mechanism of the Kyoto Protocol is expected to help create early market volume for renewables, resulting in improved technology and enhanced plantation and use of biomass for bio-energy (Overend, 2000). Plantation could in principle be distant from end-users, and it is conceivable that southern hemisphere countries with denuded and degraded ex-forest land could re-plant to become prime exporters (and perhaps processors) of biomass for users globally.

At EU level, biomass energy crops are being promoted as part of the Renewables Directive (with a target of 12% of primary energy consumption by 2010), the Biofuels Directive (with a target of 5.75% of petrol and diesel energy content by 2010) and arguably the Combined Heat and Power Directive (with a target of 18% of EU electricity from co-generation by 2010). These targets have been set within the wider context of the Kyoto agreement to reduce aggregate EU emissions by 8% below 1990 levels by 2008, efforts to improve air quality (the Large Combustion Plant Directive) and efforts to reform the Common Agricultural Policy (Agenda 2000) (Gough et al, 2000: 17).

Recent and current policy drivers for biomass energy in the UK are the Non-Fossil Fuel Obligation (NFFO); the Government target to obtain a 20% reduction in carbon dioxide emissions compared to 1990 by 2010; the Climate Change Levy (a hypothecated tax on business energy use) and the Green Fuels Challenge, which provides a 20% tax rebate for biodiesel. A voluntary greenhouse gas emissions trading scheme has operated in the UK since April 2002 and an EU trading scheme will begin in January 2005. The latter will be compulsory for large combustion installations.

In 2002, the UK Government introduced a Renewables Obligation for England and Wales, providing an incentive for generators to supply progressively higher levels of renewable energy over time, until 10% is achieved by 2010. The 2002 Renewables Order superseded the NFFO as the UK's main renewables support mechanism. It requires all licensed electricity suppliers to supply a fixed percentage of their electricity from certified renewable power producers. Certified renewable generators are awarded Renewable Obligations Certificates (ROCs) for every MWh of electric power that they produce. These ROCs can be traded separately from the electricity produced and demonstrate to the regulator that they have complied with their obligation. Suppliers who fail to meet their obligation are required to pay the "buy-out price" (currently about €45 for every MWh for which they are in deficit). This revenue is then re-circulated to suppliers in proportion to the ROCs they have provided, stimulating the market demand for ROCs and ensuring that their market value remains higher than the buy-out price, as long as the overall obligation is not met by suppliers. The obligation will remain in force until 2027 and is intended to provide a stable, long-term market for renewable power in the UK. Yearly targets have been set until the year 2010/11 and proposed up to 2015<sup>3</sup>.

In the longer term, if the UK is to achieve a 60% reduction in carbon emissions by 2050 set out in the Energy White Paper (DTI, 2003), it is likely to need at least 30% to 40% of electricity to be provided by renewables (DTI, 2003: 4.5; Future Energy Solutions, 2003). In 2000, renewables (excluding large hydro plant and mixed waste incineration) supplied only 1.3% of UK electricity, compared with 16.7% in Denmark, 4% in the Netherlands, 3.2% in Germany and 3.4% in Spain. To meet the 10% target, the UK will need to install approximately 10 GW of renewables capacity by 2010, an annual build rate of over 1250MW. Only 1200MW of renewables capacity has been installed in total so far (excluding large hydro) (DTI, 2003: 4.9) The Energy White Paper (ibid: 4.14) considers that technologies such as onshore and offshore wind and biomass are potentially - after energy efficiency and alongside CHP - the most cost-effective ways of limiting carbon dioxide emissions in the longer-term. The white paper set the aspiration, by 2020, to double renewables' share of electricity from the 2010 target and to pursue policies to achieve this.

Expressed as a percentage of current fossil carbon dioxide emissions, 'realistic potential' carbon dioxide offsets by biomass energy crops and industrial forest residues have been estimated by Gough et al (2002: 20) to be in the range of 16-31% of CO<sub>2</sub> emissions globally, 5-32% in the EU15 and 2-14% in the UK, while the 'conservative achievable' estimates were 3-15% globally, 2-21% in the EU15 and 1-4% for the UK.<sup>4</sup>

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<sup>3</sup> However, unlike the NFFO, ROCs involve no contract with the Government and it can be difficult for small generators to obtain long term power purchase agreements.

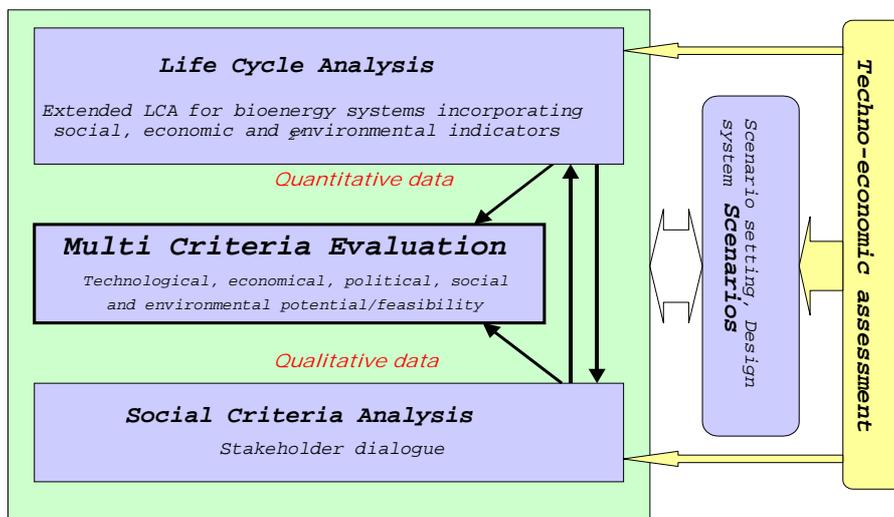
<sup>4</sup> Gough et al (2002) distinguish between 'theoretical potential capacity', for which some or all constraints have been ignored; 'realistic potential capacity', for which account has been taken of most constraints, but some optimistic assumptions are made about land availability, socio-economic and policy drivers; and 'conservative,

## Methodological discussion

The main aim of the project is to develop and assess bioenergy scenarios for the UK, taking explicit account of trade-offs between social, economic and environmental factors. Stakeholder interviews and workshops will be used to reveal and examine a wide range of opinion on factors involved in these scenarios, including the planning system, policy regimes, ancillary benefits (rural diversification/employment, local heat & power supply, landscape and biodiversity improvement). The following discussion describes the method in more detail. Some of these objectives are being pursued in parallel. A summary diagram of the method is given below in Figure 1.

In general, this approach can be compared with socio-economic models of bioenergy impact assessment, as reviewed by Madlener and Myles (2000) for IEA Task 29. While useful in many respects, one disadvantage of integrated models is that some important social and cultural factors (such as propensity to object to planning proposals) are not tractable to practical modelling (ibid: 2). This has led to their exclusion from the majority of impact assessments in the past, even though at the local level they may be significant determinants of bioenergy development (ibid: 2). It is for this reason that the environmental LCA will be supplemented and informed by MCE, rather than extended in its own terms.

**Figure 1: Summary schematic of method for bioenergy scenario development and assessment**



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achievable capacity', for which a cautious prognosis is made, based on current trends, with few optimistic assumptions.

### *Reference case*

The initial reference case for test purposes is a 25MWe short rotation willow coppice combustion plant for electrical power production. The scenarios will assume this form of plant, as well as alternatives and variants (gasification, CHP, pyrolysis, and different biomass fuels). Municipal waste and transport biofuels are excluded from the scope of SuperGen, which focuses on stationary power generation. Strictly speaking, heat provision is also excluded from SuperGen, but will be included in the context of co-production with electricity, as heat provision, particularly in areas without piped natural gas, is an important driver for bio-energy take-up.

*Objective (1)* To plan for the study of, contextualise, select and describe approximately three case study regions, to serve as reference cases for the analysis of non-technical aspects.

A regional approach to case studies has been chosen as a means of developing the UK scenarios. In a national approach, the social, economic and environmental impacts of existing UK bioenergy power plant or other reference power plant would be identified, and national scenario impacts inferred by scaling up to levels justified by local resource and land use planning constraints. A regional approach also enables this, but has the important advantage of enabling support from regional actors and regionally-organised bio-energy resource studies. These facilitate investigation of contextual factors such as potential competition for land, enabling the development of more detailed and plausible scenarios. As many regional development agencies in the UK are actively engaged in exploring the potential for bio-energy in their region, they can provide a ready-made set of stakeholder contacts. The local level is very important in planning and perception issues, but is too 'micro-scale' (site-specific) for a national assessment. The regional scale provides a reasonable compromise between the local and national levels. Some degree of national representativeness will be achieved by selecting areas that, together, include most land types found nationally. Impact quantities found for these land types will be scaled up in proportion to their national prevalence, accounting for threshold effects.

*Objective (2)* To undertake interviews, workshop-based and "Delphi" consultation with experts and key stakeholders, as a means of informing the regional scenarios.

This objective requires the engagement of academic, policy, NGO and industry experts and stakeholders via SuperGen, industry, NGO, government and consumer contacts. Experts are defined as primarily academic, consultancy, NGO and industry specialists. Key stakeholders include central government economic and environmental policymakers, local authority planners, NGOs and observer groups, representative business, farmers' and landowners' organisations.

The Delphi process is one of iterative consultation. A balanced group of experts will be presented with several regional bio-energy supply scenarios developed on the basis of the literature review and consultation with a smaller subset of experts. The group will be invited to make general and specific comment on their plausibility, strengths and weaknesses, plus suggestions for criteria in terms of which the scenarios may be ranked. Examples of such criteria, which will be used in the MCE, include public acceptability, economic profitability, rural economic diversification and various forms of environmental impact. The scenarios and criteria are then re-circulated, taking into account previous comments and asking for any revisions of views. A final set of expert / key stakeholder scenarios and list of assessment criteria is then circulated, taking into account the second stage of comments. Supplementing

this process, workshops and in-depth interviews will be undertaken with stakeholders in the three regions. At least one specialist workshop will also be undertaken, such as with land use planners and interested observers, as denial of development permission by local planning bodies and inspectors has been a major obstacle to the development of renewable power in the UK (this may change with new government planning guidance [PPS22], which provides a more positive planning framework for the development of renewable power projects and recognises national and regional greenhouse gas emissions objectives at the level of local land use planning).

*Objective (3)* To apply a real-time multi-criteria analysis tool with public focus groups, key stakeholders and bio-energy experts, to reveal opinion on trade-offs within the regional scenarios, scenario scores and criteria weightings.

This objective involves the use of an MCE spreadsheet developed within the Tyndall Centre for a previous project on stakeholder perceptions of carbon capture and storage (Gough and Shackley, forthcoming). MCE is essentially a process of identifying the terms (criteria) in which people judge a situation or case, how they rank those criteria relative to one another, and how they score a case in terms of those criteria. This process can be more or less complex, involving complex algorithms or simple matrix-style analysis. The MCE to be used in this project is of the latter type, with workings that are easily understood by participants.

The intention is to use the MCE tool with three separate groups of demographically representative public (convened by a market researcher); bio-energy experts and stakeholders, using scenarios and criteria developed with the key stakeholders and experts for objective 2 above. Preliminary results on the environmental and economic impacts from the regionally-scaled LCA studies would also inform the scenarios presented to the groups. The MCE will be conducted first with the expert group to obtain default scores for the scenarios. Groups with different backgrounds will be kept separate to allow comparison of scores and weightings.

*Objective (4)* An optional supplement of the above is a postal questionnaire survey of local stakeholders in the case study regions, to assess perceptions of sample bio-energy projects and prospects.

A questionnaire of some 15 minutes' completion time will be sent to a substantial number of stakeholders in the locality of bioenergy plant, particularly local residents, employees, users and suppliers (the co-operation of bio-energy plant managers would be necessary for some aspects of the survey). The purpose is to complement and to some extent test the regional scenario work. While the latter will probably be undertaken with the involvement of <50 people, the postal survey will seek several hundred respondents to provide perceptions on a greater, national scale. Local resident addresses would be identified from the electoral roll. Questionnaires would have an identifying number to prevent multiple returns.

## **Conclusion**

Interdisciplinary development and assessment of large-scale power generation scenarios may be undertaken with integrated assessment models. These are useful for their relative ease and speed of use. On the other hand, they have the disadvantage of not being able to deal with factors that are not readily modelled, notably stakeholder and public opinion. This may give rise to over or under estimates of plausible bioenergy capacity and benefit levels. The approach proposed here is to undertake linked environmental and economic life cycle analyses of bioenergy scenarios that are informed by consultative workshops, interviews and

Delphi-style consultation and multi-criteria evaluation. This approach is not a substitute for integrated modelling, and will take considerably longer, but it should provide a more detailed, complementary picture of UK bioenergy prospects and impacts.

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## Are Services better for Climate Change?

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### Abstract

Over the last decade, theoretical as well as empirical grounds for the existence of a negative relationship between income and environmental degradation, known as the Environmental Kuznets Curve (EKC), have attracted considerable scientific interest. Some have identified the spontaneous shift from material-intensive industry to less material-intensive services in the course of economic growth as a key factor driving the decoupling economic prosperity from environmental degradation. Nevertheless, CO<sub>2</sub> emissions is known to have opposing trend. In a recently completed database project, major U.S. environmental emission inventories, including the national Greenhouse Gas (GHG) Inventory, Toxics Releases Inventory (TRI), National Toxics Inventory (NTI) and National Environmental Trends (NET) database were linked with the supply-chain networks of 480 products and services, based, wherever possible, on the most detailed 6-digit Standard Industry Classification (SIC) codes. The resulting database contains a total of 1344 environmental interventions, including emissions of 21 GHGs, and their inducement structure as described by 1998 detailed U.S. national accounts. The present study used this database to examine the implied contribution of services to climate change. Producing a dollar of a product or service generates an average of 0.36 kg of CO<sub>2</sub> equivalent GHGs on-site, increasing to 0.83 kg when supply-chain-induced emissions are taken into account. Services produce less than 5% of total U.S. GHG emissions, and their GHG emission intensities per dollar output are much less (0.04 kg CO<sub>2</sub> eq./\$) than those of physical products, even when supply-chain-induced emissions are included (0.47 kg CO<sub>2</sub> eq./\$). When both supply-chain-induced emissions and the volume of household expenditures are taken into account, however, household consumption of services proves to be responsible for 37.6% of total industrial GHG emissions in the U.S., almost twice the amount due to household consumption of electric utility and transportation. Given the current economic structure, a shift to a service-oriented economy is shown to entail a decrease in GHG emission intensity per unit GDP but an increase, by necessity, in overall GHG emissions in absolute terms.

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Keywords: Greenhouse gas emission; sustainable consumption; input-output analysis; services; environmental Kuznets curve

For the past 100 years global annual anthropogenic CO<sub>2</sub> emissions due to fossil fuel combustion have increased by approximately a factor 12, and responsibility for around a quarter of total accumulative global emissions during the period has been ascribed to the U.S. (1–3). In the U.S., major GHG emission sources include electric power production (subsequently referred to as ‘electric utility’), transportation and several manufacturing industries, which generate around 80% of the total (4). In contrast, the service sector (excluding electric utility and transportation), comprising banking, hospitals and the retail trade, for example, as well as computer and data processing services, accounts for less than 5% of total U.S. GHG emissions (4). Economically, however, the services sector is the

largest and the fastest growing sector in the U.S. The relative share of services in personal consumption expenditure has been steadily rising, mainly by encroaching on the share of manufactured products. Over the past ten years, the size of services in aggregate Gross Domestic Product (GDP) has grown by an average of 6.3% a year in the U.S., thus doubling every 11 to 12 years (5). Today, the services sector contributes around 60% of total U.S. GDP.

In a recently completed database project, major U.S. environmental emission inventories, including the national Greenhouse Gas (GHG) Inventory, Toxics Releases Inventory (TRI), National Toxics Inventory (NTI) and National Environmental Trends (NET) database were linked with the supply-chain networks of 480 products and services, based, wherever possible, on the most detailed 6-digit Standard Industry Classification (SIC) codes. The resulting database contains a total of 1344 environmental interventions, including emissions of 21 GHGs, and their inducement structure as described by 1998 detailed U.S. national accounts (6, 7). The present study used this database to examine the implied contribution of services to climate change. In this paper, Global Warming Potential (GWP) 100 by Houghton *et al.* (8) is used to aggregate the 21 GHGs into CO<sub>2</sub> equivalents, and all prices are in 1998 producer prices. 'Services' are defined in a narrow sense to exclude the categories of Electric utility, Steam supply and Transportation services.

The results show that production of a dollar of product or service generates, on average, 0.36 kg of on-site CO<sub>2</sub> equivalent GHGs. By far the largest on-site GHG emitter per dollar is Lime production, generating 20.7 kg of CO<sub>2</sub> equivalent global warming impact per dollar (9). Others in the top ten products and services with respect to direct GHG emission intensity are mostly primary materials, energy and agricultural products, and none of the services were found to be GHG-intensive. If aggregated, the direct GHG emissions intensity of the primary sector is calculated to be 2.05 kg of CO<sub>2</sub> equivalents per dollar; this figure is far lower for the secondary and the tertiary sectors, which generate only 0.30 and 0.04 kg of CO<sub>2</sub> equivalent GHGs per dollar, respectively.

Multiplying direct GHG emission intensities by annual production volumes yields total direct GHG emissions (Fig. 1). As the figure shows, Electric utility and transportation and the primary sector are among the largest direct GHG emitters, occupying the upper part of the graph. The direct GHG emission intensities of different product groups can be clearly distinguished, as most of the plots of the primary and tertiary sectors are aligned around the upper and lower parts, respectively, of the linear regression line of the secondary sector. Nonetheless, in terms of the overall size of economy, services are among the largest, occupying the right side of the graph. In general, services occupy the lower-right part of Fig. 1, indicating their high GHG emission efficiency per dollar output with respect to direct emissions.

Including emissions from the entire supply-chain network, 1 dollar of products or services in the U.S. generates, on average, 0.83 kg of CO<sub>2</sub> equivalents directly and indirectly through the supply chain. In general, then, indirect GHG emissions in the upstream supply chain exceed the average intensity of direct emissions (0.36 kg/\$). However, the relative magnitude of indirect emissions compared with direct emissions varies substantially from sector to sector. In particular, the supply-chain GHG emissions of the tertiary sector induces are, on average, over 16 times greater than its direct GHG emissions. Nevertheless, the GHG emission intensities of services are still lower than those of other products. On average, the total direct and supply-chain GHG emissions induced per dollar output decrease as follows: Electric utility and Transportation (5.3 kg CO<sub>2</sub> eq./\$), primary sector (3.1 kg CO<sub>2</sub> eq./\$), secondary sector (1.0 kg CO<sub>2</sub> eq./\$), and tertiary sector (0.5 kg CO<sub>2</sub> eq./\$).

Linking total direct and supply-chain GHG emission intensities with household

consumption expenditure data yields a completely different picture of ‘dirty’ sectors. First, the largest GHG emission inducing products and services include the most basic necessities of energy, shelter, mobility, health care, food, *etc.* Second, except for a few items such as Electric utility, the products and services in the top 30 list do not have high GHG emission intensities. The total direct and supply-chain GHG emission intensity of Motor vehicles and passenger cars, which is ranked as the 3rd, for instance, is 1.08 kg CO<sub>2</sub> eq., only slightly higher than the average, indicating in turn the high consumption volume of these products and services. Third, most of them are associated with supply-chain GHG emissions rather than direct emissions (7).

Another striking difference is that around half the top 30 largest GHG emission inducing products and services are now services. A total of 37.6% of overall GHG emissions are induced through household consumption of services (Fig. 2). Nearly half the GHG emissions induced by services are associated with Electric utility and Transportation (45.1%). Adding on-site GHG emissions from the primary and secondary sectors upstream of the services, 84.9% of the total emissions due to the household consumption of services take place outside the sector itself (Fig. 2). Ranked within the top 30 are even services that do not generally supply tangible materials, like Hospitals (5th), Banking (17th) and Insurance carriers (24th) (Table 1). These services induce indirect GHG emissions at various industries, including, in particular, Electric utility, Transportation and Construction. Hospitals, for instance, rely on direct GHG emissions from Electric utility (37.0%), Sanitary services and steam supply (7.7%), various agricultural products (4.5%), Crude petroleum and natural gas (3.8%), Blast furnaces and steel mills (3.0%), Air transportation (2.8%), *etc.* These indirect emissions are induced primarily by the direct consumption of Electric utility (25.5%), Sanitary services and steam supply (5.1%), Real estate agents (6.4%), Industrial inorganic and organic chemicals (5.0%), Industrial and commercial buildings (4.4%), Drugs (3.5%), Surgical and medical instruments and apparatus (2.1%), *etc.* Likewise, the GHG emissions of Banking are induced through direct consumption of Electric utility (12.0%), Security and commodity brokers (9.0%), Sanitary services and steam supply (7.2%), Industrial and commercial buildings (4.7%), U.S. Postal Service (4.0%), Computer and data processing services (2.7%), *etc.* (9).

The mechanism by which services emerge once the supply chain and total consumption volume are taken into account can be understood by comparing Fig. 1 and Fig. 3. In Fig. 3 the relationship between household consumption expenditure and total direct and supply-chain GHG emissions are plotted on a log-scale. Compared with Fig. 1, distribution has shifted upwards in Fig. 3 as supply-chain GHG emissions are added to direct emissions. Furthermore, the distribution is denser in Fig. 3 than in Fig. 1. However, while the plots for the primary and tertiary sectors asymptotically approach the secondary sector, they do not generally overlap. Another interesting observation is that the plots for the primary and secondary sectors have undergone a shift to the lower left, while this is not generally the case for the tertiary sector.

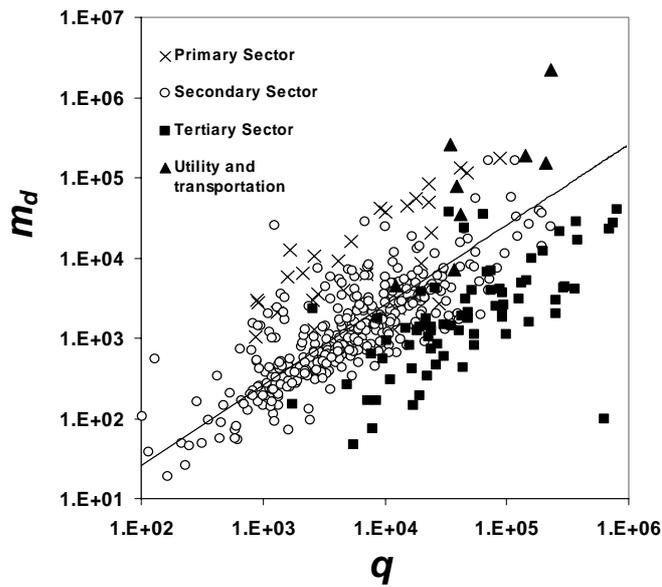
The mechanism underlying these shifts sheds light on the basic structure of GHG emission inducement. First, the shift of the primary and secondary sectors to the lower left of Fig. 3 indicates that a substantial fraction of the output of these sectors is not consumed directly by household consumers. Excluding the fraction exported, the difference between total production and total household consumption yields the amount consumed by the subsequent downstream supply chain prior to delivery to final consumers. U.S. households consume 86.0% of primary sector outputs and 43.8% of secondary sector outputs indirectly in the form of other industry outputs, a substantial part of which are services. In this regard, services act as an interface between primary and secondary products and household consumers. This explains how the plots in Fig. 3 approach one another only asymptotically. As tertiary sector services rely on input of primary and secondary products, their total

direct and indirect GHG emission intensities increase substantially when supply chains are taken into account. However, these intensities do not exceed those of the inputs, as additional value-added is created, ‘diluting’ overall intensities per dollar. By combining these two effects, the plots for the tertiary sector move closer to the level of its inputs, but not beyond. The value-added effect also helps explain how less GHG emission intensive services rise in ranking when total household expenditure is taken into account (Table 1). As these services are located at the near-to-consumer side of the supply chain, they will have undergone longer supply paths and corresponding value-added processes before being delivered to household consumers. These services therefore generally have a much larger value-added moiety accumulated in their price and the overall volume of consumption for the same material contents will consequently be higher. In the same light, the high GHG emission intensities of basic materials and agricultural products reflect their relatively low prices, which can be ascribed to the fact that the processes in question are generally located at the start of the series of value-adding processes along the supply-chain. Under these circumstances, although the GHG emission intensities of services are, by their very nature, lower than those of other sectors, overall GHG emissions will not automatically be reduced merely by engendering a structural shift towards a more service-oriented economy if the same or higher material welfare is to be maintained.

