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**Strategies towards the Sustainable Household in Germany
Findings of an EU-Research Project on Clothing Care and Shelter**

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List of Abbreviations

BMU	Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit (<i>German Federal Ministry of the Environment</i>)
BMWi	Bundesministerium für Wirtschaft und Technologie (<i>German Federal Ministry for Economic Affairs and Technology</i>)
CO ₂	carbon dioxide
DIW	Deutsches Institut für Wirtschaftsforschung (<i>German Institute for Economic Research</i>)
DIY	do-it-yourself
DOS	Design Orienting Scenario
e. g.	for example
ed.	editor
et al.	et alii (<i>and others</i>)
etc.	etcetera
EU	European Union
f	following page
GDP	Gross Domestic Product
GfK	Gesellschaft für Konsum-, Markt- und Absatzforschung (<i>Society for Consumer -, Market -, and Sales Research</i>)
i. e.	idem est (that is)
IKW	Industrieverband Körperpflege- und Waschmittel e. V. (<i>Industrial Association for Personal Hygiene Products and Detergents</i>)
kg	kilogramme
kWh	kilowatt hour
LCA	life-cycle assessment
LET system	Local Exchange Trading System
m ²	square metre
m ² a	annually per square metre
MJ	mega joule
MT	mega tons
n. a.	not applicable
NGO	non-governmental organisation
p.	page
PC	personal computer
R&D	research and development
resp.	respectively
SCE	Shopping, Cooking, and Eating
SusHouse	EU project "Strategies towards the Sustainable Household"
TU	technical university
TV	television
UBA	Umweltbundesamt (<i>German Federal Environmental Agency</i>)
UK	United Kingdom
UMIST	University of Science and Technology in Manchester
VDEW	Vereinigung Deutscher Elektrizitätswerke (<i>Association of German Electric Power Companies</i>)

1 Introduction

For a long time the discussion about economy and environment concentrated mainly on companies and governments as crucial actors for the attainment of ecological sustainability. Today, more and more the private household gets into the focus. There are especially two interrelated reasons for this development.

First, the private household is an important part of the problem. Private consumption covers about 50% of the GDP in industrialised societies. After the introduction of environmental management systems in many resource intensive industries, today, not the production itself, but its output, the product, causes often the most important environmental problems. These products are often used by households, which today resemble little factories with many machines to produce utility for the private consumer (Vergragt/van der Wel, 1998, p. 174).

Second, the private household is vital for the solution of environmental problems. Private household members do not only vote as a citizens in elections and influences thereby indirectly the legal framework, they also vote as consumers and use – deliberately or not – their money as a kind of ballot sheet which indicates companies if their offers are accepted (Hansen/Schrader 1997, p. 447). At least in theory, it is the private household that holds the basic power in a democracy as well as in a market economy. To recognise the importance of private households does not mean to underrate the influence of companies, governments, and other institutions. They all have to interact to promote sustainable household consumption.

Ideas like these have been the starting point for a Dutch project on the sustainable household in 1994 (Vergragt et al., 1995). It was based on two basic hypotheses: First, a desirable sustainable future differs so much from today that the future vision and not the present should be the main focus of the research (the backcasting approach); and second, realistic and viable strategies can only be developed in collaboration with important stakeholders (the stakeholder approach).¹ Due to limited resources, the project concentrated on alternatives to today's resource intensive washing of clothes with individual washing machines in the Netherlands. The results have been promising enough to launch a similar but much more comprehensive project: Strategies towards the Sustainable Household (abbreviated: *SusHouse*).