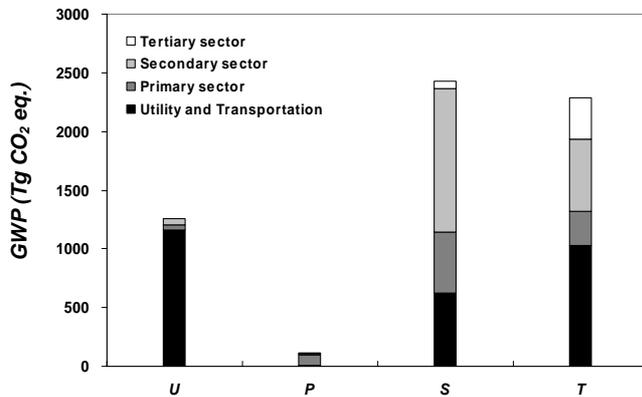
Over the last decade, theoretical as well as empirical grounds for the existence of a negative relationship between income and environmental degradation, known as the Environmental Kuznets Curve (EKC), have attracted considerable scientific interest (10–15). Some have identified the spontaneous shift from material-intensive industry to less material-intensive services in the course of economic growth as a key factor driving the decoupling economic prosperity from environmental degradation (16–18). Nevertheless, for CO<sub>2</sub> emissions Shanfik and Bandyopadhyay (19) found an opposing trend. The present analysis contributes to these findings, by explaining why services are less GHG emission intensive, and necessarily so, so that a shift to services will not, in itself, reduce aggregate GHG emissions. It is certainly true that a shift to a more service-oriented economy will reduce the GHG emission intensity per unit GDP and is desirable, especially in the context of U.S. climate change policy, where only the intensity matters (20). However, mitigation of climate change, which requires actual reduction of GHG emissions in absolute terms, is not achieved automatically in the course of economic growth and associated structural change unless the services become independent of embedded GHG emission intensive products (21). Efforts need to be devoted to developing technologies, changing consumption patterns and efficiently managing materials and energy in order to physically reduce GHG emissions and thus the intensity of global climate change.

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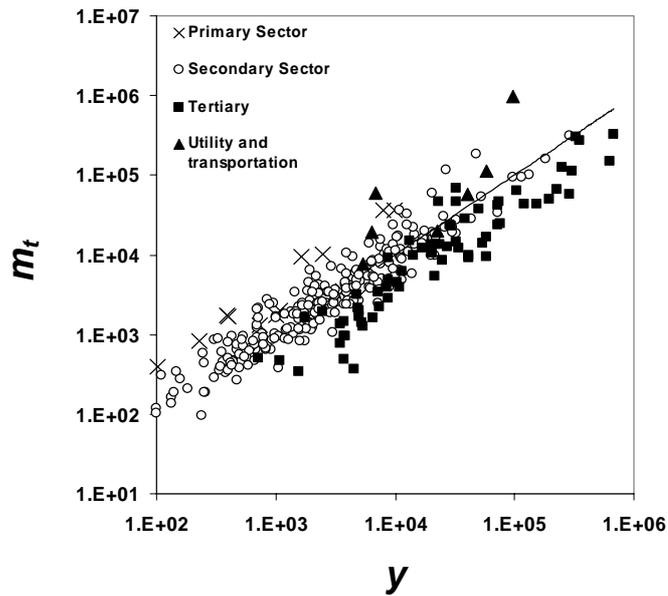
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20. In February 2002, the U.S. President committed the country to a strategy to reduce greenhouse gas intensity per dollar production by 18% over the next 10 years, slightly more than the rate of reduction since 1990, achieved in the absence of substantial policy coordination; U.S. Climate Change Policy: Fact Sheet (White House, Office of the Press Secretary, Washington, D.C., N.W., 2003).
21. For over four decades, U.S. production of manufactured goods has generally followed an upward trend, although its share in GDP has been gradually surpassed by services.



**Fig. 1.** Total domestic production ( $q$ ) in million U.S. dollars vs. direct GHG emissions in kg CO<sub>2</sub> equivalents ( $m_d$ ). Plots in a vertical cross-section at any  $q$  indicate the amount of GHG directly generated in producing  $q$  amount of products or services, plots in a horizontal cross-section at any  $m_d$  the amount of production possible for a given level of direct GHG emissions.



**Fig. 2.** Total direct and supply-chain GHG emissions induced by household consumption expenditure on Electric utility and Transportation (U) and primary (P), secondary (S) and tertiary (T) sectors, broken down according to on-site emission sources.



**Fig. 3.** Total household consumption expenditure ( $y$ ) in million U.S. dollars vs. total GHG emission inducement in kg CO<sub>2</sub> equivalents ( $m_t$ ).

**Table 1.** Services in the top 30 with respect to total direct and indirect GHG emissions, allowing for household consumption expenditure

Rank	Product/service category	GWP (Tg CO <sub>2</sub> eq.)	Share in total industrial GHG emissions
2	Retail trade, excl. eating and drinking	326.8	5.4%
4	Eating and drinking places	301.3	5.0%
5	Hospitals	268.3	4.4%
8	Owner-occupied dwellings	148.7	2.4%
9	Real estate agents	124.5	2.1%
12	Wholesale trade	111.8	1.8%
16	Natural gas distribution	67.6	1.1%
17	Banking	65.7	1.1%
18	Automotive repair shops and services	64.8	1.1%
20	Sanitary services and steam supply	58.8	1.0%
21	Doctors and dentists	58.5	1.0%
24	Insurance carriers	50.2	0.8%
25	Other State and local government	47.2	0.8%
26	Nursing and personal care facilities	46.1	0.8%
27	Water supply and sewerage systems	45.9	0.8%
28	Computer and data processing services	43.2	0.7%
29	Telephone and other communication	43.2	0.7%
30	Other amusement and recreation	42.3	0.7%
Subtotal		1914.9	31.61%

# **TOPIC SIX**

***- Institution Building and Policy Instruments -***

## **The Politics of Sustainable Consumption**

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### **Abstract**

How can sustainable consumption be put firmly on the political agenda? What would a sustainable consumption policy look like? How might sustainable consumption programmes work? I intend to promote a discussion on these questions so we can focus and drive research to make a real difference to government policy.

# **Institutions for Sustainable Consumption – Analysing Agenda 21**

Paper presented at the International Workshop

## **DRIVING FORCES AND BARRIERS TO SUSTAINABLE CONSUMPTION**

UNIVERSITY OF LEEDS, UK, MARCH 5<sup>TH</sup> TO 6<sup>TH</sup>, 2004

by Joachim H. Spangenberg

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### **Abstract**

As confirmed by the World Summit for Sustainable Development in Johannesburg, Agenda 21 is still the key document for sustainable development planning and policies. It contains a chapter on sustainable consumption, which suggests a series of measures for sustainable consumption and production and was the basis for indicators published by the UN in 1996 and revised in 2001. However, these indicators are not sufficiently targeted at the consumption patterns prevailing in the affluent countries and amongst the “golden billion” of participating in the global consumer society.

To overcome this problem, UNCSD in 1995 started a program called CCPP, Changing Consumption and Production Patterns, resulting in a specific set of indicators published in 1998. The indicators focus on the environmental impact of household consumption (resources used and the main household consumption patterns relevant in this respect), but neglect the role of business, state consumption, the social impacts and the institutional conditions for sustainable consumption. The individual indicators are designed to measure the state of the art regarding consumption, but do not provide any insight into the driving forces shaping consumption patterns.

Consumer research has by now time generated a lot of insight concerning the intrinsic motivations and driving forces for private consumption, but much less is known regarding the institutional setting necessary for or at least supportive to sustainable consumption of state and households.

At first glance, Agenda 21 could also be helpful in this respect: institutions for sustainable development play a key role throughout the document. Consequently, the comparison of institutional and consumption issues in Agenda 21 provides insight, in how far the theme of sustainable consumption has really been integrated into sustainability planning as foreseen by Agenda 21.

Unfortunately, the list of institutional sustainability indicators as suggested by UNCSD in 1996 and revised in 2001 is far from exhaustive, and due to its patchy character cannot serve as the basis for a comparative analysis. Therefore the paper makes use of the results of an earlier project, which provided a full list of the institutions (organisations, mechanisms and orientations) included in Agenda 21. Indicators have been suggested, subdivided in core institutional and interlinkage indicators for the economic, social and environmental dimension.

A first comparison of the indicators illustrates that sustainable consumption has not been integrated into the policy perspective when defining the relevant institutions for sustainable development. In a second step, some suitable indicators are isolated, but a significant deficit remains.

The deficit identified can be overcome either from the institutional analysis side, asking for the consumption relevance of the institutional setting already mentioned, or from the

consumption side. In the latter case, a new analysis is necessary to identify institutions relevant to sustainable consumption. In this case, institutional analysis needs to be supplemented by more empirical research regarding the impacts of different institutional settings on the changes in consumption patterns.

**Key Words:** Sustainable consumption, sustainability indicators, institutions for sustainable development, institutional sustainability indicators, norms, *leitbilder*

## 1. Introduction

*Agenda 21* (United Nations 1993) has been reconfirmed as the basic document for international efforts towards sustainable development during the 2002 WSSD in Johannesburg (WSSD 2002). However, despite intensive debates in the past (see for instance Norske Miljøverndepartementet 1995; OECD 1998), it is still not clear how to deal with the issue of sustainable consumption. Promoted by UNEP and supported by the EU, it figured prominently in the controversies during the WSSD, but how the 10-years plan of action on sustainable consumption the conference finally called for can be integrated with the implementation of Agenda 21 or the *Johannesburg Plan of Implementation* remains an open question (the USA was strictly opposed to the issue as such, preventing the plan to become mandatory). In particular the institutional conditions for successfully enhancing the sustainability of the prevailing consumption patterns have not been discussed. So it seems useful to get back to the original documents, trying to find opportunities for integration and furthermore to identify the needs for conceptual development beyond Agenda 21.

## 2. Sustainable consumption objectives in Agenda 21

Agenda 21 consists of 40 chapters; one of them, Chapter 4, is specifically dedicated to improving the sustainability of development through more sustainable patterns of consumption and production. It is titled “Changing consumption patterns” and according to paragraph 4.1 includes two programme areas

- (a) focussing on unsustainable patterns of production and consumption, and
- (b) developing national policies and strategies to encourage changes in unsustainable consumption patterns.

The objective underlying these themes is rather different from other sections of Agenda 21: whereas the emphasis usually is on enhancing the standard of living and thus the level of consumptions for the majority of the World’s citizens, here the quality of consumption is highlighted. This refers to poverty stricken regions, as the damage from poverty-imposed consumption patterns needs to be reduced by sufficient and sustainable consumption, but in particular to the patterns of overconsumption in the affluent countries and the global consumer class. Already the introduction to the chapter states the obvious: the issue of changing consumption patterns is characterised as “very broad”, and the readers’ attention is directed to other chapters of the Agenda to be taken into account as complementary to Chapter 4, in particular those dealing with energy, transportation and wastes, and the chapters on economic instruments and the transfer of technology. No reference is made to Chapter 8 (decision making) and Chapter 40 (information and indicators).

The text urges to adopt an international approach to promoting and achieving sustainable consumption patterns, calling on developed countries to take the lead. As developing nations follow development trajectories similar to those of the industrialised countries, it is essential that the latter demonstrate that resource-efficient, low-pollution production and consumption patterns are feasible and attractive. Literally, Chapter 4 of Agenda 21 states that *“the major cause of the continued degradation of the global environment is the unsustainable pattern of consumption and production, particularly in industrialized countries”*. Noting that consumption levels are very high in certain parts of the world, it concludes: *“This results in excessive demands and unsustainable lifestyles among the richer segments, which place immense stress on the environment. The poorer segments, meanwhile, are unable to meet food, health care, shelter, and educational needs”*.

Paragraph 4.7 defines the two key objectives of the chapter: to “*promote patterns of consumption and production that reduce environmental stress and will need the basic needs of humanity*”; and to “*develop a better understanding of the role of consumption and how to bring about more sustainable consumption patterns.*” For this behalf, research on consumption is considered a major and pressing challenge to achieve progress on the political level – orientation of politics by better information and understanding the driving forces and how to change them is identified as an essential task.

The following broad policy objectives are proposed for co-operation of governments with the appropriate organisations, to encourage changes in unsustainable consumption patterns:

- to promote efficiency in production processes and reduce wasteful consumption in the process of economic growth, taking into account the development needs of developing countries;
- to develop a domestic policy framework that will encourage a shift to more sustainable patterns of production and consumption; and
- to reinforce both values that encourage sustainable production and consumption patterns and policies that encourage the transfer of environmentally sound technologies to developing countries.

## **2.1 Activities suggested**

Chapter 4 recommends five major activities for reaching these objectives, which have to be implemented simultaneously to achieve the change in consumption and production patterns considered necessary:

- i) encouraging greater efficiency in the use of energy and resources;
- ii) minimising the generation of wastes;
- iii) assisting individuals and households to make environmentally sound purchasing decisions;
- iv) exercising leadership through government purchasing; and
- v) moving towards environmentally sound pricing.

In order to evaluate whether or not the contextual framework of Agenda 21 is adequate to encourage these activities, it is necessary to analyse their meaning and implications in some more detail.

### *2.1.1 Encouraging greater efficiency in the use of energy and resources*

To operationalise this recommendation, first of all the question must be answered “What is efficiency?” At first glance, the question is an economic one and the answer is rather simple: a tool is efficient if it effectively fulfils its task, to the satisfaction of its users, at minimum costs. But what is the task, and what are the costs?

Imagine the example of a European small to middle class car: it may cost 5,000 to 30,000 € (1,000 € thereof for advertising), have 80 to 180 horse powers to propel 4 to 5 persons at 190 to 230 km/h, while consuming 8 to 14 litres of gasoline/100 km. Overall, the differences in performance do not explain the difference in price. So it is not only the effectivity of task fulfilment, but the wider consumer satisfaction one has to look to for an explanation. Safety, comfort, image and reputation, the opportunity to compensate for experiences of private or professional suppression and other frustration by aggressive driving, and the feeling of strength and power through a strong motor enjoyed by weak

personalities play a crucial role. Not starting in A and arriving at B in a suitable condition and after an appropriate time span makes the driver happy, but how he (less she) did it.

Leaving aside for the moment the cost of infrastructure, noise, pollution, health and accidents, we are still confronted with the resource use issues Agenda 21 refers to. From a physical point of view, a car is made from about 10 tons of resources, turned into 1 ton of an technical artefact used to transport in average 100 kg of humans. For environmental reasons a catalytic converter is added, which in its production process consumes a volume of resources as high as the weight of the car itself. The resulting mobility service is used mainly in cities where the average car transport velocity is about 15 km/h, well below the 17 – 20 km/h of the horse carriage, and for distances of less than 1 km, where it would have been faster to go on foot. This service is in total enjoyed for about three months: the average car use time in Germany is 200 hours per year or 33 minutes per day over 12 years life time (making the car an “autostabile” rather than an “automobile”), and then the car is thrown away; recycling of spare parts plays no significant role so far. The relation of resource consumption and cost incurred to the volume of services generated is rather absurd.

Similarly, while the total volume of resources needed to produce and maintain a vacuum cleaner for households is several hundred kilograms, its total time of service delivery (i.e. the use time accumulated over the life time) is about two weeks, and for a household quality electric drill it is less than two days. For the middle class car, depreciation per hour of use is 2 to 12 € the vacuum cleaner accounts for 0.50 € depreciation and another 0.50 € for the storage area, and the fix costs of the drill are 0.5 to 1 € per hour of use.

Drawing lessons from the examples above, the definition suggested has to be rephrased: Efficiency is the effective, durable and convenient fulfilment of functional and symbolic needs and wants, using a maximum of human capital (ingenuity) and a minimum of natural and economic capital. Seen this way, affluent societies and the consumption patterns of the “golden billion” of global consumers still offer significant room for improved efficiency.

### *2.1.2 Minimising the generation of wastes*

For reducing the absolute volume of waste produced two strategies can be pursued, preferably in combination: reducing the relative amount of waste per unit of resources activated, and limiting the total resource throughput of the economy. The first objective can be achieved by enhancing the resource use efficiency (i.e. reducing the resource intensity of consumption, or – equivalent – increasing the resource productivity of production), and by increasing the level of reuse, recovery and recycling. This has a number of preconditions:

- Waste must become economically useful; waste as the main product of our economies (in a physical sense) must be due to product quality standards like any other output of the economy: this is what sustainability design and sustainable production are dealing with. Waste must become a ready-to-use resource.
- Waste is abundant and must become a scarce resource to become economically valuable: this is what the market effect of throughput reduction is all about.
- Waste must be cheaper to use than virgin materials. This is what new recovery and recycling technologies try to achieve, but they must be supported by price increases of virgin material: then waste will become a competitive resource.

In a capitalist economy both efficiency and recycling are a matter of factor prices, if pursued through the market. Currently, however, primary resource prices are so low (and

keep on falling) that neither the consumption needs of the producing countries are met, nor the consumption wants of the consumers face an economic limit in line with environmental concerns. The income of Third World producers can be improved by international price agreements, fair trade contracts, support for the internalisation of social and environmental costs, and by direct transfers. In the affluent economies, interventions into the price system such as environmental taxes are a necessary precondition for reducing waste generation, if not more bureaucratic regulations like obligatory recycling quota are preferred.

Such an approach has a number of benefits as compared to traditional environmental policy, if properly designed. As prices are rather unspecific instruments, leaving it to the business sector to find the appropriate answers to the economic challenge, it seems most appropriate to apply price increases to the resource input, for instance by a kind of Material Input Tax MIT in order to cover all kinds of physical throughputs systematically. As an environmental policy instrument it is

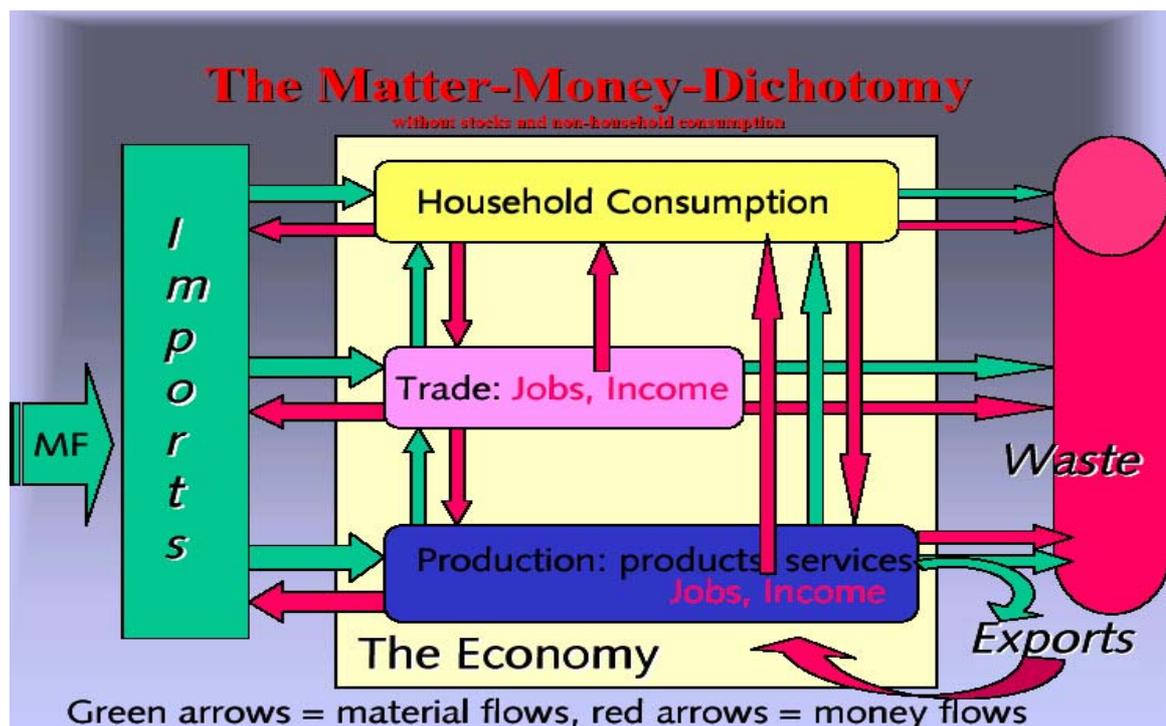
- proactive, as it reduces the pressures before the damages become obvious. This includes most of the currently discussed environmental problems (Lorek, Spangenberg 2002), but refers as well to these so far unknown and developing only in the future (if not checked beforehand);
- comparably simple to administer, as in a Western European economy, 50-60 distinct abiotic materials (including energy carriers and water but not air) are crossing the border into the economic sphere at about 20,000 points of entry (Spangenberg et al. 1999) On the output side about 100,000 substances – about 33,000 thereof in significant quantities – and 2 million products leave the human sphere and are returned to the environment (Sturm 2001), at countless points of exit (smokestacks, drainpipes, waste dumps, exhaust pipes,...). Obviously, the sheer numbers of substances to be controlled and their emission points are beyond the scope of effective control.
- stimulating innovation, as any cost increase would do. This is a rather normal economic process and depends on functioning markets, sophisticated research and development, and a reliable medium-to-long-term perspective in environmental taxation.
- cost saving on the macro level, as the reduced need for resources pays out. The lack of eco-efficiency is an economic challenge as much as an environmental one: Hartmut Fischer of Arthur D. Little (2002) has estimated the annual cost of the German resource consumption of 11 tons domestic mineral extraction plus 9 tons energy carriers to amount to 730 billion € or 20,000 € per household. Saving a mere 25% of this material use would result in 180 billion € of savings, and in the creation of additional 700,000 paid jobs.
- all-encompassing regarding the business sectors: increasing the price levels at the input side translates into a new cost structure nobody can escape. The effect is disseminated in proportion to the volume of resources used along the chain of production, down to the final consumer.

If such measures are implemented and maintained for at least a couple of decades, the total resource throughput of the economy has been demonstrated to shrink, overcompensating the continuing economic growth and thus reducing the environmental pressures generated and enhancing the long-term resource availability (Hans-Böckler-Stiftung 2001; Spangenberg 2002; Spangenberg et al. 2003). This is in line not only with the environmental demands from the concept of sustainable development, but also with its intergeneration justice condition.

One expectation, however, has to be disappointed: the desire for a reduced need for political regulation. The hope that the market mechanism could substitute for command-and-control measures is based on the experience that functioning markets enhance the efficiency of resource use, and the expectation that this would also be the case if the resource in question is waste. However, whereas for ordinary goods an exchange process of physical against monetary resources takes place, permitting to establish market prices, identify preferences and use economic instruments to increase or decrease material flows as intended (eco-taxes, more money for less resource consumption, with differing elasticity), for waste the situation is different (see figure 1). In the former case, the flow of material and money is opposite, i.e. a market transaction results in the ownership transfer of goods and their possession as the result of an opposite flow of money. In the case of waste, however, material flows and monetary flows are not opposite but parallel; money is paid to dispossess waste (as long as waste has a negative price – otherwise it would be considered as a resource). This difference has severe institutional and economic implications: whereas in ordinary market exchanges the economic incentive is to avoid losses as they are costly, with negative prices the situation is the opposite. “Loosing” the good pays, and keeping it carefully enhances the cost of treatment and disposal. Consequently, all waste flows (including products) need regulation and monitoring, in particular as all efforts to steer waste flows by economic incentives enhance the incentive to cheat, i.e. to illegally dump the waste somewhere out of sight as the cheapest means of dispossession.

As a result, wherever the flows are of opposite direction, economic incentives benefit the objectives pursued by regulation, making it possible to partially replace administrative measures by economic instruments. Where the flows are unidirectional, however, economic incentives are opposed to environmental regulation intentions of high quality waste treatment, and the more economic instruments are applied, the more control is needed (be it command-and-control or agree-and-control, voluntary approaches).

**Figure 1: Parallel and opposing flows of money and matter**



### 2.1.3 *Assisting individuals and households to make environmentally sound purchasing decisions*

Two kinds of factors can be distinguished in purchasing decisions. *Intrinsic factors determine the desire.* The individual perception of modernity, social acceptability, moral norms, individual ideals and ethical standards, and the image linked to owning or using a certain good are important intrinsic motivations. Another one is the cognitive capacity to identify the added value and simultaneously the use value of the product, its utility and convenience. *Extrinsic factors determine the demand.* Disposable income is the most obvious restriction to realising desires and expressing them as demand on the market. However, this is by far not the only one. Acceptability by peer groups, the image of modernity, the capability attributed to products to provide a real or aspired identity for their owner or user, the use of consumption to distinguish oneself, individually or as a group, from others, the reference to shared visions and ideals a product implies are important extrinsic determinants, limiting the freedom of individual decision making and household negotiation processes by socio-economic bonds. By the way, eco-products often exhibit their own “meaning” in such an obvious way that they are not suitable as “projection screens” for any other visions and identities, rendering them unsuitable for most consumers and their needs.

Obviously, promoting sustainable consumption needs more than information (although reliable and easy-to-grasp information is indispensable). However, given the broad spectrum of influence factors, knowledge alone does not change behaviour – it is as important to get the framework right, to improve the capabilities for decisions in favour of sustainable consumption. This includes the economic dimension (income level and distribution, price structure) as well as the prevailing, accepted and promoted values. Changing the latter requires new role models, political and cultural leadership, and public ethical and value discourses, to name but a few contributions. As compared to these standards, today sustainable consumption items are

- too expensive for the given disposable income of many families, in comparison to goods with a less sustainable profile throughout production, use and disposal;
- too stressing to identify: the information overload on environmentally “correct” behaviour, and the moral pressure associated with failure makes it stressing to distinguish between “right” and “wrong” and leads to escapes into ignorance;
- too rare: if not in the supermarket, where to find them? Additional mobility demands are in conflict with time planning, cost and environmental concerns;
- too unused: changes in consumption habits occur only with a high level of inertia (fashion and experimental consumption cause short term fluctuations around a rather stable long term pattern). To overcome this inertia and to accelerate and direct change, economic, social and institutional (in particular ethical and value based, idealistic) incentives must be combined;
- too invisible: a sustainability benefit must be visible (without dominating the product character) to earn the social value-added of recognition from stakeholders and reference groups, which in turn provides an incentive for more sustainable consumption. This is usually not the case if the environmental or social benefit happened upstream and is not obvious from the final product;
- too insecure: how can a consumer be sure to gain the added value of owning and consuming a more sustainable product? Will the reference groups accept it as added value, or will the joke about the waste of money in buying it? Standardised labels for ambitious and independently controlled quality standards can help to overcome insecurity and invisibility problems.

#### *2.1.4 Exercising leadership through government purchasing*

In public procurement, taking into account a broader idea of costs relevant to the community, including social and environmental costs, could be obligatory. This is not artificial intervention, since the local or regional authorities are often the institutions which have to bear the costs caused by external environmental and social effects of the products and services cheapest in monetary terms.

In these cases, even a strictly monetary cost-benefit-analysis would indicate the superiority of solutions which are not only cheap but also enhance the sustainability of the way the administration operates. It is exactly the community represented by the government which is affected by decisions of this government's purchasing.

In a number of EU countries, national legislation still forces public authorities to accept the cheapest offer without taking these indirect costs into account.

#### *2.1.5 Moving towards environmentally sound pricing*

In a number of international documents, including the WSSD Plan of Implementation, there are calls for more efficient action by applying economic instruments and the internalisation of external cost is mentioned as one example for how to use these instruments to use the dynamic of the market for the benefit of sustainable development.

However, in many cases the hierarchy of instruments the authors had in mind is not made explicit: it is not clear whether the policy objectives should be the result of a political process, and the economic instruments designed to reach or at least support these objectives (the standard-price-approach), or whether it should be the economic calculus which determines the policy objectives (overcoming market failures). In the latter case, estimates of protection costs are combined with (rather questionable) valuations of potential future damages to assess whether or not the protection of certain environmental or social assets is economically beneficial or not. The economic optimum is taken to be identical with a maximum of welfare and thus the best solution for society. In the latter case, the cost aspect dominates all other values, like convenience, tradition, ethics, aesthetics and the like. It does not guarantee the protection of assets, but a cost optimum of destruction.

From a sustainability point of view, the former approach, political target setting (at best with broad public participation) in combination with the use of markets for implementation purposes seems promising to support sustainable consumption and production. The latter approach, restricted to monetary cost minimisation, however, is too narrow to accommodate the diversity of aspects of sustainable consumption, sustainable lifestyles and the quality of life in general.

#### *2.1.6 Conclusion*

When interpreted based on the state of the art in consumption research, the Agenda 21 work programme on sustainable consumption still covers most of the relevant themes, although this is not necessarily visible from the text of the Agenda, not is this interpretation the only one possible. However, an interpretation is necessary, as Agenda 21 is not phrased in an extremely operational way, and if the benefit of the doubt is granted to its authors, an understanding based on current research should be chosen.

The operational deficit has been recognised by the CSD itself. To overcome it, the Commission in its third session decided to initiate a work programme on sustainability indicators for monitoring problems and policies.

## 2.2 The CSD Consumption Indicators: Operational Tools for Changing the Patterns?

Started in 1995, the CSD Work Programme on Sustainable Development Indicators resulted in a set of indicators published in 1996 (UNDESA 1996). They were organised in a matrix structure, by chapters of Agenda 21 and by a classification of indicators as either driving force, state, or response indicators (the DSR scheme).

For Chapter 4, however, no response indicator measuring policies was suggested, and the driving force and the pressure indicators provided refer to the potential future resource scarcity discussed in the 1970s rather than to current consumption patterns (see table 1).

**Table 1: 1996 UNCSO Indicators for Chapter 4, Changing Consumption Patterns**

Driving Force	State	Response
<ul style="list-style-type: none"> <li>• Annual energy consumption</li> <li>• Share of natural-resource intensive industries in manufacturing value-added</li> </ul>	<ul style="list-style-type: none"> <li>• Proven mineral reserves</li> <li>• Proven fossil fuel energy reserves</li> <li>• Lifetime of proven energy reserves</li> <li>• Intensity of material use</li> <li>• Share of manufacturing value-added in GDP</li> <li>• Share of consumption of renewable energy resources</li> </ul>	

Source: UNDP/CSO 1996

Besides lacking completeness, the DSR scheme has a number of inherent weaknesses (see e.g. Spangenberg, Bonniot 1998) They have been the reason for the CSD to change their system of indicators, taking into account the results of an extended testing phase. The revised system of indicators, published in 2001 (UNDESA 2001), includes “Consumption and Production Patterns” as one Theme with four Sub-themes (see table 2).

**Table 2: 2001 UNCSO Indicators for Theme “Consumption and Production Patterns”**

Sub-theme	Indicator
Material Consumption	<ul style="list-style-type: none"> <li>• Intensity of material use</li> </ul>
Energy Use	<ul style="list-style-type: none"> <li>• Annual energy consumption per capita</li> <li>• Share of consumption of renewable energy resources</li> <li>• Intensity of energy use</li> </ul>
Waste generation and Management (19-22)	<ul style="list-style-type: none"> <li>• Generation of industrial and municipal solid waste</li> <li>• Generation of hazardous waste</li> <li>• Generation of radioactive waste</li> <li>• Waste recycling and reuse</li> </ul>
Transportation	<ul style="list-style-type: none"> <li>• Distance travelled per capita by mode of transport</li> </ul>

Source: UNDESA 2001

The revised set of indicators comprises resource consumption, waste generation and travelling distances, neither covering completely the key fields of household consumption

(construction and housing, mobility and transport, food and agriculture, see Lorek, Spangenberg 2001, Spangenberg, Lorek 2002), nor touching upon state consumption or the role of business, let alone the driving forces and institutional settings identified as essential for sustainable consumption to emerge.

This deficit is at least partly due to the fact that the CSD indicators by their very nature have to be globally applicable and cannot focus solely on the situation of affluent consumers and rich societies.

### **3. The UNDESA CCPP Programme and Indicators**

To overcome the focussing problem, the CSD at its third session in 1995 adopted an International Work Programme on Changing Consumption and Production Patterns (United Nations 1995). In line with Agenda 21, it includes the following six elements:

- i) Identifying the policy implications of projected trends in consumption and production patterns;
- ii) Assessing the impact on developing countries, especially the least developed countries and small island developing States, of changes in consumption and production in developed countries;
- iii) Evaluating the effectiveness of policy measures intended to change consumption and production patterns, such as command-and-control, economic and social instruments, and government procurement policies and guidelines;
- iv) Eliciting time-bound voluntary commitment from countries to make measurable progress on those sustainable development goals that have an especially high priority at the national level;
- v) Revising the United Nations Guidelines for Consumer Protection; and
- vi) Reinforcing values that support sustainable consumption.

This list of tasks covers or at least touches upon most of the issues pointed out earlier as relevant for the development of sustainable consumption. It furthermore draws the attention to the international implications of a shift towards sustainable consumption patterns, and the necessity to develop and support transition strategies in the countries so far dependant on earnings from resource exports. However, whereas the goals are rather appropriate for the overarching objective to achieve a more sustainable consumption on the global scale, the corresponding policy measures refer more to the necessary monitoring than to the policy to be monitored itself. On the one hand, this gives the countries the freedom to develop their own policies, on the other it leaves them without advice regarding effective approaches.

This may be due to the fact that so far there is no unanimous consent as to which kind of policies should be preferred to improve the sustainability of consumption patterns – in this case, iterative learning processes are the most suitable way to proceed. Learning processes, however, need quantifiable measures of progress, as otherwise no feedback regarding the effectiveness of specific policies and thus no learning is possible. The CCPP indicators suggested by the United Nations are therefore an attempt to deliver an essential tool for policy development (UNDESA 1999). They are subdivided into two sections. The first one refers to the key resources used in consumption and production, with the sub-themes energy, materials and land (see table 3, part a).

### **Table 3: The core set of CCPP Indicators**

#### **3a. Key Resources**

<i>Energy</i>	1.	Annual energy consumption per capita
	2.	Intensity of energy use
	3.	Share of renewable resources in total energy consumption
	4.	Energy prices
<i>Materials</i>	5.	Total material requirement
	6.	Intensity of material use
<i>Land</i>	7.	Intensity of water use
	8.	Land use

From a physical point of view, this categorisation is adequate; the indicators are no longer focused on resource scarcity, but rightfully on the absolute and relative throughputs of energy and materials through the economy. For the sub-theme of land use, however, no operational indicator has been developed so far, and themes like biodiversity are completely missing.

The second section of CCPP indicators is dedicated not to the physically measurable impacts, but to the mechanisms behind; it is titled “Consumption Clusters” (see table 3, part b).

### **Table 3 (cont.): The core set of CCPP Indicators**

#### **3b. Consumption Clusters**

<i>Mobility</i>		<i>Food</i>
		<i>Recreation</i>
<i>Consumer goods and services</i>	9.	Distance travelled per capita by mode of transport
	10.	Number of road vehicles
<i>Buildings and housekeeping</i>	11.	Retail sales of selected goods per capita
	12.	Market share of more sustainably produced goods and services
	13.	Residential energy and water use per household
	14.	Average household size
	15.	Market share of more sustainably produced food
	16.	Spending on recreation as share of disposable income
	17.	Time spent on leisure, paid and unpaid work, and travelling

Source: UNDESA 1999

The list of sub-themes includes the three environmentally relevant clusters of mobility, building and housekeeping, and food, but adds two more sub-themes: recreation and consumer goods and services. This is slightly confusing, as the environmental impact of recreation is overwhelmingly caused by leisure mobility and thus already covered; the social meaning of recreation can hardly be captured by measuring the time and money spent. Consumer goods and services is the one section for which so far (2003) no detailed indicators have been suggested, for good reasons: as far as the environmental impact is concerned, the most relevant goods and services are already covered by the other sub-themes. So here an opportunity emerges to focus on the social and institutional driving forces, on the symbolic value of specific products and services, their reputation, identity and distinction function. These aspects, however, have so far not played any role in the CSD indicator development process. The mechanistic world view that the rational interest of informed consumers will be sufficient to change the consumption pattern has been

challenged frequently, but so far not been replaced by a broader, more realistic perception of the economic actors. The opportunity of going beyond the established view is given on this occasion, but has not been exploited so far.

Furthermore, the indicators suggested are far from exhaustive regarding the sub-themes they are allocated to. The responsibility of the supply side (planners, administration and business) is not touched upon, and state consumption for education, health, security and general administration is not taken into account at all. Furthermore, sustainability is implicitly defined with a strong environmental bias. So although providing an excellent starting point for measuring the sustainability of consumption in affluent societies, the CCPP indicators are far from being a final solution to the problem. The key problem is the fact that the indicators, intended to help steering policies towards sustainable consumption, has no reference to the social driving forces and the institutional setting determining the sustainability of prevailing consumption patterns. Without these, however, no successful policies for sustainable consumption and production can be designed, implemented and monitored. Whereas the indicators provided may be suitable for monitoring the effects of policies (as indicators for symptoms this is their key purpose), by the will not be suitable for addressing the causes, i.e. for strategic policy development.

In order to explain this deficit, there are two options: either Agenda 21 does not properly address the institutions at all, or the section on consumption does not sufficiently exploit the range of institutions addressed by the full text of Agenda 21. Consequently, the next step is to analyse the institutional content of Agenda 21 and screen it for consumption-relevant institutions. For this behalf, first a coherent and adequate definition of institutions is needed, which is then applied to Agenda 21 as a yardstick to identify its institutional content (Spangenberg 2001).

#### **4. Institutions in Agenda 21**

Institutions, in the narrowest sense, comprise organisations, and in the wider sense applied here, additionally the structures, mechanisms and orientations of societies, which can be analysed in a historical, juridical, sociological or economic perspective. Economics analyses the utility maximising behaviour of isolated individuals within the institutions and asks for their impact on the function of the system, thus neglecting the influence of the social context on the individuals. Opposed to this, sociology focuses on these influences, perceiving individual behaviour mostly as a dependent variable. Neither of them – and even less so the historical and juridical analysis – reflect the complex interactions of the micro and the macro level and the role they play for institutions in sustainable development. In particular, while both focus on the way a specific institution functions, they give little hints regarding the performance of institutions, their suitability for and success in supporting sustainable development (Spangenberg et al. 2002).

Opposed to this, policy science perceives ‘institutions’ as interpersonal systems of rules governing decision making. Very broadly defined, institutions for sustainable development are to be understood as the rules by which decision-making for sustainable development and implementation of these decisions is structured. Institutions are “systems of rules for authoritative conflict solution disposing of mechanisms for rule enforcement” (Czada, 1995, p. 205), and “systems of rules for the development and implementation of mandatory, societal relevant decisions and organs of symbolically facilitating societal orientation” (Göhler, 1997, p. 29). This policy science approach to sustainable development focuses on the sustainability relevant aspects of the role of organisations, decision-making processes and orientations, the impacts they have and the consequences they cause or contribute to.

Consequently, a policy science based approach to institutions for sustainable consumption must focus on their impacts rather than on their specific structure.

**Table 4: The Relationship of Ideas and Institutions**

<i>Domain</i>	<i>Elements</i>
<b>Ideas</b>	general expectations of a society guiding its behaviour; values, ideas, principles
<b>Institutions III:</b> institutional orientations	norms, <i>leitbilder</i> , mental maps, ideologies
<b>Institutions II:</b> institutional mechanisms	administrative, legal, political, social procedures, constitutional rules, organisational rules and standing orders of governmental bodies, associations, unions, NGOs, etc., written agreements, but also questions of tax law
<b>Institutions I:</b> organisations	structured temporary or permanent organisations with implicit and explicit and implicit internal rules, including formal associations like parties, sports clubs and churches, but as informal networks like NGOs or business clusters.

The definition encompasses ‘social and cultural rules’ on the national and sub-national level only as long as they play a positive or negative role in the political process towards sustainable consumption. Whereas the general social rules (expectations, values, ideas and principles) are the domain of ‘ideas’, the domain of ‘institutions’ as social rules relevant to sustainable consumption can be subdivided into institutional orientations (norms, *leitbilder*, mental maps), institutional mechanisms (procedures, legal norms) and organisations (see table 4). However, it is generally difficult to determine the borderline between ‘general social rules’ and ‘sustainability relevant social rules’ on an abstract level. On the one hand, institutions reflect the values upon which a society is based, and on the other they influence the expectations, values and principles of a society, e.g. what is understood as ‘justice’ and ‘solidarity’. Hence, institutions are empirical as well as normative phenomena. From this conceptualisation two characteristics of institutions for sustainable consumption can be derived which are suitable as analytical criteria for the identification of such institutions: They facilitate decision-making serving the various implicit and explicit goals of sustainable consumption, and/or they facilitate the implementation of such political decisions (Spangenberg et al. 2002; Spangenberg 2002).

#### **4.1 The institutional content of Agenda 21 – relevance for sustainable consumption**

Agenda 21 as a document frequently refers to institutions in the narrow meaning of organisations (without providing a clear definition), and characterises a variety of mechanisms as “institutional”. Orientations are mentioned as well (frequently with reference to indigenous peoples and religious and ethical motives), but not under the heading of institutions. So the most relevant institutions for the future development of consumption patterns are neither systematically addressed, nor is their character as institutional conditions for development processes recognised (at least not explicitly). For the purpose of analysis, however, it

seems to be adequate to make use the broader concept when analysing the Agenda, to identify its full potential for supporting the move towards sustainable consumption and production patterns. This has been done in a project for UNCSA, funded by the German Environment Agency, resulting in a list of institutions, their objectives and suggestions for indicators to measure their performance. In table 5, those indicators and themes have been selected for presentation, which cover consumption-relevant issues (overlaps with the CCPP indicators are marked by printing in *italics*).

The analysis of institutions implicitly and explicitly addressed has demonstrated that a wealth of institutional references can be found in Agenda 21. It refers to a plethora of organisations, to many mechanisms and to a number of orientations, but includes no comprehensive list, nor does it show a systematic integration of these different levels of institutions. In particular the crucial role of orientations (they determine to limits to political action by shaping the acceptability and the represent the habits which result in specific consumption patterns) seems to be underestimated.

**Table 5: Consumption-Relevant Institutions in Agenda 21 and Their Indicators**

Health Issues	Health expenditures Water expenditures as share of disposable income Energy expenditures as share of disposable income
Employment and income issues	% employed Income distribution Real taxation level <i>Spending on recreation as share of disposable income</i> Time spent on leisure, paid and unpaid work, and travelling
Environment	<i>Distance travelled per capita by mode of transport and gender</i> <i>Number of road vehicles</i> <i>TMR, TMR/GDP</i> <i>Share of organically produced farming products</i> Private debt as share of the annual household income Energy consumed, energy intensity of GDP
National budget	Share of disaster prevention Share of military expenditures

Table 5 clearly indicates that state consumption plays a minor role in the total of institutions in Agenda 21 (expenditures for health, military and disaster prevention show up), and that of the issues concerning household consumption only a fraction is dealt with.

#### **4.2 The Deficits of Agenda 21**

Regarding household consumption, the situation is rather ambivalent: on the one hand, extrinsic factors like limitations through disposable income and household debt are mentioned regarding water and energy expenditure; in more general terms, employment rate and income distribution point to the conditions shaping the patterns of consumption. On the other hand, no reference is made to status and positional goods (when people buy things they don't need with money they don't have to impress people they don't like), to compensatory consumption or to addictive buying. The role of fashion, peer groups and social pressures is not reflected in the Agenda. Constraints and motivations from ethical or other value-based discourses are mentioned, but not in the context of sustainable consumption and not in an operational way.

Furthermore, the supply side is not taken into account: business and planners, designers and decision makers have a significant influence on what is available to consumers. They determine to a significant degree how desires are translated into demand, which options are available to realise dreams and aspirations, what households can consume (even if there are no social or economic constraints).

In total, despite the broader coverage of institutions and the overlaps between the CCPP indicators and the institutional content, Agenda 21 must be described as overly simplistic, assuming a simple mechanical relation of information provision, human understanding and adaptation of behaviour in general and of consumption patterns in particular. Power structures, social processes and institutional constraints are neglected when measures for sustainable development are suggested; the complex interaction of social, psychological, economic and institutional factors in determining patterns of consumption and production are not adequately addressed. As it stands, Agenda 21, despite its merits, is not a suitable basis for any policy factually changing the patterns of consumption.

## **5. Sustainable Consumption in the WSSD Plan of Implementation**

The deficits pointed out above have become ever more clearly visible since the UNCED conference in Rio de Janeiro 1992. There have been debates, failed and successful projects and many efforts, which at least provide material enough to learn from failures (success stories are rare). In the run up to the 2002 Johannesburg World Summit on Sustainable Development WSSD, there was plenty of opportunity to exchange experience and draw lessons for the future. So it is interesting to conclude with a brief assessment of the WSSD Plan of Implementation (PoI), which attributes a crucial role to sustainable consumption and production, dedicating its Section III to “Changing unsustainable patterns of consumption and production”. The chapter includes paragraph 13 to 22 (of a total of 153) and has a prominent position in the report (rather similar to Chapter 4 in Agenda 21).

Paragraph 13 defines the global scale of the task, stating that “*All countries should promote sustainable consumption and production patterns, with developed countries taking the lead and with all countries benefiting from the process*”. For this behalf, § 14 calls to “*promote the development of a 10-year framework of programmes [...] to accelerate the shift towards sustainable consumption and production*”. The purpose of such programmes is defined as – again – to promote “*social and economic development within the carrying capacity of ecosystems*”. Sustainable consumption has a lot to do with promotion, and it is essentially environmentally sustainable consumption and production. This is confirmed by the reference to the instruments to be chosen: “*where appropriate, delinking economic growth and environmental degradation through improving efficiency and sustainability in the use of resources and production processes, and reducing resource degradation, pollution and waste*.” For this behalf, countries should “*identify specific activities, tools, policies, measures and monitoring and assessment mechanisms, including, where appropriate, life cycle analysis and national indicators for measuring progress, [...] applying, inter alia, the polluter-pays principle*” and “*[d]evelop awareness-raising programmes [...], through, inter alia, education, public and consumer information, advertising and other media*”. This should be supported by developing and adopting “*where appropriate, on a voluntary basis, effective, transparent, verifiable, non-misleading and non-discriminatory consumer information tools*”. Policies should be developed to provide incentives to “*[i]ncrease investment in cleaner production and eco-efficiency in all countries*” such as “*state financed loans, [...], technical assistance and training programmes for small and medium sized companies*” and should promote the “*[u]se of environmental impact assessment procedures*”.

Specific sub-chapters are dedicated to energy (including energy conservation, efficient energy use and the need to support the development of renewable energy sources: § 19), to the need for efficient multi-modal transport systems (§20: they should be safe, affordable and convenient, reducing congestion, adverse health effects, greenhouse gas emissions and urban sprawl), to waste (prevent and minimize waste and maximize reuse, recycling and use of environmentally friendly alternative materials, environmentally sound disposal: § 21) and to the sound management of chemicals throughout their life cycle (§ 22).

The tone and the level of details have changed from Agenda 21 to the PoI, as should be the case if the step from airing objectives to defining specific targets is done. It provides a mix of policy suggestions, objectives, targets, policy recommendations and suggestions for policy instruments, naming politics and public authorities as responsible for taking such measures. It also emphasises the role of the business sector, with a focus on small and medium sized enterprises, and call for policies affecting their behaviour and performance. A remarkable demand is the call, pushed into the PoI by intensive NGO campaigns before and in Johannesburg, to “[e]nhance corporate environmental and social responsibility and accountability”, including “codes of conduct, certification and public reporting on environmental and social issues, [...] workplace-based partnerships and programmes”; the latter a key concern of the international Trade Union Movement meeting in Johannesburg. As a result of fierce resistance from some countries, many of the policy suggestions come with caveats like “as appropriate”, “on a voluntary basis”, “in line with WTO regulations” and other phrases to make sure that free markets, or the development of poor countries, or free trade, or economic growth are not disturbed.

The Johannesburg Plan of Implementation is much more concrete than Agenda 21, and it touches upon a number of issues which Agenda 21 has not dealt with properly. This includes a strong reference to the role of business, although mainly support for business is addressed, not tasks and obligations. However, in this respect the call for corporate accountability provides a good starting point for a stepwise policy procedure, starting with voluntary activities, the definition of best practice for corporate social responsibility programmes, and ending with legal provisions to provide a level playing field for all enterprises. Reference to state consumption remains rather vague, highlighting the role of public procurement, but neither mentioning the possibility to transform state consumption in such important areas as health and educational services, nor the role public authorities play in shaping private consumption by legislation and planning. Whereas the economic and information instruments discussed are broadly in line with what is needed to promote environmentally sustainable consumption and production, unfortunately there is no reference to the social processes determining values and motivations. Stronger than in Agenda 21, the role of specific information (labelling etc.) is highlighted, plus the role of awareness rising. However the next step, discussing preferences and how to influence them for the benefit of sustainable consumption is not taken. Social factors, habits and expectations as driving forces of human behaviour, in corporations and for consumers, are not mentioned. To a large degree, individuals and households, and economic actors in general, seem to be considered to be a-social actors, their behaviour determined by insight, not by the social influences which have been empirically shown to be shaping consumption and production.

The social dimension of sustainable consumption and production is mentioned frequently, but the instruments suggested refer rather exclusively to the environmental dimension. Economic aspects are not touched upon in a sustainability perspective, but the market economy in a neo-liberal view is taken to be economically sustainable as such. The reservations of many countries, in particular the USA, to consider their current life styles as a problem, and the production patterns as an issue of state concern, have led to a preference for voluntary action and market mechanisms, without a serious analysis in which cases and under what

circumstances these are promising instruments, and under which other conditions different instruments might be more promising. Policy science is in rather unanimous agreement that for an issue as complex as sustainable production and consumption not one “silver bullet” will do the job, but a broad range of instruments is necessary.

One more positive aspect is the permanent reference to the development opportunities of the so-called developing countries, and the reference to their shared but differentiated responsibilities. For instance China, now the World’s biggest consumer of resources, cannot be ignored when talking about globally sustainable patterns of production and consumption. However, besides stressing the responsibilities of the South, it is just as important that providing a different role model in the North (in particular in Europe and Japan, as the USA is not willing to change course for the time being) is combined with support for transition strategies in the South, as changes in the consumption patterns in a globalised economy necessarily affects global partners on all steps of the chain of production, consumption and disposal.

Consequently, although the measures suggested are much more operational than in Agenda 21, although they cover a broad range of issues in a more determined way, and although they will definitely make the economies and societies in particular in affluent countries less unsustainable if implemented, how the recommendation to “*integrate the issue of production and consumption patterns into sustainable development policies, programmes and strategies*” is to be realised, remains an item for future debates and efforts.