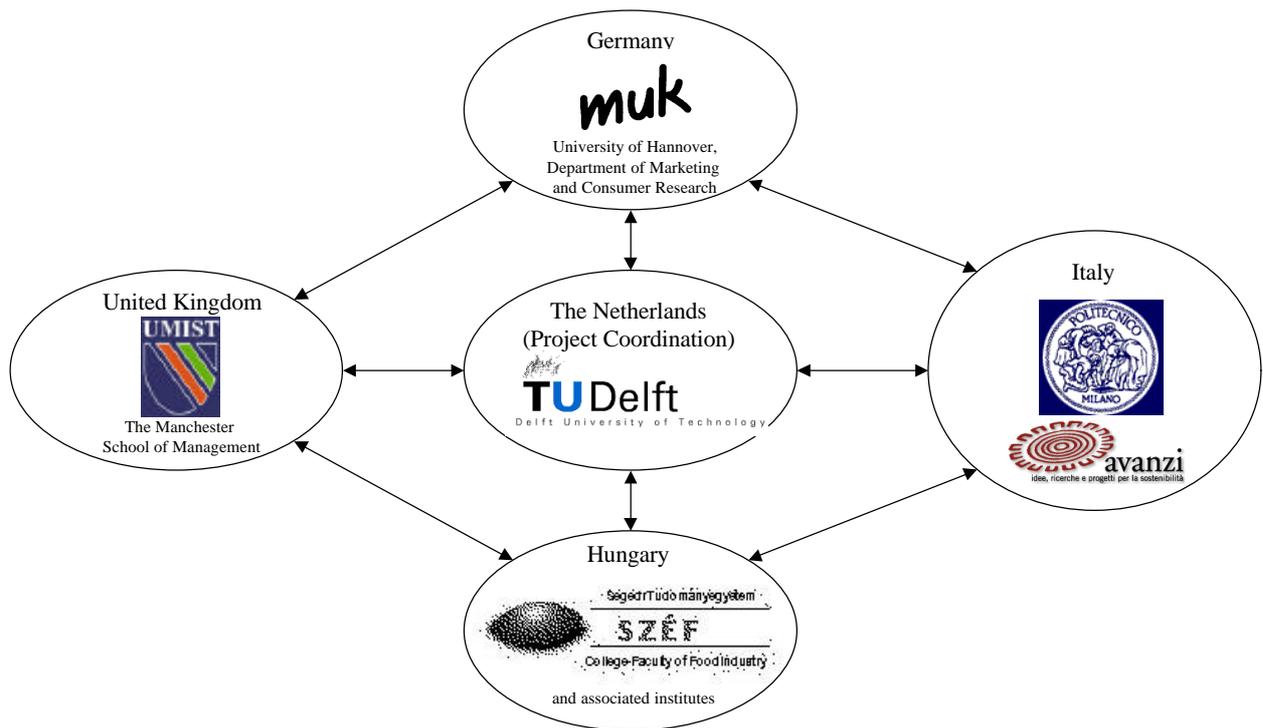
There were two main goals for the *SusHouse* project: The first was, as the title indicates, to find strategies towards the sustainable household. This contents oriented aim was

¹ See for a more detailed description of these approaches chapter 2.1 and 2.2 of this report.

complemented by a second one: to develop a methodology which is suitable for the creation of sustainable solutions. This methodology development followed a "creating by using" approach.

SusHouse was financed by the EU-Commission and ran from January 1998 to June 2000. Project partners from six institutions out of five European countries took part in this process (see Figure 1).²

Figure 1: Project Partners



This research paper summarises the basic approach, the methodology and the results of the SusHouse project with a special focus on the research done in Germany.

² Of particular interest is the involvement of a project team from the non-EU-country Hungary, where the situation differs a lot from EU-average. A list of all SusHouse researchers and their respective function is documented in appendix A.

2 Approach and Methodology of the SusHouse Project

2.1 The Backcasting Approach: The Sustainable Household in 2050 as Focal Point

The future household consumption has to be sustainable or there will not be any desirable future. This realisation was the normative starting point for the SusHouse project. At present, most of the important ecological indicators show that recent consumption patterns in developed countries are far from being sustainable. What is worse, a lot of forecasting analyses, e. g. in the fields of mobility or energy consumption, show that the prevailing trends do not point towards sustainability but indicate an acceleration in the use of the environment. Even if forecasting concentrates on existing green trends, often sustainability seems to be out of reach – unless some hypothetical technical innovations are taken into consideration. The environmental progress we observed during the last years has been substantial in many fields of consumption; nevertheless, frequently it has been overcompensated for by a rising consumption level. E. g. although washing machines and tumble dryers today are much more energy efficient than some years ago, the washing of clothes consumes more energy than ever due to a rising household equipment rate and increasing amount of laundry per person. Maybe the future will allow further gains in efficiency, though technological progress alone will not be enough. What is needed in order to reach a sustainable consumption is – according to most scientific studies in this field – not an increase in efficiency of some percent but an efficiency revolution.³

If the starting point that a sustainable future is without alternative is taken seriously the forecasting of the probable future does not provide adequate guidelines. It is more appropriate to start from the desired sustainable future. In other words: First you have to know where you want to go before you can find a way to get there. This is the basic idea of *backcasting* (e. g. Vergragt et al. 1995; Vergragt/van der Wel 1998, pp. 72ff.). Backcasting is a general idea, not a fully developed and generally accepted methodology.⁴ The ideal typical backcasting process can be divided into three steps:

- Backcasting starts with the identification of a desired future situation. This step reflects the present, but should not be limited by the current situation and prevailing trends.