## 6. Conclusion

From Agenda 21 via different indicator programs to the Johannesburg Plan of Implementation, significant progress has been made in the attempt to accommodate sustainable consumption and production into the overall sustainability framework. Nonetheless, still a lot remains to be done to come to grips with the issue and the full spectrum of its factors and driving forces. A real integration is still pending, and government initiatives are so far rather punctual and exemplary than broad and consistent. This impression has been confirmed by the recent discussions in the European Union and in Germany on this issue.

What is missing is the extension of the task list to include social, economic and institutional sustainability criteria as well, and a non-mechanistic and thus more realistic perception of society, taking into account the role of institutions and the co-evolution of the social, economic and institutional dimensions. Modern consumer research has a lot to contribute to the appropriate shape and effective implementation of national sustainability strategies, but so far this knowledge is rarely made use of in the political process.

One major problem is the consumption pattern of current idols, the rich and the beautiful (usually also rich). Their consumption patterns are more resource intensive than those of the average household (which falsifies the expectations that increasing wealth would lead to reduction of environmental pressures, the “Environmental Kuznets Hypothesis”), making it an important policy task to develop specific policies affect the behaviour of the most wealthy segment of society (Lorek, Spangenberg 2001).

Politics for sustainable consumption needs clear frameworks, but also new positive examples, identities and leitbilder (the common denominator of the possible and the desirable, a positive vision of the future as it should and could be). Politics in this respect cannot restrict itself to moderation, but is responsible for setting directions (with citizens having a democratic choice). Leadership is necessary, plus transparency about the consequences of different decision options.

Sustainable consumption and production will remain a policy challenge for the foreseeable future. Nonetheless action is possible and necessary today, combined with an iterative learning process to improve the quality of life while enhancing the sustainability of the prevailing lifestyles.

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# A Global Institution for Locally-Driven Sustainable Production and Consumption

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## Summary:

Current patterns of production and consumption fail to meet the needs for over 1 billion of the earth's present inhabitants, yet jeopardize prospects for future generations.

The market economy reflects one side of human nature and potential, and helps humanity cultivate and harvest *part* of what we need to survive and to thrive. Its explosive growth has been enabled by market-supporting *institutions*: rules, enforcement mechanisms and organizations, including systems of credit and finance, property rights, patent law, and less formal but equally important norms of behavior. This growth has brought profound benefits, along with profound damages to natural, cultural and social environments, exploitation of people, and gross and persistent – indeed, structural – imbalances of power and well-being, of development. Humanity responds to the excesses and costs of the economy primarily with various forms of centrally coordinated collective action, primarily government, primarily at the level of nation states. But these centrally coordinated, concentrated-power solutions fall increasingly short in their responses to the evolutionary dynamism, as well as the global reach, of the market.

This paper describes a system of practical, simple, yet powerful global institutions to promote locally-driven sustainable production and consumption. The goal is to augment, not replace, the market and centralized governance. The system design draws on recent advances in stakeholder engagement, individual human development, community-driven development, social capital and the theory of global public goods. The interconnected institutions are:

- a) A corporate labeling system for continuous sustainable improvement and annual contributions to a global development fund. Each company establishes, with participation of labor and other stakeholders, measurable targets and practical actions to improve the company's economic, social, and environmental impacts. Progress begins with SMEs, creating a business case for large company membership. Existing labeling schemes and reporting systems are applied and innovated within this framework, at the discretion of each company and its stakeholders, in ways most appropriate to the individual applications. Thus, the ends, not the means, are branded.
- b) A global fund with equal per capita allocation, decentralized management, investing in human development and community-based action for sustainable consumption;
- c) Governance of the labeling system and fund based on a global peer review network, using empowerment evaluation and web-based transparency to increase performance and promote learning.

### **Background: The Economy and the Freeconomy**

Imagine the earth from space, in broad-brush sketches of the infinite and dynamic complexity. Oceans teeming with life, suddenly nearing exhaustion from hungry humanity's mounting chase. Cities, song and dance, cultures, technology, and an ever-growing economy. Starvation, poverty, sickness, terrorism, and war. The status, and the trends, inspire both celebration and outrage at the same time.

The market economy reflects one side of human nature and human potential. And it helps empower humanity to cultivate and harvest *part* of what we need to survive and to thrive. During the past 200 years the market economy has grown exponentially in scope. So have its benefits, and so have its costs. Its explosive growth has been enabled by market-supporting *institutions*, which are rules, enforcement mechanisms and organizations, including systems of credit and finance, property rights and their enforcement, patent law, judicial systems, and less formal but equally important norms of behavior.

But in the absence of an equally thriving and developing freeconomy, the economy and the humanity that shapes and is shaped by it, have grown severely out of balance. We have tried to respond to the excesses and costs of the economy with various forms of centrally coordinated collective action, primarily government, primarily at the level of nation states. But these centrally planned, bureaucratic, concentrated-power solutions are falling increasingly short in their responses to the evolutionary dynamism, as well as the global reach, of the market.

The market economy in some important ways hosts its own evolution, it provides a natural selection environment in which increasingly potent innovations at private profit-making are spontaneously created in decentralized fashion at the micro level. These innovations then spread and alter the economic "ecosystem", while altering other aspects of human and non-human life on earth as well. Governments, too, change, but slowly and from central points of control (even if these are influenced by popular elections, and by the market economy), not in a way that hosts or fosters micro-innovation, internal dynamism, and evolution-from-within. Evolution is how the universe gets things done. It is time to restore balance to humanity's development by re-discovering, re-nourishing and re-investing in the evolutionary freeconomy.

The freeconomy is the sphere of decentralized and primarily *non-market* creation of *non-marketable* goods that humans (and indeed, the market) need to survive and to thrive. These goods are non-marketable because you can't possess them, you can't exclude non-payers from benefiting from them. Another feature of these goods is that they are not "used up" through providing their benefits. They are not *consumed*, but rather are *accessed*. Good examples are literacy, the internet, financial stability, eradication of communicable diseases, clean air, and peace. Economists call these goods "public goods", a name that tends to immediately make non-economists think of public parks, public schools, public property – the provision of governments. Which shows how invisible the freeconomy really is, because government provision is only one of many ways that public goods are created. The freeconomy also includes, but goes beyond the non-profit sector. It includes but goes beyond the "volunteer sector." It includes millions of activities that we perform in our families and in our communities and in relationships every day – activities that most of us want, and all of us need, to perform much more of. Growing the freeconomy will make this possible.

In the economy, “time is money,” and wages or profits provide what is an *extrinsic* reason for production, for work, for entrepreneurial activity, for investment. In contrast, much of the creative activity in a thriving freeconomy is done wholly or at least partially for its own sake, for *intrinsic* reasons by the doers themselves. This free action also tends to foster the development, to increase the capabilities, the *freedom* of the doers. And by providing freely available public goods, this creative, intrinsically valued activity also increases the capabilities, the freedom, of others in the community and the world. The freeconomy is *freedom creating more of itself*.

## **Outline of New Earth**

What primarily distinguishes Sustainable Consumption (SC) from Cleaner Production (CP) is its focus on the demand side. Work on the demand side comes in two groups, both important: *incremental* shifts in product/company choice, which puts pressure on the production side for continuous improvement while reducing life cycle environmental impacts; and *structural* lifestyle/infrastructure shifts, which alter the broad composition of the “demand vector.” Finally, we note at the outset that the *sustainability* scope of SC is broader than has been the environmental scope of LCA to date; sustainability adds social and economic dimensions.

The New Earth system of institutions has been designed to promote both the incremental and structural shifts required for progress on SC. First, it drives incremental SC by creating a labeling system for firms that engage in stakeholder-driven continuous evaluation and improvement of impacts on the environmental and social (and thus economic) dimensions of sustainability. This system applies to all scales of business, with an initial emphasis on very small ones. It is designed to radically grow the demand for and application of increasingly “consequential” (rather than attributional) LCA methods and data, and it will also increase the pressure on these tools to address social impacts. By labeling the overall activity, rather than a specific method, and by using transparent peer review for decentralized evaluation, the system will drive continuous innovation and learning in the tools and methods of evaluation, while avoiding “lock-in” to any one reporting system, such as the GRI, or any one approach, such as The Natural Step.

The New Earth system drives *structural* SC in three ways:

- a) Providing information and seed funding support to communities to evaluate and continuously improve their environmental and social impacts. This immediately available seed funding and support network greatly increases the market power of the label, while educating (through application) citizens in the concepts and basic tools of comprehensive (e.g., life cycle) impact consideration.
- b) Providing funding to NGOs engaged in capacity-building development projects that address basic human needs.
- c) Engaging children in education about development, and empowering them to drive local social action, globally networked, for sustainable development. Children are not only the future adults and future inhabitants of the earth. They are also, in the present, a major source of ideas, hope, and inspiration for all the world’s people. Progress on SC is advanced by helping children understand major sustainable development issues, while also helping them learn to take positive action promoting development today in a way that *they* help to shape. Numerous studies show that small actions on behalf of civil society at a

young age lead to lifetimes of civic involvement and commitment. And our experience so far has also shown that the children's hope, imagination, and creativity helps many community adults to break through the barriers of inaction in their own lives.

Finally, the system also drives progress on cleaner production, by providing locally-governed investment funding to companies that are socially and environmentally responsible, and for firm investments in environmental retrofits.

The bylaws of the New Earth organization summarize its objectives and activities as follows:

- A) To create a global source of funding for projects that meet -- and increase capacity for meeting -- pressing human needs for food, water, shelter, sanitation, education and health care, and that protect other life and habitat of local, regional, and global importance. This will be accomplished by
  - 1) Certifying businesses as New Earth Members on an annual basis as long as they meet four commitments, one of which is to contribute 1% of profit to the global New Earth Fund; and
  - 2) Distributing each year a fixed share of New Earth Fund income among projects that address the objectives described above.
- B) To provide ideas, support, and seed money for voluntary community groups in all nations that can identify local needs and implement strategies to meet those needs. This will be accomplished by distributing a fixed share of New Earth Fund income among such community groups.
- C) To encourage businesses to engage their stakeholders in a process of continuously identifying and improving their impacts on society and the environment. Such activity will be required of New Earth Member businesses, and will be facilitated through peer exchange and web-based information dissemination.
- D) To invest in private sector activities that stimulate local and regional economic development that is socially and environmentally responsible and innovative. This will be accomplished by investing a fixed share of New Earth Fund income annually in such private sector activities. All interest from these investments will go back into the New Earth Fund.
- E) To provide peer exchange and networking opportunities and a global source of ideas and experience to voluntary groups that are seeking to strengthen communities and meet human and environmental needs. Participation in such peer exchange will be an annual obligation of communities and organizations that receive New Earth seed funding, and will be facilitated by a web-based system for information exchange among such communities and organizations.

### **Getting Involved**

A for-profit company, not-for-profit organization, or self-defined community engages New Earth when all its members make the following commitments:

- a) To contribute 1% of profits (if a for-profit company) to the New Earth fund;<sup>1</sup>
- b) To allow paid employees of the organization (if there are any) 1% of each work-year as paid time off to voluntarily work for sustainable development within or beyond their home community.<sup>2</sup>
- c) To create and transparently operate a “Better and Better” program that engages stakeholders to do the following: (i) continuously learn about the immediate and long-term impacts of the organization on its members and the rest of the world (society and the environment); (ii) set targets for continually improving those impacts; (iii) create and undertake projects to improve these impacts; and (iv) transparently report and continuously improve the targets, projects, and achievements.
- d) To participate annually in a review/evaluation process with peer organizations. In this process, members of non-competing organizations visit and review the success of an organization at achieving steps a-c above, and host a peer review team doing the same for them.

### Areas of Endeavor

Resources from the New Earth fund are disseminated on an equal per capita basis worldwide (after adjusting for purchasing power parity). The funds are to be used to pursue progress in each of four areas of endeavor:

- Development: projects that directly meet -- and develop capacity for meeting -- pressing human needs for food, water, shelter, sanitation, education and health care, and that protect other life and habitat of local, regional, and global importance.
- Enterprise: venture capital investment in private sector activities that stimulate local and regional economic development that is socially and environmentally responsible and innovative; returns on these micro- and macro- investments help drive exponential growth of the New Earth fund.
- Communities: This segment of funding directly empowers voluntary communities, enabling them to launch local sustainable development initiatives and to plug into the New Earth network of linked communities, exchanging and hosting persons from around the world who participate in local projects, cultural and idea exchange, and peer review activities.
- Access: New Earth is largely about creating benefits that are at least in principle available to all. But people need at least basic levels of material and technical provision, and personal ability, in order to play a contributing and benefiting role in

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<sup>1</sup> Why 1% of profit? Why not a higher or lower minimum threshold? New Earth must itself *create* the business case for membership; so 1% is *predicted* to be a membership fee which will be exceeded by membership benefits. This prediction is based on the following observations (1) many successful companies currently donate higher shares of profit to charity; (2) the exact breakeven point will vary from company to company, and year to year; (3) as Epstein and Roy (2003) noted, the business case for Corporate Social Responsibility (CSR) depends on the CSR actions being compelling to stakeholders, and (4) 1% of profit is something of a “compelling” or “credibility” threshold; (5) if companies can benefit from setting and publicizing *higher* levels, they will experiment, discover this fact, and take advantage of it.

<sup>2</sup> 1% of a full-time position is 2.5 days per year. This should come in addition to, not at the expense of, traditional and existing leave for illness and vacation. Why 1% of work-year? As with the profit share, many companies already provide at least this level of time to employees for volunteer service (Fleet Bank, Starbucks, Timberland...) and report that they benefit from employee attraction, morale and retention. Simplicity and consistency with the 1% profit share are also positive features. And it is a minimum level, which both employers and employees can voluntarily surpass.

New Earth. Examples include literacy and connections with people who have access to the Internet. The Access area of endeavor provides funds for efforts that enhance the growth and impacts of New Earth by ensuring that all people of the world can take part.

### **Nomination through Donation**

Nomination through donation is a way that communities and individuals can encourage local and global businesses to become New Earth members. Private donations from individuals, foundations, or businesses to the New Earth Fund can be made “in the name” of some business, contributing to its nomination level (which is reported publicly on the internet). When the nomination level for a business reaches the level of its first-year membership fee<sup>3</sup>, the company is nominated for membership. Local citizens will congratulate local businesses and invite them to become New Earth members; national and global companies’ nominations will be publicized as widely as possible in the press and on the Web. Companies have 1 year to accept the nomination; if they do so they are granted a free year of membership. If they decline the nomination they can later join New Earth but without the waived membership fee.

Means for implementing nomination through donation (NTD) are to be freely innovated around the world; possibilities include special credit cards, websites, and charitable donations. An international network of school/community-based NTD projects will be piloted beginning in Spring 2004, to demonstrate and refine an approach (initially tested in Maine in the US) in which sustainable development curriculum materials from UNESCO and other sources provide the basis for an educational unit that culminates in an art project, in which each student creates and paints a hollow globe that expresses his/her vision of a sustainable world. The globes will have coin slots on top, and each student can take his/her globe to a local retail business, asking the proprietor to host it in a visible spot to collect New Earth donations towards nominating that business. The globes can be accompanied by simple information cards about New Earth. Once the donations reach the nomination threshold, the students and interested members of the community will congratulate the business on their nomination. In this manner:

- a) Community involvement and awareness will create a strong business case for membership for the local, community-based businesses.
- b) Flyers and the availability of funding for community projects will drive people to voluntarily “spread the word” about New Earth to other communities, which will start their own “globe programs” or will innovate other local variations on the nomination-through-donation principle. Community development networks will provide low-friction channels for this information to spread among communities. Media attention as the programs launch and spread will also help.
- c) As the number of communities aware and supportive of New Earth grows, and the memberships of small businesses builds, this in turn will mean creation, from the grass roots, of a strong business case for membership among larger companies.

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<sup>3</sup> The nomination threshold is an estimate of 1% of the businesses’ annual profit. For publicly-traded companies which publicly report profits, the threshold is tied to prior-year profits. For other companies, the threshold is calculated from the number of employees, based on available statistics for the appropriate sector.

# **Tools for Sustainable Households in the City of Tomorrow Critical discussion of the results of the ToolSust project and the implications for sustainable consumption.**

**Presented by Henri C. Moll,  
Center of Energy and Environmental Studies IVEM  
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## **Introduction**

The global challenge to engage in a process of sustainable development was put forward in the Brundtland report *Our common future* (1987). On the Rio meeting (1992) this obligation has been adopted and has been elaborated in the Agenda 21. Agenda 21 has made clear that the design of sustainable pathways and the implementation of sustainable strategies will require multidisciplinary scientific efforts and will address all system levels, ranging from the international and national level to the city and individual level. Next to top-down policy making, such as international agreements and national laws and standard setting, also bottom-up processes will be crucial for sustainable development. Considering the cycles of renewable and non-renewable resources through the environment and the economy changes will be important both at the production side (resource extraction and processing, production of goods and services) and at the consumption side (acquisition of goods and service, use with in the household, and disposal).

In the ToolSust project, to be presented below, the bottom-up perspective was chosen to be the starting point for an analysis of the possibilities to build on sustainable development, and to develop tools for the implementation. Therefore research concentrated on households and the closest administrative level above households the municipality or city. Also the analysis was mainly directed at consumption and other related household behaviour and at assessments how to change these in a more sustainable direction. Different scientific disciplines were used in this project: natural sciences to assess the environmental load of consumption and social sciences to assess the potential for change analysing the general context of consumption and household behaviour and measuring the acceptability and feasibility of change options.

The development and demonstration of scientific tools that may contribute to the implementation of sustainable strategies in cities and households was an important objective of the ToolSust research. The tools developed and applied incorporated the following social processes: information and communication, participation, and social capital building. The general objectives of the tools were description and analysis of present-day consumption and facilitation of short term changes and long term change in household behaviour and city policies.

In this paper the structure and some results are presented of the ToolSust project. The discussion of the results is mainly focused on the similarities found performing the research in different European cities. In this way it is possible to elaborate effectively the implications for sustainable consumption.

## Presentation of the ToolSust project

The project ToolSust was the result of international and interdisciplinary research collaboration, sponsored by the EU within the fifth framework programme. ToolSust is the acronym for ‘The involvement of stakeholders to develop and implement *tools* for *sustainable* households in the city of tomorrow’. Five cities Fredrikstad (Norway), Stockholm (Sweden), Guildford (UK), Padova (Italy) and Groningen (the Netherlands) participate in this project. For each city a scientific institution was involved in the research. The project ToolSust was directed on two main goals: to develop methodologies and tools that may be helpful for politicians, stakeholders and scientist to further sustainable development at the city level and specifically at the level of households, and to contribute directly to the implementation of sustainable practices at the household and city level.

A bottom-up approach was followed. The household is considered as the basic unit of consumption. Attention is paid to the use of energy within households, recycling, shopping behaviour and local transport. The determinants of household consumption patterns were analysed and the direct and indirect effects of household consumption were measured in energy terms. The interdisciplinary analysis of household consumption patterns involved economic, political, psychological, sociological and environmental approaches. In this way all dimensions of sustainable development could be addressed: the economic, the social and the ecological dimensions

The research was structured in four main phases.

1. Description of the present political, social and environmental context of the cities.
2. Analysis of household consumption patterns and measuring the environmental impact of consumption and identification of approaches to decrease the impact of consumption.
3. Social experiments to effect short term changes to diminish the impact of consumption by giving information, inducing participation and by the enhancement of social capital.
4. Design of long term scenarios aiming at sustainability in the city, by the use of a backcasting workshop approach with politicians, stakeholders and households.

For the project some theories were inspiring to develop tools about sustainable consumption and consumer behaviour. Two paradigms were very relevant for the design of the project and the interpretation of the results.

- Ecological modernisation, as a common perspective for the total project.
- Ordinary consumption, consumption in the everyday life perspective.

According to the ecological modernisation paradigm the future sustainable society will be a modern society. Necessary environmental measures are often also profitable and do create “win-win-situations”. Environmental problems are solvable by technological and institutional change. The relationships between the state, the citizens and business should be reformed, giving all actors the possibility to participate in policy making and responsibilities for reaching sustainable outcomes. The tools chosen for exploration in the project – communication, participation and social capital building – are fitting very well in this paradigm.

The Ordinary consumption paradigm focuses specifically on consumption – a weak spot in the ecological modernisation paradigm. Here consumption is studied in the context of everyday life. The daily life perspective emphasises that action and practices are results of routines and habits more than individual attitudes. In daily life one finds a mixture of rational, in-tended behaviour and more routinised practices. The social norms and

structures form to a great extent the organisation of daily life. Daily life is complex and not structured around the single individual behaviour, but by an intricate pattern of social norms and routinised practices. Different motivations for action often come in conflict, thus consumption practices are results of negotiations. Consumption in modern societies is to a large degree mass-consumption of ordinary products.

### **Description of the present political, social and environmental context of the cities.**

The main goal of the first phase was to establish a point of departure by drawing a picture of the environmental situation related to consumption in the five cities. These pictures could be used to identify bottlenecks and to compare the cities with each other. Another goal was to establish a close relationship between the research group and the local authorities, businesses, NGOs and other relevant stakeholders. But this work had also a scientific value of its own, because the results were also theoretically interesting. The following methods were used to produce the description of the present political, social and environmental context of the cities.

- Analysis of municipal environmental policy documents and secondary data.
- Quantitative consumer surveys, measuring environmental attitudes and behaviour.
- Qualitative structured interviews with stakeholders and officers of city departments.

Some of the general findings for all cities are the following:

- The environmental awareness is high just as the attitude to demonstrate concrete environmentally relevant behaviour.
- For the political authorities in the cities traffic represents the largest environmental impact, while consumers think that energy and waste handling are more important!
- The waste handling of glass and paper is well organised in the cities, and the consumers are satisfied with the waste management of these fractions. For the other household fractions the waste management is more problematic, and consumers are less satisfied with the waste handling of textiles, organic and toxic waste.
- The cities have problems with production and distribution of organic food, but the lack of consumer knowledge about the organic labels also represents a bottleneck.
- Traffic is a main environmental problem, but the use of car for shopping is higher in Fredrikstad, Padua and Guildford than in Stockholm and Groningen
- All cities have problems with energy use, but the environmental consciousness related to energy use is higher in Padua, Guildford and Groningen than in Fredrikstad and Stockholm.

In environmental policy the cities have managed to pick the low hanging fruits, but they all struggle to establish practices within sectors where the results are harder to achieve. This phenomenon is seen very clearly for the recycling activity and for transport. It is relatively easy – both for consumers and local authorities - to recycle paper and glass. It takes more planning and organising to recycle textiles and toxic waste, not only at the city level, but also for households. Transport is not only a matter of organising the traffic, it represents also a challenge to individual lifestyles, and it is no surprise that all cities have increasing problem with traffic.

The methods used address the triangle local organisations as stakeholders, citizens and local authorities. The interplay between these groups is presented in figure 1.

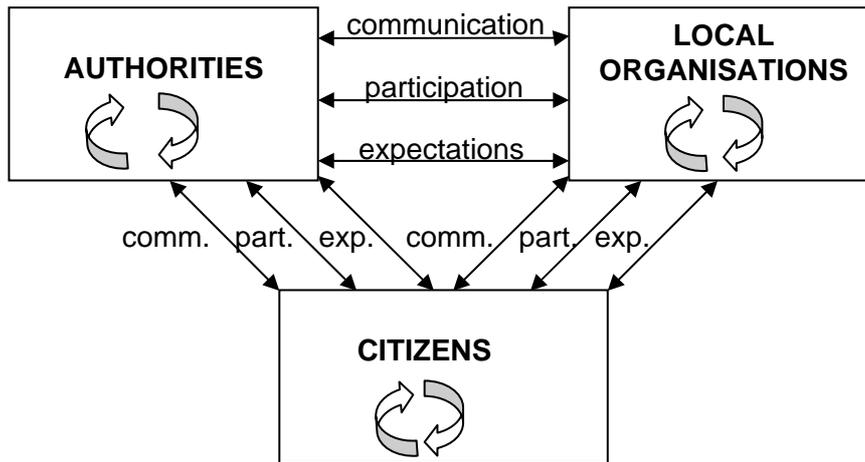


Figure 1 Actors at city level and their interactions

Different kinds of interaction take place between (and among) the actors involved in the local environmental policy development. The most obvious interaction is communication. Besides communication there is participation, which is different because it implies that people do not only talk but that these talks lead to adjustments of the actions and objectives. Thirdly there are the – in many cases implicit – expectations of one actor about the attitude and behaviour of other actors involved. These different kinds of interaction influence each other. Expectations can have a large influence on the way communication and participation take place while experiences with communication and participation can lead to changes in the expectations that the actors have. The circular arrows in the three boxes indicate that mutual interactions also exist among authorities, among local organisations and among citizens. In an ideal situation the communication between all actors is open and honest, significant mutual influence between all actors exists and the mutual expectations are positive as well as realistic.

In the Groningen case the development of energy policy was considered to be a success story, and the acceptance of the abandonment of separate collection of organic waste by the local organisations and the citizens was low. These results were explained with help of this diagram.

The dialogue on the energy issue worked very well. Both the authorities and the stakeholders are pleased with their mutual relationship and the high response of the population regarding the energy saving project indicates that the authorities are successful in their attempts to reach and involve the population. The high readiness of citizens to save energy is probably also a reason for this success.

The readiness to recycle waste by the citizens is also high. On this issue the authorities have not been very successful in their communication with the public. Wrong perceptions about the public opinion exist among the authorities. The lack of a dialogue between the authorities on the one hand and stakeholders and citizens on the other hand probably is the main explanation for this. The incorrect expectations of the authorities about the public opinion on the abandonment of separate organic waste collection explain the lack of success to gain the support of the public for this measure. The very positive attitude of the public towards waste recycling might very well explain the negative judgements about the change in the organic waste collection system.

## Analysis of household consumption patterns and measuring the environmental impact of consumption and identification of approaches to decrease the impact of consumption.

In the second phase the main objective was to describe and analyse the environmental impact of household consumption. To enhance this understanding and to measure it precisely we used the concept of household metabolism. The household metabolism is calculated in terms of total energy requirements, including the direct and indirect energy requirement addressing among others energy use within the household, mobility and consumption. To calculate the energy requirement of households, the Energy Analysis Program EAP is used, developed at IVEM. Energy intensities of consumer goods, calculated with country specific EAP data-bases, were combined with expenditure data to determine the total energy requirements of different types of households. Calculations were made concerning the total household energy requirements and concerning the subdivision of the household energy requirement related to the household activity categories (see figure 2).

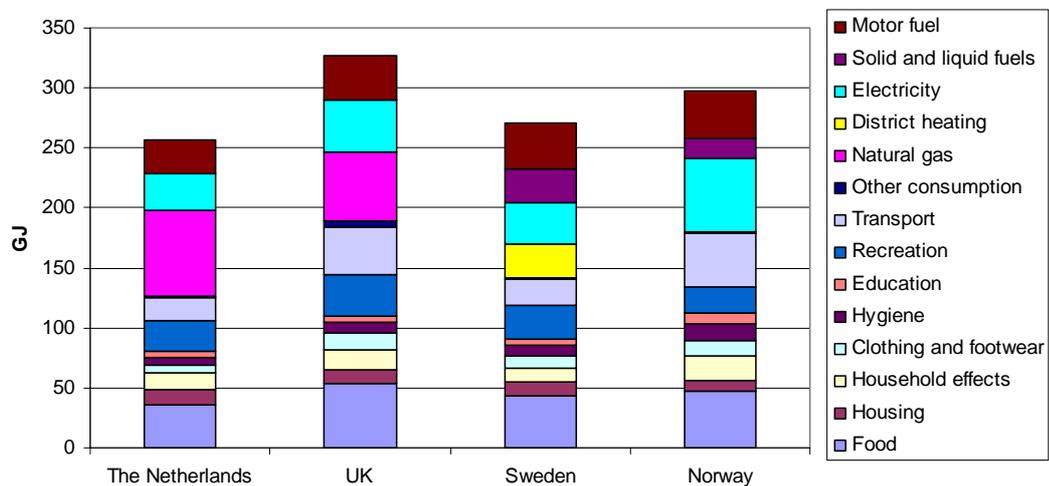


Figure 2. Total annual energy requirements and energy requirement per budget category for an average household in the different countries.

Looking at the results in figure 2 some similarities are striking. In all countries and for all household types heating, electricity, food, transport and recreation are the most important categories with regard to energy requirements. Apparently in these wealthy West European countries consumption patterns and the resulting energy requirements resemble each other. Also salient differences are observed. The absolute amounts of the energy requirement differ substantially when comparing the country results and remarkable differences are found with regard to the share of the direct energy in the total household energy requirements.

The differences between countries with regard to average household energy requirements are mainly explained by three factors: the efficiency of electricity generation, the average levels of household expenditure and the average indirect energy intensities. Thus reducing energy use in the economic sectors and especially in the electricity production sector is an important strategy. Efficiency results in the past and probably also in the future are compromised by the accompanying rise in household expenditures. So to take benefit of future efficiency increase, it is also of importance to change the consumption pattern (i.e. the division of the household budget over the consumption categories).

The differences within countries found by comparing the national average energy household requirements with regional and city's level results are mainly explained by differences in the expenditure level. In addition, we observe in the city's results lower figures for direct energy use, especially for motor fuels, than in the corresponding regional and national data. This suggests that on the city level some options exist to decrease the direct energy requirements: the traffic and transportation system (including cycling and public transport) and a compact city structure.

The quantitative differences between households within with different characteristics (income, size of household and so on) are mostly explained by the level of household expenditure. For a low-income household, the share for heating and electricity is high (together around 50% of the total energy requirement) and the share of motor fuel, transport, and recreation is low (together less than 20%). For a high-income household, the share of heating and electricity is low (together 25% - 35%) and the share of motor fuel, transport, and recreation is high (together 30% - 40%).

Based on this analysis the following crucial parameters are identified for change at various system levels.

- At the (inter)national level the structure of the economy or the structure and efficiency of the energy supply system are important factors that determine the energy requirements of households. Both the economic structure and the energy supply system are important determinants of prices of goods and services and the energy intensity of consumer items.
- At the city level or the regional level the physical structure such as the infrastructure, the presence of different types of industries, and the way buildings, houses and other facilities are located determine seriously the way how households organise their daily life. Also, qualitative aspects such as the quality of the public transport system, the environmental quality of the direct surroundings, and the quality of the dwelling are important determinants of household energy budgets.
- At the level of individual households the division of the budget over different consumption items and categories is very important just as the use of direct energy.

Thus change should address household behaviour, city structure, national energy and economic policy, international context

### **Social experiments to effect short term changes to diminish the impact of consumption by giving information, inducing participation and by the enhancement of social capital.**

The third phase of the ToolSust research dealt with the possibilities for short-term changes in some cities. The three research subjects in this phase were:

- The importance of consumer information, carried out in Fredrikstad, Norway
- The relation between social and environmental sustainability, within the paradigm of social capital, carried out in Padova, Italy
- The importance of stakeholder participation, carried out in Guildford, UK

These three studies were based upon different theories and traditions and the variation in methods is substantial. However, they all combined quantitative and qualitative methods. Although the potential for short term changes were discussed from different angles, it is still possible to draw some common conclusions:

- All studies concluded that individual attitudes and information are still important factors, but as a single instrument the change effect is limited.

- Information tools should first of all to be combined with other political or markets tools, carried out by political authorities or local businesses.
- The importance of social networks and social norms in the communities should be recognised. Individuals are seldom only individuals, they belong to and interact with social communities, and if this is not understood the effect of consumer information will be limited.
- An everyday life perspective was important to understand the complex relationship between attitude and behaviour. The analysis of the householders green purchases and food practices demonstrated that these activities enter into complex patterns of every day life consumption practices. Thus, environmental friendly consumption behaviour is not merely the outcome of an individual reflexive or rational choice, rather consumption practices are results of social conventions, negotiations and priorities made in the household.
- The everyday life perspective was also important in understanding how information is mediated, used and acquired among householders. In general, information faces a lot of barriers in this acquiring process. Again, the socially embedded networks of every day life seem to be frequently used information channels.
- The dimension of trust was an important factor. Lack of trust presents a bottleneck for all environmental friendly consumer practices, such as shopping behaviour of organic food and eco-labelled products.

Thus the everyday life perspective must not be viewed as a perspective dealing with the small and insignificant environmental questions; rather this perspective can give important contributions to the understanding of the major challenges of sustainable consumption. In spite of increased environmental efficiency, the environmental gains are constantly compromised by the growth in consumption in many consumption areas.

### **Design of long term scenarios aiming at sustainability in the city, by the use of a backcasting workshop approach with politicians, stakeholders and households.**

In the fourth research phase of ToolSust the five participating research teams explored the potential for long-term changes using a backcasting approach in close collaboration with stakeholders in the five European cities. Stakeholders of interest in the ToolSust project are local political authorities, consumer organisations, environmental organisations, retail businesses, households and individuals. During this phase, the ToolSust teams were expected to draw upon results from earlier phases of the project where the importance of consumer information and the consequences for quality of life were investigated and where the processes for involving stakeholders and consumers were analysed. Also the EAP tool for modelling household's indirect and direct energy use was used to evaluate the developed long term change approaches

The method included two workshops with local stakeholders and some back-office work. Several images of future systems for shopping and household practices are developed when using this method and they are based on suggestions from the stakeholders themselves.

The first workshop with local stakeholder aimed at producing thematic clusters of ideas of how a sustainable city might work around 2040. In the workshop the work proceeded in four steps: introduction of aim and workshop methodology, idea generation, clustering and, finally, prioritisation by voting on the most and the least desired ideas.

The teams did the work of creating scenarios out of clusters of ideas back office. A deductive methodology was applied. In short, this means that one tries to find two key dimensions in the material (clusters of ideas) that can be combined to form a grid of four quadrants, each representing one scenario (skeleton). This is not always easy, as testified by several teams. However, all project teams managed to make a “scenario cross” that was interesting and also reasonably true to the material generated at the workshops. In all cities except Padova, the savings in energy use due to measures taken in the scenarios were calculated with the EAP model.

The second workshop had a more conventional format than the first one with presentations of images, discussion and critique followed by (group) discussions on policy measures promoting a development that leads to the images of the future.

From the analysis of ideas that appeared in the five workshops and the results in terms of voting several ideas were identified that seem to be common goods in a European context. The popular and common ideas are certainly a reflection of on-going Agenda 21 work, value reorientation globalisation and national and local politics. The findings indicated that there are enough common and popular ideas for describing a sustainable city in an EU context (see Table 1 as an example).

**Table 1 Ideas about transport, mobility and traffic in the five cities**

<b>Proposal</b>	<b>Padova</b>	<b>Guildford</b>	<b>Groningen</b>	<b>Fredrikstad</b>	<b>Stockholm</b>
Better cheaper public transport,	Yes	Yes	Yes	Yes	Yes
Increased non-motorized transport	Yes	Yes	Yes	Yes	Yes
Cleaner cars and engines	No	Yes	Yes	Yes	Yes
Ecological long-distance travel	No	Yes	Yes	Yes	Yes
More use of waterways instead of land	Yes	Yes	Yes	No	Yes
Traffic regulation	No	Yes	No	Yes	Yes
Restrictions about car ownership/use	No	Yes	No	Yes	Yes
New forms of car ownership	No	No	No	Yes	Yes
Restricted travel distance	No	Yes	No	No	Yes
Restricted air travel	No	Yes	No	No	Yes
Economic policy instruments in use	No	Yes	Yes	No	No
Less freight by lorry or polluting vehicles	No	Yes	No	No	Yes
Cable ferry	No	No	No	No	Yes
Tuition at home	No	No	No	Yes	No
Local air transport	No	No	Yes	No	No

Underlying the dimensions that the five teams (see Table 2) identified were four regimes governing the ways society works and therefore shaping our visions of the future. These four regimes are related to use of space, values in everyday life, organisation of society and how technology is used. Often, at least two of these regimes were present when the teams formulated their dimension. This means that a two dimensional mapping technique, as used

in this project, is too restricted to fully portray all the possible options to organise society and therefore to create visions. However, working with four dimensions is visually difficult and a large, perhaps too large, a number of scenarios are generated. Nevertheless, by analysing the dimensions used in the five cities an underlying structure of regimes is identified that is probably recurring in similar studies.

**Table 2 Dimensions identified by the five research teams.**

	<b>Padova</b>	<b>Guildford</b>	<b>Groningen</b>	<b>Fredrikstad</b>	<b>Stockholm</b>
Dimension 1	Multi-culturalism versus Localism	Global versus Local	Green versus Compact	Urban versus Modern	Green versus Manhattan
Dimension 2	Individualism versus Collectivism	Top-Down policy versus Bottom-Up	Village versus Metropole	Local versus Traditional	Organisation from below versus from above

The potential energy reductions related to household consumption were substantial in the images of the future sustainable cities. Some were up to a half of today's average energy use per household. All the images were however not radical enough to fulfil long-term goals (see figure 3 for the Groningen results).

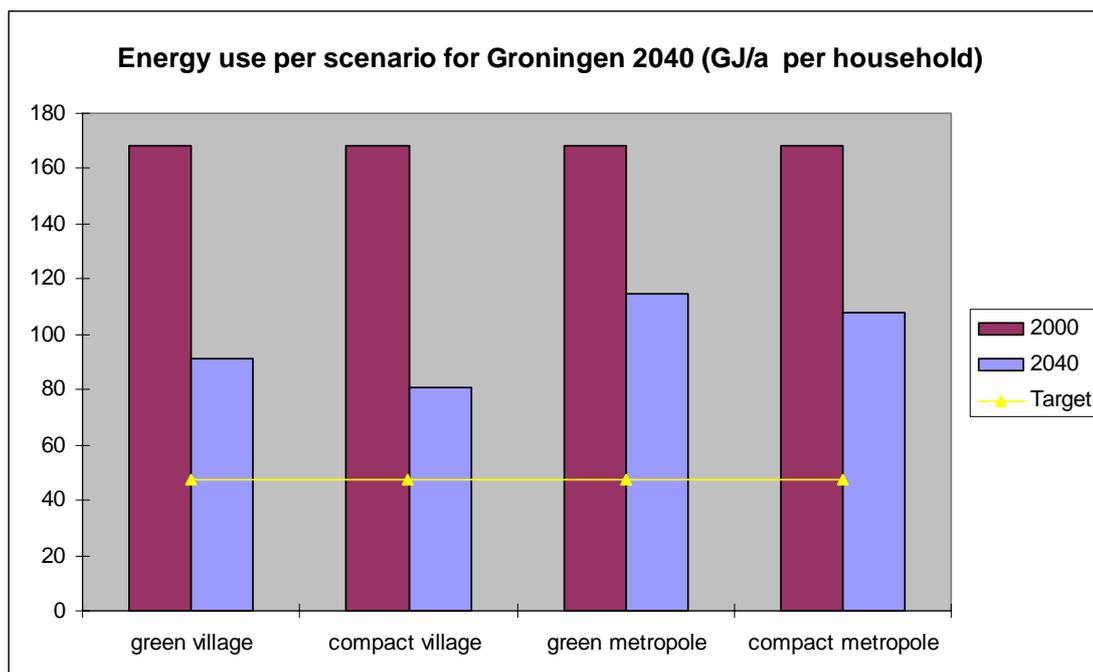


Figure 3 Total energy requirements per household according to the four scenarios for 2040 and compared with the reduction target.

### **Some conclusions and implications for sustainable consumption**

To effect short term environmentally driven changes in household behaviour and household consumption theories about ordinary consumption and the daily perspective consumption is the most adequate analytical framework. Consumption practices are not solely guided by individual deliberate choices, but are mainly conducted by social

constraints and/or possibilities such as social conventions, routines, habits, household resources and facilities within the households (e.g. appliances and surrounding the households). Instead of general information and mass communication advice tailor made on the specific consumer context should be given to realise real changes. Otherwise environmentally driven change by households can be effectively facilitated or triggered by structural change on other system levels (city, national, international).

Values are important for the design of long term approaches. However developing sustainability values will not occur spontaneously within the households hitting their consumption patterns. Government and institutions should play a major role in developing new values. The present paradigm adhered widely of ecological modernisation is limited in its value orientation: it fails till now the address the global warning issue, doing things more effectively is compromised by consuming more, and it neglects global equity issues about fair trade, equal access to resources, technology and healthy life.

Building up mutual trust and social capital in general is a condition sine qua non for sustainable development in cities. Mutual expectations about others (consumers, stakeholders, government) are presently limiting effective communication and participation necessary for the cooperation for a more sustainable city.

### **Acknowledgements**

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# **Lifestyle Changes and its Influences on Energy and Water Consumption in China**

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## **1. A Co-Evolution of Production Possibilities and Consumption Pattern**

### **The Economic Miracle**

The latter half of the 20th century was a period of the 'economic miracle' for East Asia. Firstly, East Asian countries or regions including Japan, Korea and Taiwan achieved a high annual growth rate of GDP per capita at an average of 8% during the 1960s – 1970s. They achieved industrialization, urbanization, electrification, and motorization in a short timescale of about 20 - 30 years, which took Western countries over two hundred years to achieve. However, at the same time China was engaged in 'socialist movements', especially the ultra leftists of the 'Great Leap Forward' and 'Cultural Revolution', which severely stagnated China's economic development for 20 years.

Since the 'Opening Door Policy', which was implemented in 1978, China has developed with an annual GDP growth rate of almost 9.8% annually, almost three times the world average of 3.3% [James, 1998]. By 2003, China's GDP had reached 6.7 billion US dollars of absolute value, which would put China amongst the seven richest nations or even the second largest economy if counted in purchasing power parity (PPP) [Sun, 2004].

### **Improving Lifestyle and Structural Economic Changes**

The most direct and significant result of China's economic growth is the amazing improvement in quality of life for Chinese people. China's population has experienced a transition from 'poverty' to 'adequate food and clothing'; today growing parts of the population are getting closer to 'well to do' lifestyles. These segments of society have the financial ability and the desire to spend their growing income on luxurious products. They not only want to survive with enough food and clothes, but also like to obtain a quality life of high quality food, comfortable living environments, health care, personal beauties and higher education.

In fact, China's economic development after 1978 has also been characterized by regional disparate development of (economic) - infrastructure and policy inclinations and support, which resulted in the significant differences of income and with it lifestyles between regions<sup>1</sup>.

At the same time we could also witness a gradual transformation of China's economic structure from a shifting dominance from agriculture to growing shares of industrial and service sectors. With the availability of a wider range of products the consumption patterns changed. For example, people's diet changed or co-evolved with the development of agricultural sectors with a larger variety of products and a higher extent of food processing; the transformation of housing policies from restricting private ownership to encouragement of a commercial housing sector and private ownership dramatically boosted the construction of new housing developments.

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<sup>1</sup> The regional inequality is mainly consisted of urban-rural; coastal-interior differences.

### **Great Demand for Natural Resources**

The change of production and consumption patterns directly relates to the allocation and consumption of natural resources. From the perspective of energy consumption, the per capita consumption grew from 264.3 kgce<sup>2</sup> in 1965 to 614.4 kgce in 1980, and further increased to 1034 kgce in 2001, to four times the 1965 level [Pan, 2002]. Furthermore, the categories of residential energy consumption has been transforming from cheap but less efficient biomass fuels to more commercial energy (e.g. coal, oil & gas). In fact, China's rapid industrialization was built upon high intensive energy consumption. China is trying to escape from that and to move towards a more efficient energy production and consumption.

Similarly, water resource allocation has been shifting from traditional agricultural irrigation to larger shares for industrial and domestic uses. However, agriculture is still the main consumer in water consumption, although its total consumption fell from 97% to 69% during the last 50 years. Industrial and domestic users raised their shares from 2% to 21% and 1% to 10%, respectively.

### **Objectives**

In this paper, we will give an overview of changing lifestyles influenced by different policies over a 50 years period of Chinas development. We will then pick a few key areas such as diet, housing, education, water and energy consumption to exemplify these changes and discuss some of their causes. In particular, we will

- investigate how changing policy foci directed economic development and resource allocation;

- describe lifestyle changes under different stages of economic development with special consideration of urban – rural disparities.

- generate historical trends for domestic resource consumption along with lifestyle changes, particularly for energy and water consumption.

## **2. A Brief Review of Pre –1949: Rich versus Poor: Lavish Lifestyles contrasted by Plain Survival**

Before 1949, most parts of China were experiencing unrest and turbulence due to warfare. Over 80% of the total population lived in rural areas. They were engaged in traditional agricultural production, and were hungry and cold.

In rural China, 91% of villagers (peasants) were forced to live on rented land from the 9% of rural residents (feudal lords) [Yang, 1986]. More than half of the surplus products produced were used to pay extremely high rent and loan interests to the landlords [Gabriel, 1998]. Therefore, there were two completely different lifestyles in rural China. Peasants worked hard for the whole year and produced the agricultural outputs, but they were living under dire poverty and struggling to feed themselves. The daily diet structure for peasants was coarse bran with cheap vegetables, and meat consumption for peasants was of unreachable demand. In contrast, the feudal lords obtained a large income without much work. The lifestyle of them was extremely lavish because most of them were enthusiastic to show off their wealth

In urban areas, the first industrialization took place in 1842 after the Opium War when Western capitalists encroached the land to build factories and drove the original small economy bankrupt [Lu, 2003]. As a result, urban workers had to be employed in capitalist

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<sup>2</sup> Kgce: kilogram coal equivalent

enterprises, for which they received little wages but worked over 12 hours per day. Although the self-exploiting artisans could work independently, the products could only be sold to the large-scale merchants who had enough market power to be more accurately described as price makers [Gabriel, 1998]. Consequently, they also received unfair payments. For most urban residents, their lifestyles were as plain as for the rural peasants. Table 1 clearly describes the ‘starvation’ throughout China demonstrating that the majority of income was spent on staple food and clothing simply for survival.

**Table 1: The Consumption Pattern of Chinese people prior to 1949 (in %)**

Food	Clothing	Rent for house	Fuel & light	Miscellaneous	Total
64.9	14.0	5.3	7.5	9.3	100

*Source: Yang, 1986. Research on Chinese Consumption Structure (p. 186)*

Generally speaking, people’s demands on natural resources were very basic. However, the category of resource consumption was much different. The rural landlords and urban capitalists were living in luxury houses with heating supplied by burning coal and firewood; some even had electricity for lighting, however, this was only available for a very small part of the total population. Most Chinese just acquired free or cheap resources for their livelihoods; water was only for drinking and cooking, stalks were the main source for heating and cooking, and kerosene was the only commercial energy for lighting.

### **3. An Effective Beginning (1949-1957): Recovery of the Economy and Improving Lifestyles**

The premier task after the New China was established was to recover from the damage done during the war and to generate new economic development. Due to geopolitical reasons, China created a Soviet-style ‘Socialist Planning System’ giving priority to heavy industry development in cities.

#### **Planning Economy and Stimulating Productivity**

Under the socialist planning system, the central government planned the quantities of output command and allocated resources and materials. Public ownership of “Means of Production” is a significant characteristic of this kind of planning economics. The huge income disparities of the feudal era were drastically reduced during this time period.

In rural China, the redistribution of land<sup>3</sup> effectively stimulated China’s agricultural aggregate output that increased by 25% in real terms from 1952 to 1957, and with it grew the income and the consumption of peasants [CSB, 1981].

In cities, the central government redistributed the unequal regional development from coastal to interior areas which were closer in proximity to raw materials and energy resources. This stimulated industrial productivity and worker’s motivations to produce increasing outputs. Even though industry made remarkable efforts on urban constructions, the industrial sector only contributed 7% of annual GDP on average as compared to the primary sector, which produced 74% of GDP [Demurger, 2001]. However, 90% of China’s capital was concentrated in the urban industrialization, which foreshadowed the significant economic developments in cities.

#### **Steady Improvement of People’s Living Situation**

<sup>3</sup> Land Reform of 1950 was implemented throughout China’s rural areas, which demolished the old rural landlord system and replaced by a self-exploiting direct production system, which was completed in 1952[Gabriel, 1998]

The effective economic development conducted to the growth of people's net income level. As Figure 1 shows people's income increased by 3.2% in countryside and 2.3% in cities respectively. Those increases did not have a significant effect on poverty reduction. By the end of the 1950s, still 64.4% of total population was affected by poverty<sup>4</sup> [Hu, 2003]. From the perspective of people's consumption pattern during the first *Five Year Plan (FYP)*, food and cloth still dominated the majority of people's income both in urban and rural areas (as shown in Figure 2).

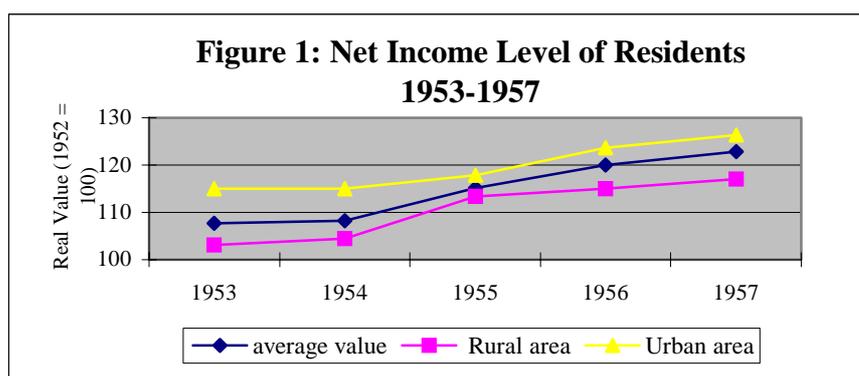
From the view of food consumption, people's dietary structure changed from surviving to consuming high quality diverse food items such as pork, fruits, milk products and eggs; the total calorie intake and material consumption also grew rapidly, for example, grain consumption increased by more than three times and cloth consumption more than doubled (as shown in Table 2).

Housing established another important difference between urban and rural lifestyles. Although the types of houses were similar (bungalows), urban residents enjoyed their houses, as 'welfare benefits'<sup>5</sup> while rural peasants had to pay for the houses by themselves [Taylor, 2001].