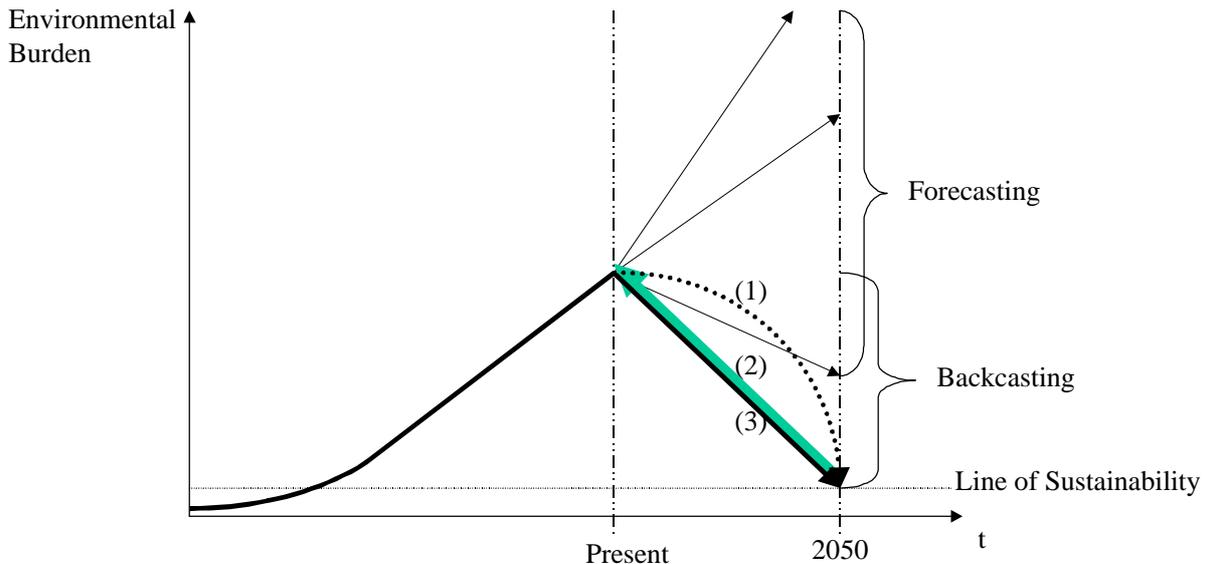
³ The proposed efficiency factors vary between 4 (von Weizsäcker/Lovins/Lovins, 1997), 10 (Schmidt-Bleek, 1998) and 20 (Vergragt/van der Wel, 1998) dependent on different assumptions.

⁴ An attempt to transform the backcasting approach into a worked out methodology is the so called Future Workshop ("Zukunftswerkstatt") by the Austrian physicist and futurologist Robert Jungk (e.g. Jungk/Müllert 1991). In contrast to the SusHouse methodology, in Future Workshops, all three phases of backcasting are usually run through by the participants on one or two days. Thus, it is normally used for "smaller" and more concrete analytical problems.

- The second step is the backcast in the narrow sense: looking back to the present and identifying the main differences between vision and reality. Additionally, it should include the identification of the main obstacles for strategies towards the desired future.
- The goal of the last step is to develop a road map to depict the way from present to the desired future.

Figure 2 illustrates this approach and its application to the SusHouse project.

Figure 2: The Backcasting Approach in the SusHouse Project



In the SusHouse project the future setting which had to be developed in step 1 was called *Design Orienting Scenario* – or in short: *DOS*. A DOS should have the potential to be sustainable on a global perspective and in a world with more habitants than we have today. Therefore, SusHouse aimed at reaching a factor 20 of environmental burden reduction potential in comparison with the present situation in industrialised countries. To make sure, that the time horizon is far enough to allow the turn back of trends and the break up of structures without leaving limits of imagination, the year 2050 was chosen as the focal point. The goal was to develop sustainable solutions that seem possible to become real within the next fifty years. To guarantee this, the involvement of stakeholders played a crucial role.

2.2 The Stakeholder Approach: Co-Developing Future Solutions for the Sustainable Household

For the construction of the above mentioned DOSs in the sense of a desired future, it was an important step to combine the expertise of the SusHouse researchers with the knowledge of those relevant for the household activities under investigation (see chapter 2.3.3). Thus, an

interactive think tank and a creative as well as participatory scenario building process could be enabled (Quist/Pacchi/van der Wel, 2000).

Based on Freeman (Freeman, 1984, p. 31), in the SusHouse project stakeholders were defined as "all those people or organisations who are either affected or who can affect the performance of various functions at the household level" leading to the following differentiation (Pacchi, 1998, p. 1):

- supply side stakeholders (companies and trade associations from various industrial sectors),
- demand side stakeholders (household members, consumer organisations),
- regulators/ policy makers (at different levels),
- research, experts and media,
- independent organisations (like environmental NGOs).

Since SusHouse was oriented towards the year 2050 besides present stakeholders also future ones had to be taken into consideration (see also chapter 2.3.4.1). This meant for instance looking for firms active in today's market niches or for NGOs with innovative household projects.