**Table 2: Selected Goods of per capita Consumption**

	Grain (kg)	Pork (kg)	Fresh Eggs (kg)	Cloth
Pro-1949 <sup>6</sup>	61	1.98	0.15	3.23
1957	203	5.08	1.26	6.82

*Source: Yang, 1986. Research on Chinese Consumption Structure (p. 186)*

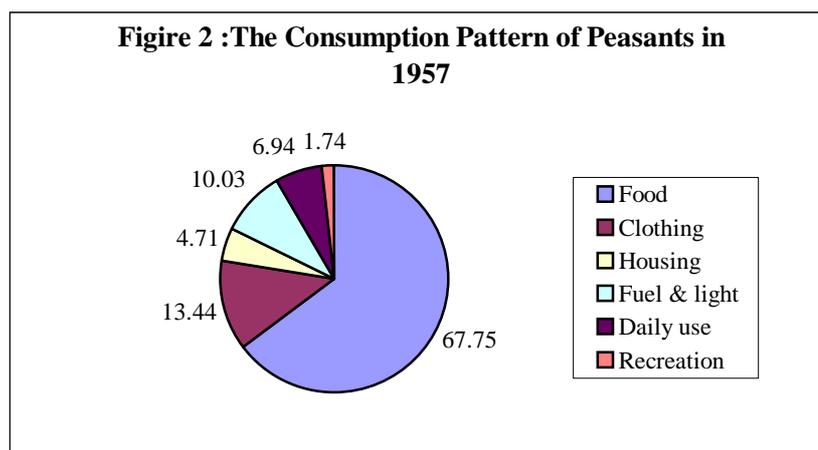


*Data source: China Statistics Yearbook, 1986*

<sup>4</sup> The figure was 71.9% prior to 1950 [Hu, 2003].

<sup>5</sup> Housing commercialization was restricted at that time. The houses were provided by government or State-owned employer and come as a part their jobs [Zhang H, 2003].

<sup>6</sup> The data of pro-1949 was estimated by Yang, 1986



*Data source: Yang, 1986. Research on Chinese Consumption Structure (p. 190)*

### **Biomass for Villagers, Coal for City Dwellers**

There was a substantial difference in residential energy consumption pattern between urban and rural household. Urban residential energy was more commercial energy based, while biomass fuels dominated energy consumption in villages, accounted 86% of the total household energy usage [CSB, 1981]. For example, coal and firewood were purchased for cooking and heating in cities, in contrast crop residues and stalks were used in rural cooking and heating because this was free and convenient to acquire. In addition, about 90% of Chinese cities had been provided with electricity for residential lighting by the end of 1950s [Luo, 1998], while most rural people still kept the traditional way for lighting by using candles and kerosene<sup>7</sup>.

### **Queuing for Wells**

China's water withdrawals were mainly used for agricultural irrigations, which occupied 97.09% of the total consumption in 1949. The absolute amount of industry water use increased four times from 2.4 in 1949 to 9.6 billion m<sup>3</sup> in 1957 (as showed in Table 3) [MWR, 2000], because of the large-scale industrial development during the first FYP. Meanwhile, per capita residential water usage for urban households slowly increased from 28.5 to 38.4 litres per day<sup>8</sup>. The main reason was that most people still got their water from a source near their home for daily drinking, cooking and washing, both in urban and rural China. The water consumption for showering or bathing was rare activities for Chinese people at that time. However in cities, the infrastructure of the water supply system was quickly expanded in order to ensure the industrial output during the first FYP. The urban water supply system only covered 60 cities prior to 1949, and expanded to more than 150 cities by the end of 1950s [Zhang R, 2003], which created the gap of residential water usage between urban and rural China.

**Table 3: Water Use in China 1949 – 1957 (in billion m<sup>3</sup>)**

	1949		1957	
<b>Agriculture</b>	100.1	97.09%	193.8	94.63%
<b>Industry</b>	2.4	2.33%	9.6	4.69%
<b>Domestic</b>	0.6	0.58%	14	0.68%
<b>Total</b>	<b>103.1</b>	<b>100%</b>	<b>204.8</b>	<b>100%</b>

<sup>7</sup> The governmental provided 1kg kerosene for each rural household per year for lighting [Zheng, 2002].

<sup>8</sup> The figures were calculated based on the dataset of MWR 1999 by author.

Source: Ministry of Water Resources 1999 & 2000 "The Water Resources Bulletin in 1999

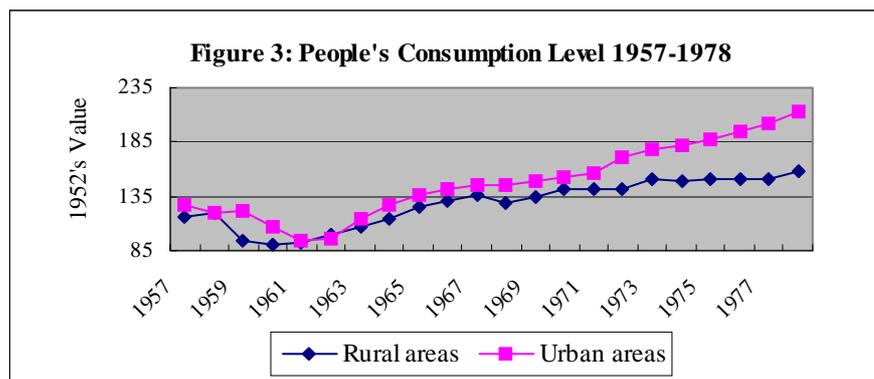
#### 4. A Tumultuous Period: Political Conflicts and Economic Stagnation, 1958-1978

Economic recovery stopped in the following years. Instead, the radical left took possession of governmental politics and quickly spread to areas of social and economic life.

##### A Crash Industrialization Program - 'Great Leap Forward' (1958 – 1960)

In early 1958, Mao called on China to 'walk on two legs', which further emphasized the importance of heavy industry, especially iron and steel productions [Lu, 2003]. Thousands of small steel-making furnaces were set up in rural China<sup>9</sup> throughout the country in response to Mao's call of 'steel as the key link'. Ironically, 90% of these types of steel products could not be utilized and had to be re-smelted which obviously resulted in low energy efficiency<sup>10</sup>. As a significant number of peasants switched to industrial production, particularly to steel production, and natural disasters resulted in the dramatic decreases of agricultural output causing serious starvation for large parts of the population in the early 1960s.

The decline in GDP directly influenced people's livelihood. As shown in Figure 3, the average value of consumption level decreased from 125 Yuan in 1958 to 104 Yuan in 1962, the value reached the lowest point of 99.4 Yuan in 1961, which completely negated the economic efforts during the first FYP [CSB, 1986].



Data source: China's Statistics Yearbook, 1981, 1986

##### Economic Disaster – "Cultural Revolution" (1966 – 1976)

Although the failure of the Great Leap Forward was disastrous, Mao still believed leftist politics could be used to achieve a circumstance of equalitarianism in China's society. By contrast, Liu Shaoqi and Deng Xiaoping believed that socialist society had to be built based on economic support; efficient economic development necessarily resulted in income inequality; in the case of China, the inequality should be reduced to acceptable levels, not to be minimized or annihilated. Due to the inconsistency in political opinions, Mao launched the 'Cultural Revolution' against any kind of western or capitalist ideology. The government concentrated all their energy in large-scale political movements; China's economy reached the brink of collapse at the end of the 1960s. The annual growth rate of GDP per capita rate declined for two years by -5.7% in 1967 and -4.1% in 1968 respectively [CSB, 1986].

The radical movement almost ended in 1972. Chinese government returned to normal and started to re-construct the national economy under the national work plan of 'increasing equipment imports and enlarging economic exchange' [Lu, 2003], which resulted in a

<sup>9</sup> The household registration system was implemented to ensure the control of steel outputs. Households were the basic unit of producer communities.

<sup>10</sup> The annual growth rate of energy consumption was 26.7% during the Great Leap Forward period, but the annual average change of GDP growth was -2.0% [Lang, 2001].

2.7% annual growth rate of GDP per capita from 1970 – 1978. During these 20 years, China’s population grew by 50% from 660 million in 1958 to 963 million in 1978 [CSB, 1999] putting further strain on the already limited resources. The average annual growth rate of GDP per capita was 3.2% over the two decades while other Asian countries (i.e. Japan) were developing fast at about 8% of GDP growth rate.

**Basic Livelihood and Traditional Lifestyle**

The devious economic development during this period resulted in a stagnation of improvements in people’s livelihoods. During the Great Leap Forward, people’s consumption levels significantly declined both in urban and rural China. Therefore, China had to use the next three years (1961 – 1964) to restore people’s consumption standard to previous levels. Since then, the consumption level started to grow again; during these 20 years overall income growth rates were 2.9% in cities and only 1.37% in rural (in real terms). Table 4 investigates the consumption pattern of Chinese peasants; food and cloth still dominated the majority of people’s consumption expenditures. It also did not find any notable changes in other consumption categories, which at least demonstrated that peasant’s lifestyles were the same as usual. Meanwhile, many urban residents escaped from poverty and shifted to fairly ‘adequate food and clothing’ [Lu, 1998].

During these 20 years, the policies were designed to fight against everything that could be related to the western- or capitalist- links. The government prohibited western influences from flowing into China. Therefore, people had no opportunity to realize how huge the differences were between themselves and western people. Many Chinese thought their lifestyles had been dramatically improved compared to the standard prior to 1949. Moreover, they were not motivated to further change because all the other people had the same.

**Table 4: Peasants’ Expenditure Categories (1957 – 1978) (in %)**

Years	Food	Clothing	Fuel	Daily use	Recreation	Housing	Total expenses
1957	67.75	13.44	10.03	6.94	1.74	2.10	100
1963	63.30	11.21	9.32	8.79	2.67	4.71	100
1965	68.46	10.51	8.31	7.18	2.71	2.83	100
1978	67.71	12.70	7.11	6.57	2.71	3.16	100

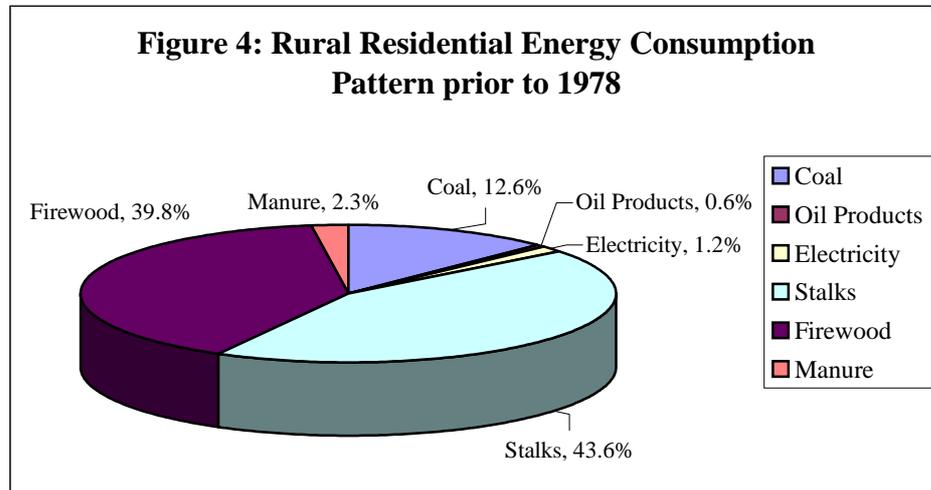
*Source: Yang, 1986. Research on Chinese Consumption Structure (p. 186)*

**Less Biomass in Rural China, More Coal in Cities,**

The near stagnation of lifestyle changes resulted in little increases of the absolute amount of per capita residential energy consumption. However, the consumption switched towards more commercial energy sources.

Before 1970s, peasants had to seek energy sources for their residential use by themselves because rural energy infrastructure constructions were excluded from the national plan. Until 1975, the government allowed small local coalmines to be developed to meet peasants’ increasing residential energy demands, which resulted in rapid increase of coal consumption in rural areas, from 9.73 in 1965 to 95 million tons in 1978 [Zheng, 2002]. However, many peasants were still struggling against poverty, and preferred to save for better food and clothes rather than buy fuel (e.g. coal). Therefore, biomass fuels still occupied 85% of total rural energy consumption, but some commercial energy started to be consumed as shown in Figure 4.

Cities were granted favourable policies in energy construction. Prioritising all resources to cities provided sufficient energy to industries and also to cities dwellers. Each urban resident consumed 774 kgce<sup>11</sup> commercial energy per year (70% was coal for heating and cooking), which was about 6 times more than peasants did [Pan, 2002]. Until 1978, electricity became a popularised source of energy in 90% of urban households' daily lighting while many peasants were still using kerosene lights.



*Data source: China's Rural Statistics Yearbook, 2000*

#### **Wells in Rural China but Tap Water in Urban China**

Again, the development of water infrastructure did not happen in rural China. People had to acquire their living water from wells, which did not allow for significant increases in household's water consumption.

By contrast, per capita residential water consumption in cities grew at an outstanding rate of 4.7% annually during those 20 years due to the tap water system being established for almost 90% of the cities. By 1980, the per capita residential water usage for urban households was 97.3 litres per day [MWR, 1999]. The figure not only included the daily usage (e.g. cooking, drinking and washing), but also regular activities, such as horticultures and showering and bathing in public bathing places.

### **5 A Stirring Period: New Policies, Booming Economy and Diversifying Lifestyles since 1980**

In 1978, Deng launched the economic reforms and established the 'open-door policy' at the Third Plenum of the Eleventh Party Congress. Since then, China's economic system has fundamentally changed from a central planning economy to a mixed system with elements of central planning and market mechanisms. By following that, China succeeded in achieving an annual growth rate of GDP per capita as 8.6% in real terms<sup>12</sup> for more than 20 years. People's living standard rapidly improved and their lifestyles diversified.

#### **Policy Innovation with income increases**

In rural China, the government decided to change rural agricultural policies in 1978 to guarantee higher levels of agricultural output. The '*Household Responsibility System*' was therefore established throughout the country. Under this system, peasants could

<sup>11</sup> kgce: kilogram coal equivalent

<sup>12</sup> The GDP per capita is calculated at 1995 constant prices. Tibet and Hainan was not included due to missing data for GDP components.

independently arrange, produce and sell their products, which effectively stimulated peasants' motivations and responsibility and was enthusiastically accepted [Lu, 2000]. As a result, agricultural outputs grew to almost four times the pre-reform level by 1997 while productivity increased 1.5 times during the same period [Fan, 2002].

Another important government activity in rural China was the opening up of the rural economy. The rural enterprises have been therefore dramatically developed during the past two decades. In the early 1980s, employment in the agricultural sector accounted for 97% of total rural labour, but this figure declined to 68% in 2001 [CSB, 2002], which is still a considerable share. The new rural economic structure led to a growth in peasants' net income from 133 Yuan in 1978 to 2330 Yuan in 2001; the annual growth rate was 7.8% in real terms [CSB, 2002].

In cities, the real reform did not actually start until the end of 1984. The central government granted more autonomy to local authorities, which formed the domestic competition between provinces. The direct consequence from this competitive mechanism was an increase in industrial productivity, resulting in rapid GDP growth. In addition, China started to intensively attract foreign trade and investment since the beginning of 1990, which not only made a significant contribution in China's economic growth but also brought advanced technology and management systems to Chinese enterprises [Fan, 2002]. Consequently, city dwellers' net income increased as an annual growth rate of 10.1%. By 2001, the average income for each urban resident was 6859 Yuan in 2001, three times more than peasant's level [CSB, 2002]. People did not only settle for sufficient food any more; and started to purchase high-quality goods and adopted more diverse lifestyles.

### **Rapid Consumption Growth**

Table 6 and 7 investigates the changes of consumption pattern from 1978 to 2001. The proportion of expenditures on food and cloth steadily decreased while the proportion of other items' increased. The figures for food, housing, education expenditures, and water and energy expenditures significantly changed; therefore we use them as indicators to reveal people's lifestyle changes since 1978.

**Table 6: Rural Consumption Expenditure Pattern**

Rural China	Expenditures		Food & Cloth		Transport		Housing		Household appliances		Education & Recreation	
	Yuan	%	Yuan	%	Yuan	%	Yuan	%	Yuan	%	Yuan	%
1978	116	100	94	82	11	9	12	10	8	7	3	3
1985	317	100	214	78	5	2	58	18	16	5	12	4
1990	584	100	388	75	8	1	101	17	31	5	31	5
2001	1741	100	930	53	110	6	279	16	192	11	248	14

*Data source:* China Statistics Yearbook, 1996, 2002

**Table 7: Urban Consumption Expenditure Pattern**

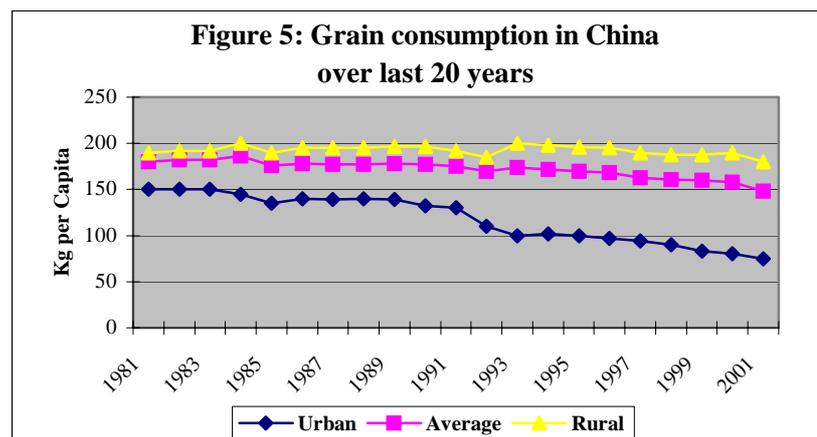
Urban China	Expenditures		Food & Cloth		Transport		Housing		Household appliances		Education & Recreation		Medical Care	
	Yuan	%	Yuan	%	Yuan	%	Yuan	%	Yuan	%	Yuan	%	Yuan	%
	1985	673	100	449	67	14	2	32	5	58	9	55	8	17
1990	1279	100	865	67	40	1	61	7	108	10	112	9	26	2
1995	3538	100	2245	64	171	5	250	7	297	8	312	9	110	3
2001	5309	100	2547	48	457	9	547	10	395	8	974	12	343	7

*Data source: China Statistics Yearbook, 1996, 2002*

### Diet change:

Although food and cloth still dominated people's expenditure both in urban and rural areas, the share has been progressively decreasing since 1978 (Table 6&7). From the perspective of food structure, people's diet contains more meat and health food, but less cereal products. Figure 5 illustrates the decline of grain consumption in both rural but mainly in urban China. The decline of grain consumption does not mean the total calorie intake decreased, but rather that we can observe a switch to more diverse diets with higher share of meat, fish, fruits, etc.

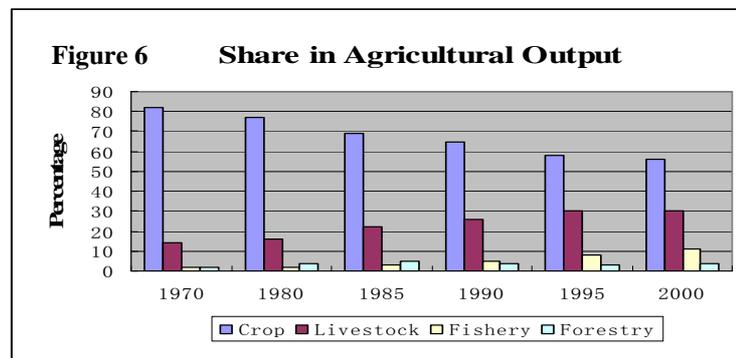
In fact, there is a substantial gap in the consumption patterns of urban and rural consumers due to the inequality of income levels. For example, per capita grain consumption by rural households (178 kg) was more than double that by urban households (80). Meanwhile, urban per capita consumption of pork, red meat, poultry, eggs and aquatic products were much greater than rural consumption. But the saturation of the pork market in urban China is narrowing this gap between urban and rural pork consumption [Wu, 2003].



*Data source: China's Rural Statistics Yearbook, 2000*

The significant increase of availability of meat and other dairy products boosted the development of livestock production, and other agricultural productions [Hubacek and Sun, 2001]. As a result, diversified agriculture emerged in rural China, many peasants shifted from the traditional agriculture of crop cultivation to more commercial agricultures. As Figure 6 shows, the share of livestock output almost doubled from 16% to 30% in 1970 – 2000. The fishery production even grew at a higher rate. One of the outstanding features in

the changes of agricultural structure is that the share of grain drastically declined from 78% to 50% [Gale, 2002]. Along with the emergence of diversified food and changing demand, the industry of food processing and manufacturing has been flourishing since the reform.



*Data source: China's Statistics Yearbook, 2001*

### **Housing and household appliances:**

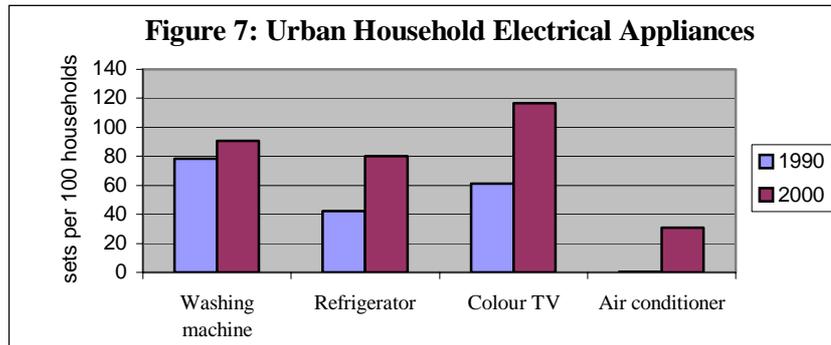
The outstanding increase of expenditure on housing during the time period from 1978 to 1990 both for rural and urban households (as showed in Table 6&7) could reveal people's willingness to improve their living conditions. Many rural households rebuilt and extended their bungalows by using building materials of concrete bricks and tiles instead of marl and woods. At the same time, per capita living space expanded from 8.1 m<sup>2</sup> to 24.2 m<sup>2</sup>, and the lifespan of houses extended by more than 20 years [CSB, 2002].

In urban China, the problem of housing shortage was much more serious than in rural areas. The per capita net living space for urban residents was only 3.6 m<sup>2</sup> prior to 1978, mainly because of restrictions on private house ownership. Cities dwellers urged the development of housing. Until 1981, the commercialization of the housing sector brought about with the Housing Reform Policy had been introduced to solve the problems of urban housing shortages and poor housing conditions [Zhang H, 2003]. This policy encouraged private ownership and people buying their own apartments. Meanwhile, the government, state owned enterprises, individuals and oversea developers invested significant funds into the urban housing development. Lin (1991) estimated that the total housing investment between 1979 and 1990 was 6.74% of total GDP. As a result, city dwellers started to move from previously tiny bungalows or apartments to new Multi-stories apartment blocks or even high-rise buildings, and per capita net living space increased to an average of 15.5 m<sup>2</sup> in 2001 [CBS, 2002].

People settled down in more spacious living places that allowed them to shift their attention to household appliances and other durable goods. For example, since the 1980s, urban residents spent increasing amounts on large durable furniture (e.g. wardrobes, beds and sofa etc). Household appliances have kept a constant share of urban household expenditures for investment since 1985 (shown in Table 8), while the categories of household appliances have been changed. This development was also enabled by an increasing rate of household electrification since 1990. Therefore, household electrical appliances purchased by people quickly increased in both quantity and category during the past ten years (as showed in Figure 7). For example, purchase of refrigerator and colour TV in urban areas has both doubled in 2000 compared with 1990. Colour TVs have already covered over half of rural China, and other categories of electric appliances have been rapidly spreading through China.

Another example are air conditioners, previously a sign of the wealthy, increased significantly to about 30 sets per 100 households [CSB, 2001]. The popularisation of household electrification dramatically boosted the household appliance production. The

electronic industry has become the largest industry in China, which contributed about 8-10% of GDP, and 30% of export profits [People Daily, 28/02/02].



*Data source: China's Statistics Yearbook, 2001*

### **Education:**

With the unfolding of the reforms and liberalisation, more and more peasants have realized that increased education would make them more productive and employable. Therefore, they are willing to pay more for education, especially for their children. Rural residents view schooling as a means to migrate to an urban job; the people with the highest level of education and skill are the most likely to enter nonagricultural work, leaving the less skilled in farming [Gale, 2002]. As a result, almost 60% of youth population in rural China could complete the nine years compulsory education, and 15% of them could be sent to colleges for further studies by 2001 [China Education and Research Network]. Meanwhile, almost 20% adult peasants joined part-time courses to learn about and acquire new agricultural technology. Although the above figures are not outstanding, it is pleasing to see the transformation of turning peasants into modern peasants, which speeds up the commercialization and modernization in rural China.

In cities, people's ideology is progressively opening up to the west as they admit and try to reduce the disparity between themselves and western lifestyles. It not only embodies in spending on general living conditions, but also the gradually increasing investment in education and medical care. 'Go abroad to study or work' for youth generation (age: 19-36)<sup>13</sup> became a popular topic in urban China today. The total number of overseas people dramatically increased in the past a couple of years. For example in 1978, only 50 people sponsored by government went to abroad to study and work, the figure leaped to 39 thousand in 2000, and doubled again in 2001. By 2002, the total amount reached 125 thousand, 93% of them financed by themselves [Science Daily, 26/08/03]. Although 'Go abroad' could not happen to everyone; it accelerates the process of people's realization to the west, and stimulates the urban households to further transform to health and knowledgeable lifestyles after the affluent livelihoods.

### **Diverse Energy Sources in Villages and Cleaner Energy in Cities**

Adequate energy support is the basis of China's rapid economic development and household modernization.

So far, non-commercial energy like biomass still dominates rural residential energy consumption patterns. For example, stalks, firewood and other non-commercial energy sources contributed approximate 85% of residential energy in 1980 [Zhou, 1999]. The

<sup>13</sup> Due to the cultural reason, most people less than 25 years old have to be paid by their family for study in abroad.

overuse of biomass energy caused such problems as the cultivated land degradation and destroyed forest resources. Since the policy of biomass energy conservation and forestation were established in the middle of 1990, the absolute amount of biomass energy consumption has fallen from 250 Mtce<sup>14</sup> in 1995 to around 200 Mtce in 2000. However, the total amount of residential energy is continuously growing, with major increases from commercial sources. The total amount of commercial energy consumption grew remarkably by 3.6 times, from 41 Mtce in 1980 to 149 Mtce in 2000 [Pan, 2002]. Therefore, it is interesting to point out that the commercial energy for rural residential uses will gradually replace biomass energy and become the major energy source in the future. Coal consumption shows a descending tendency after 1988, which demonstrates that coal is no longer the favourite source for rural household daily use. In addition, the government encouraged people to use fuel-saving stoves to replace the traditional ones since 1986, and the fuel-saving stoves could increase the thermal efficiency to 25% - 30% [Zheng, 1998], which also led to the reduction of coal consumption. By the end of 1997, the fuel-saving stoves had been installed in 180 million rural households, which accounts for 89% of total rural households [Wang, 1998].

The improvement of urban people's living conditions significantly changed urban residential energy consumption pattern. In terms of heating, most urban areas still keep the traditional way of heating by burning coal<sup>15</sup>. The increase of per capita net living space is likely to result in more coal being consumed. However, the previous type of individual heating has been switched to large-scale central heating as people moved from bungalows to apartment blocks, which effectively enhanced energy efficiency. Furthermore, many rich cities (e.g. Beijing) have been installed the 'consumer control system' of heat supply to allow heat supply to best match demand [World Bank, 2001]. On the other hand, the government provides LPG (liquefied petroleum gas) or gas pipelines for people's daily cooking instead of traditional cooking by burning coal, to reduce urban coal consumption. Per capita coal consumption for urban residential use rapidly declined from 348.5kg/year in 1985 to 88.2kg/year in 1999. As the outstanding growth of household electrical appliances for urban households, the per capita residential electricity consumption increased more than four times during 1985-1999. Electricity became the dominant fuel in all Chinese cities, accounting for 59% of the whole household energy consumption [CSB, 2000].

#### **Water reform in villages, potential scarcity in cities**

Also residential demand for water has significantly grown since 1978, although it remains a relatively small share of total water consumption, which is 3.8% in cities and 6.8% in countryside [Zhang H, 2003].

The per capita water consumption in rural households was 89 liters per day by 2000. Compare to 244 liters daily use in urban China, many peasants would have great potential ability to consume more, which is due to poor water infrastructure in rural China. According to the 1997 census of agriculture, only 17% of rural households had access to tap water [USDA, 2000]. With the increase of peasant's net income level an increasing demand for water related household appliances such as kitchen sinks, washing machines, and shower heads (standard urban amenities) is evident but hard to achieve due to the poor water supply situation. Therefore, the demand for improving rural water infrastructure progressively increases in recent years. Chinese government invested 4 billion Yuan in 2000 in order to construct water tap supply systems in rural China, which has already covered 41% of the whole countryside by the end of 2002 [Wang, 2003].

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<sup>14</sup> Mtce: Million tons coal equivalent

<sup>15</sup> Household heating mainly happens to the north China.

More and more efforts have been made on improving housing conditions in cities. If we compare the present housing design standard with previous ones, now, over 70% of the new apartments have flush toilets, kitchen sinks, and shower head and other basic facilities, but only 34% of households had flush toilets prior to 1980 [Zhang H, 2003]. Furthermore, many city dwellers with outstanding growth of income are switching their lifestyles towards western standard in order to achieve a comfortable, healthy and hygienic livelihood. Many household appliances such as washing machines, dishwashers, refrigerators and water heaters which were novelties in the beginning of the early 1980's are now popular among urban households. For each 100 families, 92 have washing machines, 52 had water heaters by 2001 [CSB, 2002]. All those housing improvements contributed in the increase of per capita daily household water consumption from less than 100 liters in 1980 to 244 liters in 2000, with the expectation to be further increased to 280 liters per day by 2010. However, compared with American daily use with some 400 liters per capita, one can see enormous potential increases of residential water demand as lifestyles change.

## **6. Conclusion**

China's case is an interesting example of how consumption patterns have changed in relatively short period of time. A large share of the population (almost 70%) is still living in rural China with the associated lifestyles. Often times there is no adequate infrastructure to provide for electricity and water, people have to gather their own energy sources and collect their water from wells. For them as for many other Chinese before them changing their lifestyles is dependent on the opportunities provided by income and the availability of products and resources. The story of changes in lifestyles in china is still mainly a story of economic development and of catching up with the rest of the world. People mainly in urban areas are closer to a "Western Ideal" in terms of consumption of products and services. Sustainability in consumption is not quite a widespread issue yet. The first goal is to achieve a certain standard before thinking about the environmental side effects. Environmental destruction in China has reached enormous scales already, increasing awareness and pressure on policy makers and production facilities. China has proven to quickly develop from a developing country to an important economic player. Maybe in terms of sustainability we can hope for a similar quick development. Given the size of the economy and China's population one would hope so.

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# AUSTRALIAN APPROACHES TO GOVERNANCE IN SUSTAINABLE URBAN HOUSING: ENERGY AND WATER

by  
Mark Tranter<sup>1</sup>

## Introduction

Cities provide a number of challenges for sustainable consumption. The conglomeration of large numbers of people in confined spaces leads to demands for such services as an efficient transport, retail and recreational services, an acceptable standard of housing, adequate energy supply, a reliable and disease free water supply, efficient waste disposal system and so on. It is a challenge when faced with such a thirst for goods and services to attempt to move towards sustainable patterns of consumption. There are ranges of options available to attempt to achieve sustainability, such as education, tax incentives, labelling, persuasion and coercion. Generally, any activity in this regard falls to government and the choice of mechanism(s) adopted, if any, depends on the political will of the government and the perceived cost of such measures.

This paper looks at two of those demands which modern urban lifestyle places on services: energy and water, in an Australian context. It looks at mechanisms adopted by various governments to deal sustainably with these issues and attempts to evaluate the success of these mechanisms to encourage sustainable consumption.

## Energy – the Australian Background

For a number of reasons the present Australian Government has no intention of ratifying the Kyoto Protocol. That is despite Australia's generous treatment under the Protocol where the target level for greenhouse gas emissions was to be an increase to 108% of the 1990 levels by the 2008-2012 period. The main reason for this concession was Australia's reliance on energy produced from fossil fuels. Australia has massive reserves of fossil fuels in particular coal,<sup>2</sup> and its electricity generation sector has an 80% reliance on generation from this source.<sup>3</sup> Household consumption of electricity indirectly produces the greatest amount of greenhouse gas emissions (17%).<sup>4</sup> While the present government will not ratify Kyoto, it has indicated a commitment to meet the Kyoto emissions target.<sup>5</sup> In this regard there have been national programs directed at reducing greenhouse gas emissions such as energy efficiency provisions of the national building code and mechanisms to encourage and coerce the use of renewable energy sources.

## Energy Efficient Housing

Before 2003 there were no national measures to provide that new detached dwellings be constructed having regard to energy efficiency principles: such things as insulation,

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<sup>2</sup> There are estimated to be 258 years of reserves of black coal and 744 years of reserves of brown coal in Australia: Australian Bureau of Statistics, *Energy and Greenhouse Gas Emissions Accounts Australia*, (Commonwealth of Australia, Canberra 2001), Cat. No. 4604.0, Table 13.

<sup>3</sup> Australian Bureau of Statistics, Note 2.

<sup>4</sup> Australian Bureau of Statistics, *Year Book Australia 2003: Energy and the Environment – Greenhouse Gas Emissions*, (Commonwealth of Australia, Canberra, 2003), Cat. No. 1301.0.

<sup>5</sup> Dr David Kemp, Federal Minister for the Environment, "Australia's Approach to climate Change" Opening Address, Institute of Public Affairs Conference, 28 February 2003.

ventilation, shading and siting. While there had been a national building code since 1996, building regulation was primarily the concern of the eight state and territory jurisdictions and adherence to the national code was a matter for the individual jurisdictions. The diversity of climatic conditions on the Australian continent from the tropical climate of the north to the temperate regions of the south also presented drafting challenges to a one size fits all code. Nevertheless, 2003 saw the incorporation of energy efficiency provisions into the Building Code of Australia. The objective of these provisions is quite clearly to reduce greenhouse gas emissions.<sup>6</sup> It is estimated that the measures will reduce greenhouse gas emissions by 1.51 million tonnes of CO<sub>2</sub> equivalent by 2010.<sup>7</sup> The new measures operate by dividing the country into 8 climatic zones (See Appendix 1) and prescribing requirements for each of the zones with respect to:

- Building fabric including insulation,
- External glazing,
- Building sealing
- Air movement, and
- Services such as heating and cooling ductwork.

It is not the purpose of this paper to argue the stringency of these energy efficiency provisions but it is interesting to note that one of the authorities responsible for them when discussing building fabric modelling admitted:

By some European standards our 5 star level would be considered to represent only a very mediocre level of thermal performance.<sup>8</sup>

### **Factors Relating to the Impact of Energy Efficiency Measures**

These energy efficiency measures are mandatory for all new detached housing construction in Australia but there are several structural and institutional factors and a very significant consumer preference factor which operate to reduce the impact of these provisions.

A structural issue is that the measure will in the main only apply to new housing stock. In 1999 the housing stock at which these measures were targeted was approximately 6 million dwellings. The estimate was that housing stock increased at 130,000 dwellings per year which in percentage terms is 2 per cent per annum. The impact over a 10 year period was expected to be 20 per cent of the total detached housing stock.<sup>9</sup> In the calendar year January – December 2003, when the new provisions commenced in some jurisdictions, there have been 119,877 dwellings approved<sup>10</sup> indicating that the actual impact may be less than anticipated. Another structural factor is that the provisions at this stage apply to detached residences. During the 2003 calendar year there were 53,946 multiple dwelling units approved to which the energy efficiency provision do not yet apply. The sooner these are added the more significant will be the impact.

There are two institutional factors which also must be considered. While the provisions are a national code their introduction is dependent on state and territory implementation. For

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<sup>6</sup> Australian Building Codes Board. *Building Code of Australia 1996*, Volume 2, Part 2.6 Energy Efficiency, Clause O2.6, Page 3901.

<sup>7</sup> Australian Building Codes Board, *Regulatory Impact Statement (RIS 1002/04): Energy Efficiency Measures BCA Volume 2 (Housing Provisions)*, December 2002, page vii.

<sup>8</sup> Australian Greenhouse Office, *Australian Residential Building Sector Greenhouse Gas Emissions 1990-2010 Final Report*, (Canberra, Commonwealth of Australia, 1999) page 35.

<sup>9</sup> Australian Greenhouse Office, *Australian Residential Building Sector Greenhouse Gas Emissions 1990-2010 Final Report*, Note 8, p42.

<sup>10</sup> Australian Bureau of Statistics, *Building Approvals, Australia*, (Commonwealth of Australia, Canberra) Cat. No. 8731.0.

example, the provisions only commenced in one State, Queensland, in September 2003 and have not yet commenced in the most populous State, New South Wales. Secondly, the stringency with which the provisions are enforced depends on individual local governments which are often not the best resourced level of government.

Probably the most crucial factor in the effectiveness of the energy efficiency provisions is the matter of consumer preference. It is recognised that it is possible to lose any energy gains in building design by increased demand for consumer comfort levels.

Small increases in required user comfort levels could significantly impact on energy demand in this area.<sup>11</sup>

This means consumers are able to take the benefits of energy efficient design, whether it be warmer winter temperatures or cooler summer temperatures and build on those to improve comfort levels. Increasing affluence and more readily available air conditioning units, sees increasing numbers of air conditioning units being installed. In 1994 35% of dwellings were fitted with air conditioning while by 2002, 49% of households had air conditioning.<sup>12</sup>

While energy efficient housing design is a laudable step, the benefits in saving energy and consequently greenhouse gases, may be lost by the increasing consumer demand to control comfort levels through air conditioning. There is still the argument that an energy efficient air conditioned premises will use less energy than a less energy efficient air conditioned premises. Thus while energy use continues to increase, the argument is that without the energy efficiency provisions, energy use would have increased to an even higher level.

## **Solar Hot Water Systems**

The Australian climate lends itself to harnessing solar power. The average amount of solar energy that falls on Australia is 15,000 times the nation's energy use.<sup>13</sup> Appendix 2 shows that almost the entire continent averages above 6 hours of sunshine per day with areas above 10 hours of sunshine per day. By comparison London averages 4 hours of sunshine per day.<sup>14</sup>

Electric water heaters accounts for 27 per cent of residential greenhouse gas emissions.<sup>15</sup> Modern solar hot water systems (SHWS) are an efficient and reliable method of providing household hot water which is the largest energy demand in residential dwellings.<sup>16</sup> The disadvantage of SHWS is that such systems cost on average 3 times the price of a conventional electric hot water system.<sup>17</sup> To encourage the use of this energy efficient means of heating water, most Australian jurisdictions provide a rebate scheme to encourage their installation. The details of the rebate schemes appear in Figure 2 below.

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<sup>11</sup> Australian Greenhouse Office, *Australian Residential Building Sector Greenhouse Gas Emissions 1990-2010 Final Report*, Note 8, p56.

<sup>12</sup> Australian Bureau of Statistics, *Environmental Issues: People's Views and Practices*, (Commonwealth of Australia, Canberra, 2002) Cat. No. 4602.0.

<sup>13</sup> Australian Bureau of Statistics, *Year Book Australia 2003: Energy, Special Article – Renewable Energy in 2003*, (Commonwealth of Australia, Canberra) Cat. No.1301.0-2003.

<sup>14</sup> The Meteorological Office, England SE & Central South 1971 - 2000 Averages [http://www.met.gov.uk/climate/uk/averages/19712000/areal/england\\_se\\_&\\_central\\_s.html](http://www.met.gov.uk/climate/uk/averages/19712000/areal/england_se_&_central_s.html) accessed 12 February 2004.

<sup>15</sup> Australian Greenhouse Office, *Australian Residential Building Sector Greenhouse Gas Emissions 1990-2010 Final Report*, Note 8, p 25.

<sup>16</sup> Australian Bureau of Statistics, *Environmental Issues: People's Views and Practices*, 4602.0, Note 12

<sup>17</sup> An average price for a solar hot water system is A\$3,900 (Approximately UK£1,640)

<b>Australian Jurisdiction</b>	<b>Hot Water System Rebate (max/average if available)</b>
New South Wales	Nil but was \$500 before Sept. 2003
Victoria	\$1,500/1,100
Queensland	\$750/400
South Australia	\$700
Western Australia	\$500
Tasmania	Nil
Australian Capital Territory	\$1,600/1,000
Northern Territory	\$400 but only first home buyers

Figure 2

### **Renewable Energy Certificates**

In addition to the rebates above, purchasers of SHWS can participate in the renewable energy certificate (REC) scheme. This scheme was established by the *Renewable Energy (Electricity) Act 2000* (Cth) and is similar to other such trading schemes, e.g. carbon trading. It imposes a requirement that the suppliers of retail electricity in the nation must source a certain percentage of their wholesale electricity purchases from renewable sources, such as hydro, wind, solar and the like. Thus at the end of a calendar year the supplier must produce RECs which correspond to their required purchase of renewable energy. For example, if a supplier purchases 100,000 MWh of electricity in 2004 their requirement from renewable sources for the year will be 1.25 per cent<sup>18</sup>. In that case they will be required to have purchased the equivalent of 1,250 MWh from renewable sources for this year. One REC is equivalent to one MWh, therefore the supplier must surrender to the regulator (Office of the Renewable Energy Regulator) 1,250 RECs. If they have insufficient certificates then a penalty of A\$40 per certificate for the shortfall is imposed.<sup>19</sup>

The scheme has been extended not just to alternative energy generation, but allows the one off issue of RECs to purchasers of domestic solar hot water systems replacing an electricity hot water systems. The number of RECs issued depends on the size of the system and the climate zone. A typical number of RECs would be 30 which would be currently valued at approximately A\$35 per certificate giving a further price reduction for a domestic solar hot water system of A\$1050. Speaking in round figures, the typical solar hot water system would be reduced in price to A\$2,450 (£1,030) after collecting a rebate if applicable and selling the RECs. This is still approximately 90 per cent more expensive than an equivalent electric hot water system.

### **Market Penetration of Solar Hot Water Systems**

<sup>18</sup> *Renewable Energy(Electricity) Regulation 2001*, section 23.

<sup>19</sup> *Renewable Energy (Electricity)(Charge) Act 2000*, section 6.

Given the relative price disadvantage that remains with the choice of a solar hot water systems, and despite arguments about reduced electricity charges over the longer term, consumer purchasers must still have a commitment to environmental sustainability to make the solar choice in water heaters. In 1999 five percent of Australian Households used solar water heaters.<sup>20</sup> In a survey conducted in 2001-02, 3% of new homes had solar hot water systems installed.<sup>21</sup> More recent figures from one Australian State, Queensland, indicates that the uptake rate of SHWS is better than this percentage. They are as follows:

January 2003–June 2003

No. new house approvals:	13,418 <sup>22</sup>
No. SHWS rebates paid for new homes:	1,175 <sup>23</sup>

These figures are indicative<sup>24</sup> of a figure of 8.75 per cent of new homes in the jurisdiction having SHWS installed. During the same period rebates for replacement SHWS, that is in existing dwellings, numbered 2,776. Since the commencement of the rebate scheme in July 1998 up to the present 19,315 rebates have been paid.<sup>25</sup>

### **Photovoltaic Cell Generation**

Given the copious supply of solar energy in Australia, there is also the opportunity to take advantage of solar generated electricity by the installation of photovoltaic cells on dwellings. As far as sustainability is concerned, the concept of individual urban dwellings providing a significant part, if not all, of their own power requirements is attractive. The need for additional grid generated power is reduced and the unsightliness and reliability issues associated with above ground grid transmission are persuasive arguments in favour of household installation of solar power. There are also incentive mechanisms for the installation of these. However, these are quite expensive systems to install, and even more so than SHWS, the consumer's choice to install photovoltaic cells would need to be motivated by environmental concerns rather than the promise of any short term economic gain. The cost of such a 1.5 kW system generating 1800 kWh of electricity would be approximately A\$20,000 (UK£8,400).<sup>26</sup> The Australian Government, in conjunction with the other governments, supplies a rebate of up to A\$7,500 (UK£3,150)<sup>27</sup> which is approximately 40% of the likely cost of such a system. There is also the opportunity for the owners of grid connected systems to obtain additional funds by participating in the REC scheme. Nevertheless, as discussed above given the capital outlay and the relatively low level of potential savings, a consumer would require a significant commitment to sustainability to follow this path.

Consequently, the numbers of grid connected photovoltaic generation systems which have received rebates since the commencement of the rebate scheme in February 2000 has been

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<sup>20</sup> Australian Bureau of Statistics, *Australian Residential Building Sector Greenhouse Gas Emissions 1990-2010 Final Report* note 8.

<sup>21</sup> Australian Bureau of Statistics, *Year Book, Australia 2003: Construction Feature Article-Attitudes of residential builders to energy issues*, (Commonwealth of Australia, Canberra) Cat. No. 1301.0-2003.

<sup>22</sup> Australian Bureau of Statistics, *Building Approvals, Australia 2003* (Commonwealth of Australia, Canberra) Cat. No. 8731.0.

<sup>23</sup> Environmental Protection Agency (Qld), personal email communication, 10 February 2004.

<sup>24</sup> These figures are indicative because the time of approval would not coincide with the rebate payment which would be at the completion of construction.

<sup>25</sup> Environmental Protection Agency (Qld), Note 23.

<sup>26</sup> Australian Bureau of Statistics, *Year Book Australia 2003, Energy, Special Article – Renewable Energy in 2003*, Note 13.

<sup>27</sup> This is the figure for Queensland, other States provide lesser amounts.

low – 1,570. Off grid solar systems numbered 3,231 in the same period.<sup>28</sup> At this stage, the expense of the technology is a significant impediment to consumer choice in this area without much heavier incentive from government.

### **Energy Use**

The measures discussed here: energy efficient house design, solar water heating subsidies, renewable energy certificates and photovoltaic cells have, a relatively short history in an Australian context. In some ways it may be unfair to judge the various mechanisms in place against electricity consumption which historically increases. This is especially so when the cost of that electricity by world standards is relatively cheap (see Appendix 3). The growth in energy use in the residential sector has been consistently 2 to 3 per cent annually between 1998 and 2003.<sup>29</sup>

### **Water – The Australian Background**

Australia is the driest of the inhabited continents with an average continental rainfall of approximately half that of Europe (See Appendix 4). Nevertheless the coastal areas are reasonably well watered and it is in these areas that most Australians live in large cities.<sup>30</sup> However, the generally dry nature of the continent and what to most observers appear to be the effects of climate change manifested in a series of droughts in recent years, has seen even the largest cities instituting water saving measures.<sup>31</sup>

In some areas, water resources are already stressed and are highly vulnerable, with intense competition for water supply. This is especially so with respect to salinisation and competition for water between agriculture, power generation, urban areas and environmental flows.<sup>32</sup>

The strain on urban water supplies over the past few years has seen a renewed interest in urban water conservation methods. Two of these areas of interest are capturing and reuse of rainwater and recycling grey water. In this area particularly, the approaches employed to encourage and coerce consumer change has been driven from the grass roots. Since most water supply issues in Australia are controlled by local governments or regional boards, the initiatives have come from that lowest level of governance at times assisted and at times obstructed by the levels above them in the hierarchy.

### **Rain Water Reuse – Incentive Mechanism**

In an era of pressure on water resources, the humble rainwater tank has made a comeback in the Australian urban psyche. Whereas once these were regarded as relics of the past and were allowed to rust and decay before being removed, today their use is being encouraged by water supply regulators.

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<sup>28</sup> The Australian Greenhouse Office, *Photovoltaic Program*, available on the internet at <http://www.greenhouse.gov.au/renewable/pv/index.html> accessed 23 February 2004

<sup>29</sup> Australian Bureau of Agricultural and Resource Economics, *Energy Update 2002* [http://www.abare.gov.au/data\\_services/energy.html](http://www.abare.gov.au/data_services/energy.html) accessed 22 Feb 2004 p2; Queensland Treasury, *Figures on the National Electricity Market*, personal communication, 24 February 2004.

<sup>30</sup> See Appendix 5 & 6 in relation to Australian rainfall distribution and population distribution.

<sup>31</sup> Namely Sydney, Melbourne and Canberra. The tourist city of the Gold Coast (pop. 400,000) has had severe water restrictions in place since October 2002 allowing very restricted watering of gardens and buckets the order of the for other uses such as washing cars).

<sup>32</sup> B Pittock, *Climate Change: An Australian Guide to the Science and Potential Impacts*, (Australian Greenhouse Office, Canberra 2003), p4.

The primary method of encouragement is to offer an incentive for their installation. Canberra, the national capital, has one of the longest running rebate scheme for the installation of rainwater tanks which has been in operation for the past 7 years. The scheme offers up to \$500 (UK£200) for the installation of a rainwater tank in residential premises. After only fairly minimal response from consumers in the past, the 2003-2004 financial year to date has seen 245 tanks installed with a minimum capacity of 1.67 ML. This is a significant contribution in only seven months to the water storage capacity of the city.

There are numerous other examples of this type of rebate scheme. Brisbane City with 330,000 households<sup>33</sup> has instituted a similar scheme since June 2002. The incentive is the same as the Canberra scheme, that is a rebate of \$500.

This method of residential water storage by means of rainwater tanks has the potential to provide a growing supplement to the mains water supplies of Australian cities at a time when the effect of climate change seems to be reducing average rainfalls.

### **Governance Issues and Rainwater Tanks**

The benefits of the installation of rainwater tanks in urban areas has a number of advantages. As mentioned, it supplements the mains water system supply reducing the demand on that infrastructure. This can assist in postponing costly infrastructure upgrading such as treatment works and dams. It has also been touted as a means of reducing peak storm water flows by the initial diversion to domestic rainwater storage thereby reducing flash flooding.<sup>34</sup> However, there were a number of governance issues which were required to be addressed before these schemes were implemented. The primary concern of regulators was health issues. There remains concern about the threat to health posed by the consumption of untreated water captured from roofs, particularly in inner city areas. Consequently, the local governments and authorities encouraging and in some cases, mandating their installation, indicated that the water should be for non-potable uses, such as gardens, toilet flushing and hot water heating. Other governance issues included the standard of the plumbing connections, ensuring no cross connections to the mains supply, the standard of construction of the tank, siting requirements to avoid impacting on visual amenity. The resolution of these issues meant compliance with an array of health, building, plumbing and land use planning regulation which in most cases were not the province of the authority wishing to pursue the rainwater tank scheme.<sup>35</sup>

While incentive mechanisms by way of rebates have been the primary devices used in this area, governments are now moving to require rainwater tanks in an urban context. A Sydney local authority, Wyong Shire Council has mandated the installation of rainwater tanks in all new residential development since 1 January 2003.<sup>36</sup> In its first year of

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<sup>33</sup> Brisbane City Council, *Statistical Portrait of Brisbane* available on the internet at [http://wic001lc.server-web.com/statistical\\_portrait/brisbanes\\_regions/households/](http://wic001lc.server-web.com/statistical_portrait/brisbanes_regions/households/) accessed 23 February 2004.

<sup>34</sup> Brisbane City Council *Rainwater Tanks* available on the internet at [http://www.brisbane.qld.gov.au/residential\\_services/water\\_sewerage/rainwater\\_tanks/index.shtml](http://www.brisbane.qld.gov.au/residential_services/water_sewerage/rainwater_tanks/index.shtml) accessed 9 February 2004.

<sup>35</sup> By way of illustration the Brisbane City Council initiative when it was instituted in 2002 meant consideration of the implications of provisions of the *Health Act 1937*, *Health Regulation 1996*, *Integrated Planning Act 1997*, *Standard Water Supply Law*, *Sewerage and Water Supply Act 1949*, *Building Act 1975*, *Building Regulation 1991*, *Standard Building Regulation 1993*, *Building Code of Australia*, *Land Title Act 1994*, *Australian Standard AS/NZS 3500*, *Brisbane City Plan 2000*.

<sup>36</sup> Wyong Shire Council, *Quality Housing – Development Control Plan No. 100*, section 3.10.

operation 251 new rainwater tanks were installed with a total capacity of 1.255Ml.<sup>37</sup> For its initiative in this regard, which included other issues such as energy efficiency, the Shire won the 2003 New South Wales Local Government Association Award for excellence in Sustainable Design Planning and Building. This is an example of a local government initiative in this regard, albeit assisted by enabling State legislation.<sup>38</sup> On a State level the Victorian Government has announced a State wide initiative which incorporates rainwater tanks and other water efficiency and energy efficiency measures for residential development in that State.<sup>39</sup>

## Greywater Reuse

While many of the obstacles relating to rainwater recycling are being overcome, the issue of greywater reuse is encountering similar obstacles. The arguments in favour of recycling are similar to rainwater reuse in the reduction of the demand on mains water supply and infrastructure but the major stumbling blocks relate to health and possible environmental harm. Greywater recycling poses more serious health threats than rainwater recycling. To various degrees, depending on source and household habits, greywater will be contaminated by micro organisms some of which may be pathogenic, may contain chemical pollutants such as sodium, nitrogen, phosphates and organic chemicals and contain particulates.<sup>40</sup>

Once again there is a plethora of regulatory instruments and contradictory stances in the various Australian jurisdictions. Looking at the three more populous eastern States the situation is as follows:

New South Wales: Untreated greywater must be discharged at least 100mm below ground level. Other greywater must be treated by an approved treatment system.<sup>41</sup>

Victoria: Untreated greywater can be directly dispersed subject to a duty to not create a public health risk. Other greywater must be treated by an approved treatment system.<sup>42</sup>

Queensland: The disposal of untreated greywater is an offence.<sup>43</sup> Other greywater must be treated by an approved treatment system.<sup>44</sup>

Thus the governance issues vary between jurisdictions and there is, perhaps appropriately given the health risks, a reluctance to loosen the regulatory requirements for disposal of greywater. Consequently there are no incentives for consumers to adopt greywater recycling and the attitude of the regulator varies from guarded encouragement<sup>45</sup> to prohibition.<sup>46</sup>

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<sup>37</sup> Personal communication to the author, 10 February 2004.

<sup>38</sup> *Environmental Planning and Assessment Act 1979* (NSW), section 72, allows NSW local governments the scope to introduce such measures.

<sup>39</sup> Steve Bracks, Premier of Victoria, *Media Release: New Homes in Victoria Reach for the Stars*, 4 July 2003.

<sup>40</sup> NSW Health, *Greywater Reuse in Sewered Single Domestic Premises*, (New South Wales Government, Sydney 2000), p4.

<sup>41</sup> NSW Health, *Greywater Reuse in Sewered Single Domestic Premises*, note 40, p7.

<sup>42</sup> EPA Victoria, *Domestic Wastewater Management Series: Reuse Options for Household Wastewater*, (Victorian Government, Melbourne 2001), p3-4.

<sup>43</sup> *Water Act 2000* (Qld), section 824(5)

<sup>44</sup> *Plumbing and Drainage Act 2002* (Qld) section 101.

<sup>45</sup> For example the Victorian EPA, Wyong and Byron Shires in New South Wales.

<sup>46</sup> Queensland.

## **Placing Sustainable Consumption at the Forefront of Governance**

Australia is a signatory to all major international environmental treaties. It has taken on the mantra of ecologically sustainable development which had its international genesis in the Brundtland Report and Rio Declaration. From this has come various Australian agreements and legislative instruments which have espoused ecologically sustainable development, or sustainability, as their primary object. Examples of these are the *Intergovernmental Agreement on the Environment* (May 1992) Recital 3, *Environment Protection and Biodiversity Conservation Act 1999* (Cth) Section 3, *Environmental Planning and Assessment Act 1979* (NSW) Section 5, *Environmental Protection Act 1994* (Qld) Section 3 and so on. These instruments look at important macro areas of environmental governance such issues as world heritage properties, land use management and establishing industries with polluting potential.

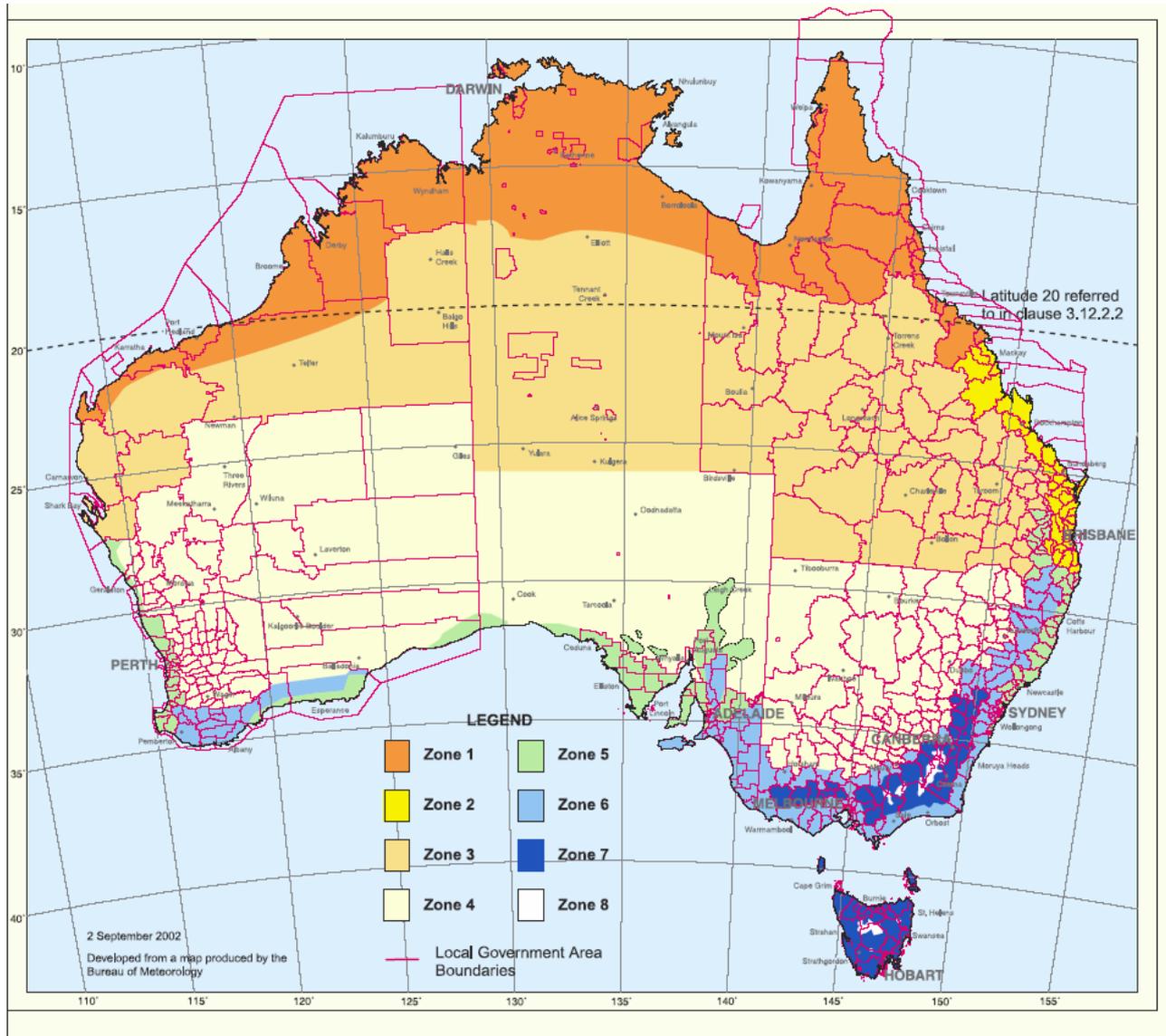
The areas examined here are fundamental consumer issues relating to household energy and water supply. The challenge is to move consumer habits towards sustainability in those areas. The devices employed in Australia in these areas, mainly a mixture of monetary incentives and some mandatory measures, are undoubtedly moving patterns of consumption in a sustainable direction. However, their impact has not been significant. One impediment is that the laws that control these areas are often complex and do not have as an overarching goal sustainability. They may be concerned with health issues, orderly development or reliability of supply, thus decision making is made based on such issues and, of course, cost.

For legislation in the area of urban housing to refocus on sustainability requires the political will of the law makers to support that change. In the energy area particularly, it can be seen that unless the costs of such some measures drop dramatically there is a very large disincentive for consumers to adopt them without much increased government assistance.

To move forward in these areas requires a clearer focus on sustainability by all governments and then the determination to move towards that goal. At the present time the movement is slow and lacking in national coherence.

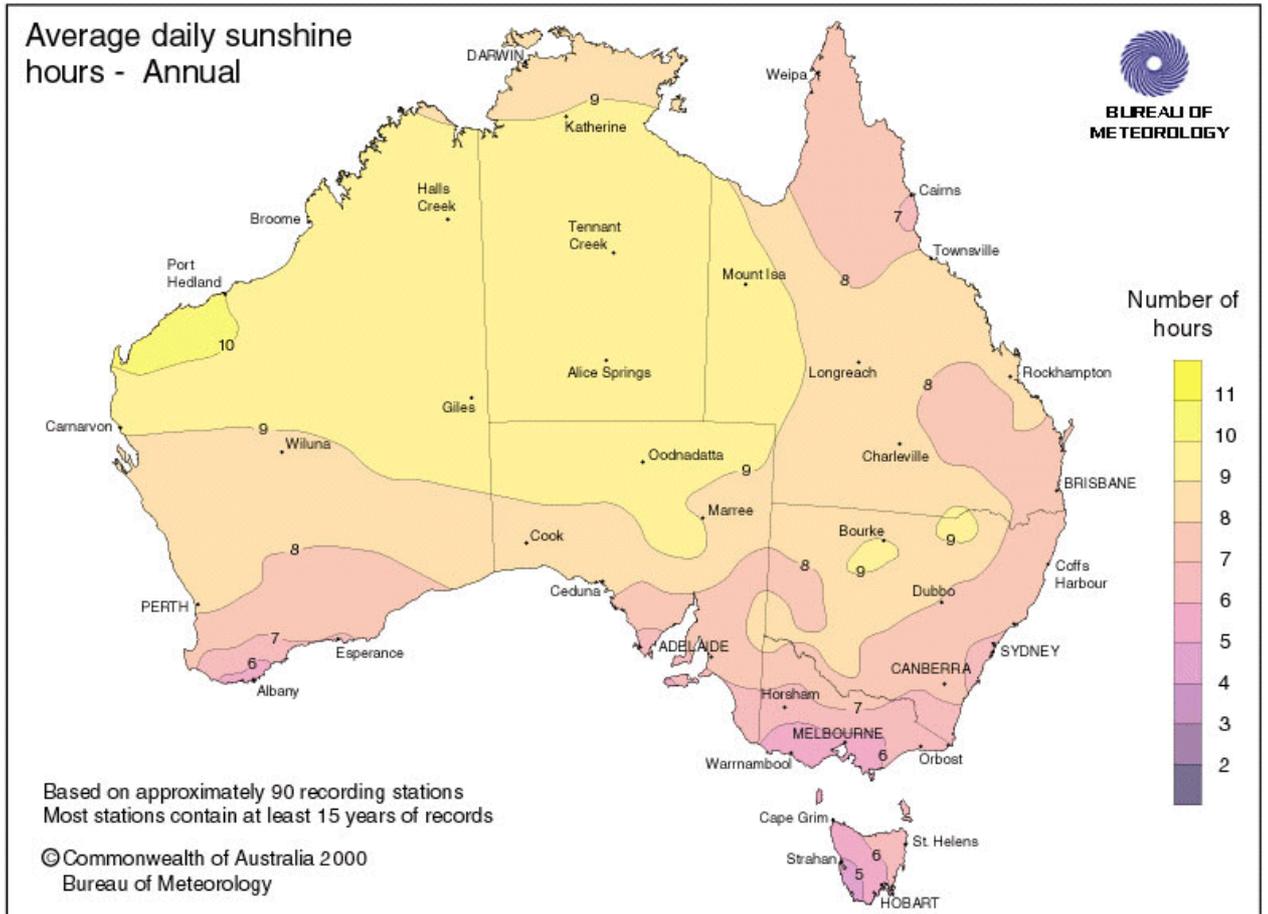
# APPENDIX 1

## Australian Building Code Climate Zone Map



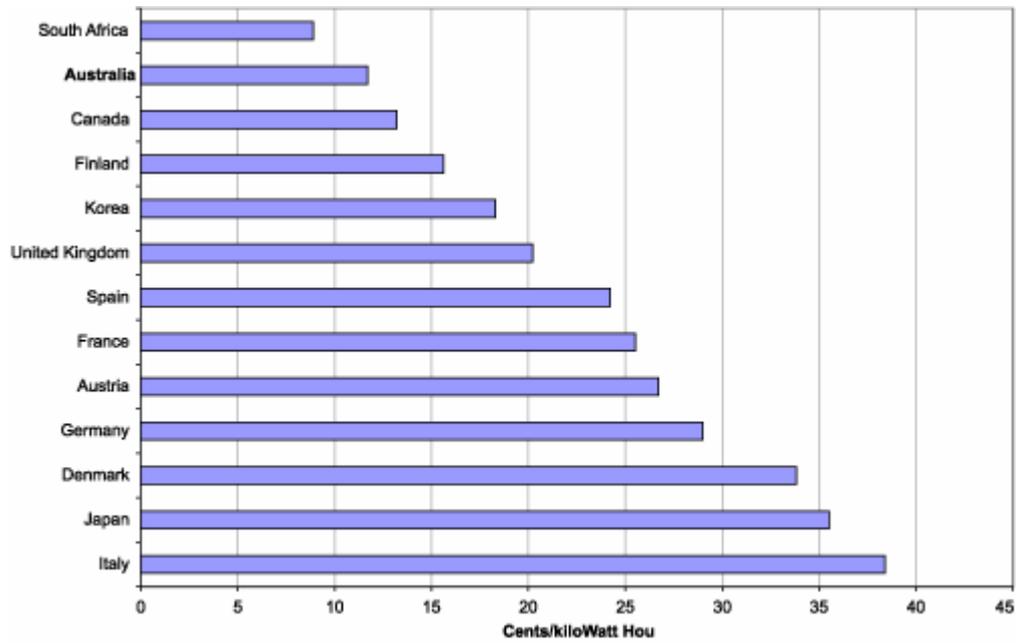
## APPENDIX 2

### Australian Daily Average Sunshine



## APPENDIX 3

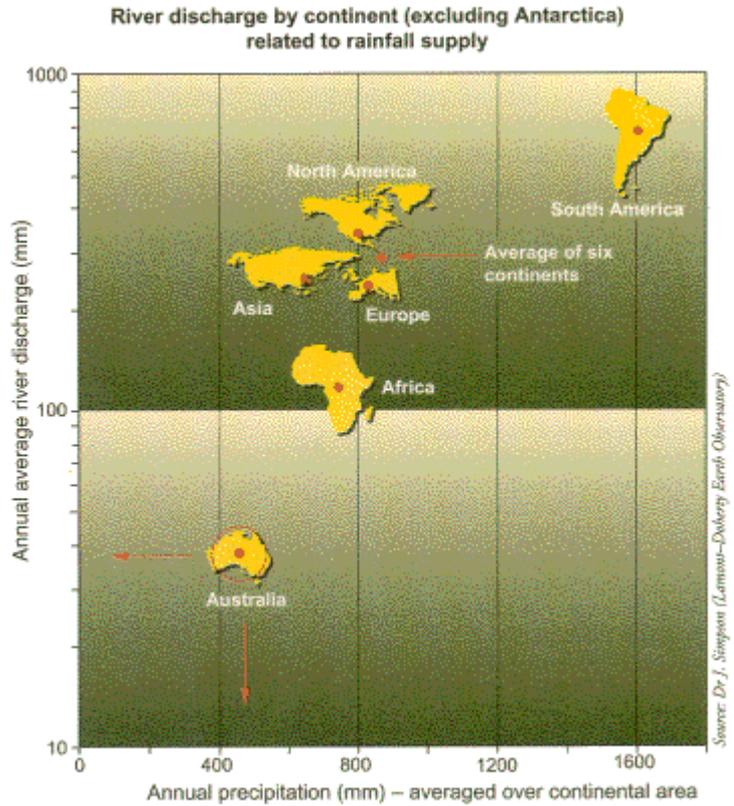
### Residential electricity price comparison, January 1999



**Australian State of the Environment Report 2001,  
Department of Environment and Heritage**

# APPENDIX 4

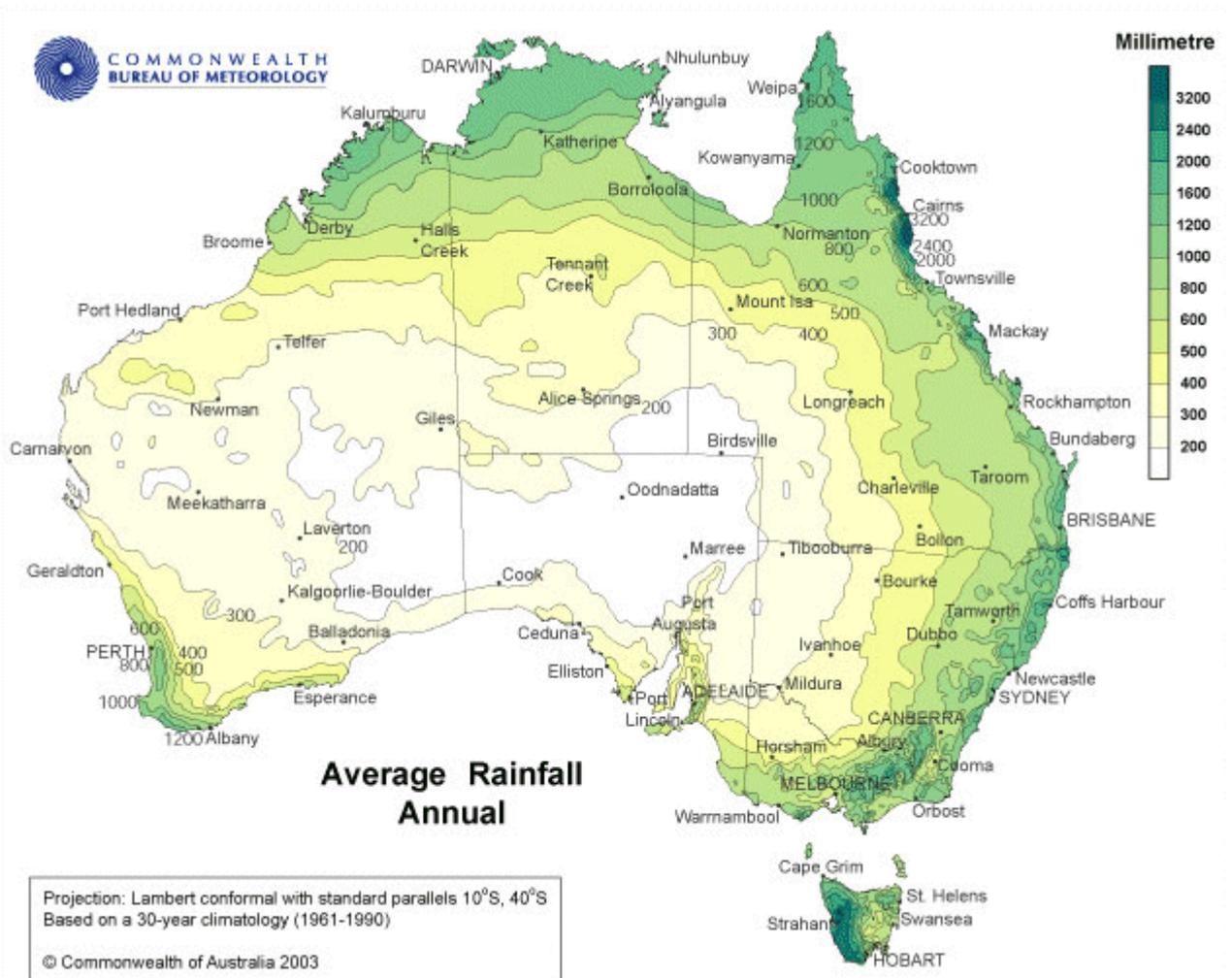
## Australian Continental Rainfall



### Melbourne Water

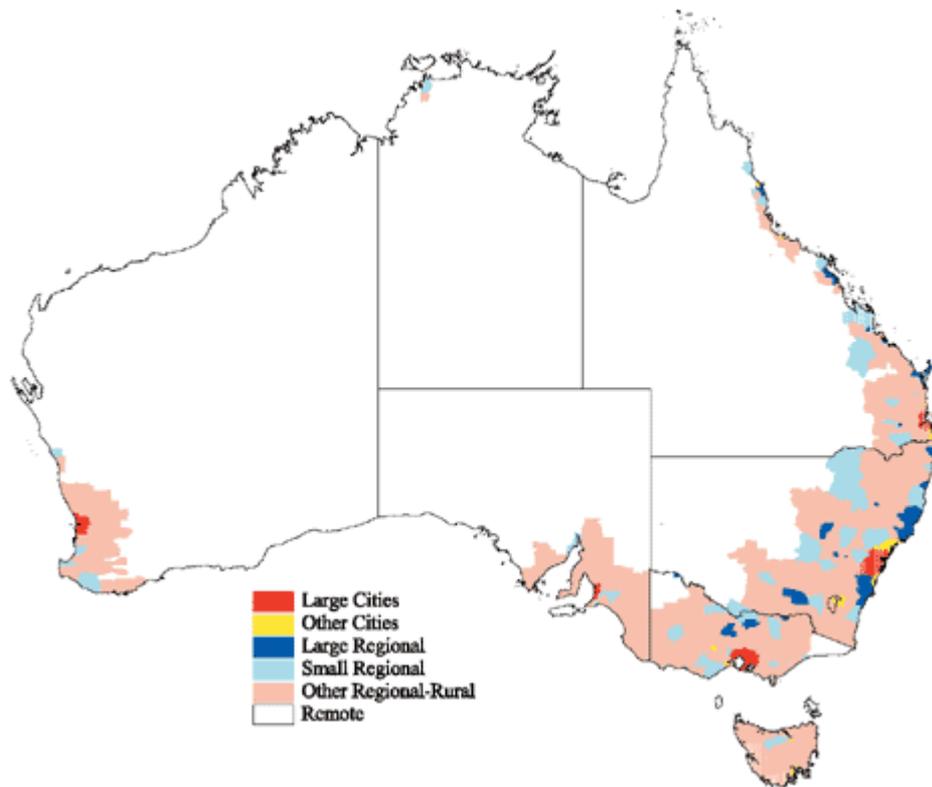
# APPENDIX 5

## Australian Rainfall



## APPENDIX 6

### Australian Population Distribution



Australia, State of the Environment Report, 2001  
Source: ABS National Health Survey, 1995 (unpublished data).