As future studies literature shows, within scenarios specific driving forces - i. e. social, technological, environmental, economic and political trends – bring about specific consequences and lead to particular future settings becoming possible or plausible (Pacchi/Pfeiffer, 1999, p. 4). Since scenario building was a core task of the SusHouse project the impact of these driving forces became an important element with a twofold influence: First, the research team made assumptions on the importance or unimportance of certain driving forces for the present as well as for the future of the household function in question. These assumptions were based on desk research and finally led to the identification of a group of stakeholders who were to be actively involved in the scenario building process. Second, the enrolled stakeholders themselves made assumptions on what were relevant and irrelevant future trends and thus attributed specific weight to single persons involved in the scenario building process while others were seen as less important. This affected the interaction pattern among the stakeholders.

Having this central role of the driving forces in mind, special attention was paid to their analysis during the phases of stakeholder enrolment and of interaction with and respectively among the stakeholders.

With aiming at the involvement of both present and future stakeholders the SusHouse projects tried to break new ground. On the basis of future studies insights concerning expert knowledge-based future extrapolations and also more participatory ways of exploring options for desirable future settings (Bell, 1997; also Slaughter, 1996) the SusHouse Stakeholder Management methodology was developed and linked with the other methodological tasks of the project.

2.3 The SusHouse Methodology: Linking Household Functions and Analytical Tasks

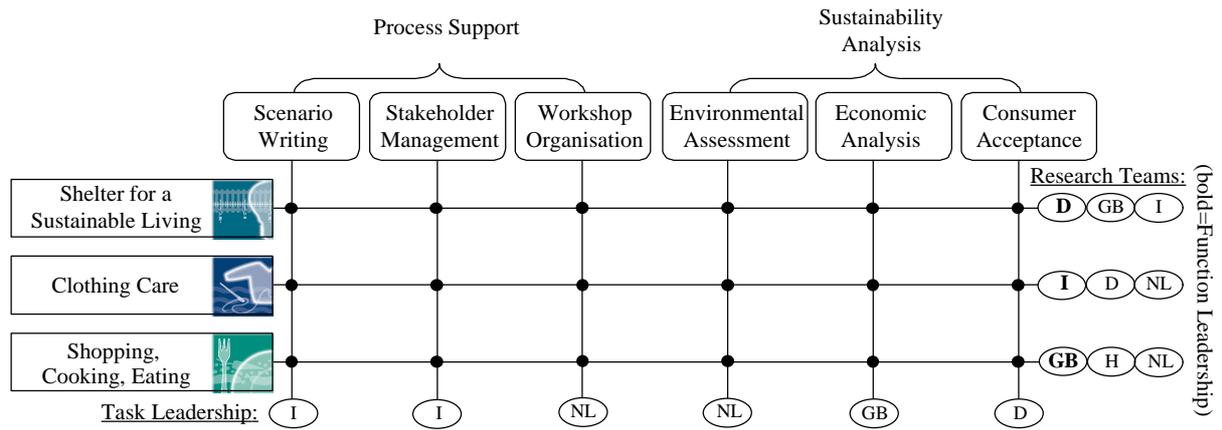
2.3.1 The SusHouse Methodology Matrix

First, the research object, the household, had to be operationalised. In the SusHouse Project, a household was understood as an economic unit of persons (one or more) who live together and spend a common budget. To divide it into units that can be handled analytically, we focused on the household functions. These functions serve to satisfy the needs of household members and have to be fulfilled – in one or another way – today as well as in a sustainable future.

Since the household comprises more functions than we had resources to do research on, we had to select. Our selection criteria had been the following three: (1) ecological relevance, (2) research demand, and (3) research capacity resp. interest of the different research partners. According to them, we chose three functions for further analysis: (1) "Shelter for a Sustainable Living" (abbreviated "Shelter") which focuses on the need for a comfortable temperature and lighting within the private dwelling, (2) "Clothing Care" which deals with the need for clothing and its care, and (3) "Shopping, Cooking, Eating" (briefly, "SCE") concentrating on the need for nutrition.⁵ Every function was examined in three of the participating countries under supervision of one Function Leader.

For every function in every country, the whole backcasting process had to be carried out with relevant stakeholders. To facilitate this process, special experts (Task Leaders) were designated for the tasks of Scenario Writing, Stakeholder Management and Workshop Organisation. These process support tasks were complemented by sustainability analysis tasks which included Environmental Assessment, Economic Analysis and Consumer Acceptance research. The respective Task Leaders guided the evaluation of the developed DOSs for the three different functions. Figure 3 illustrates the matrix organisation of the SusHouse project.

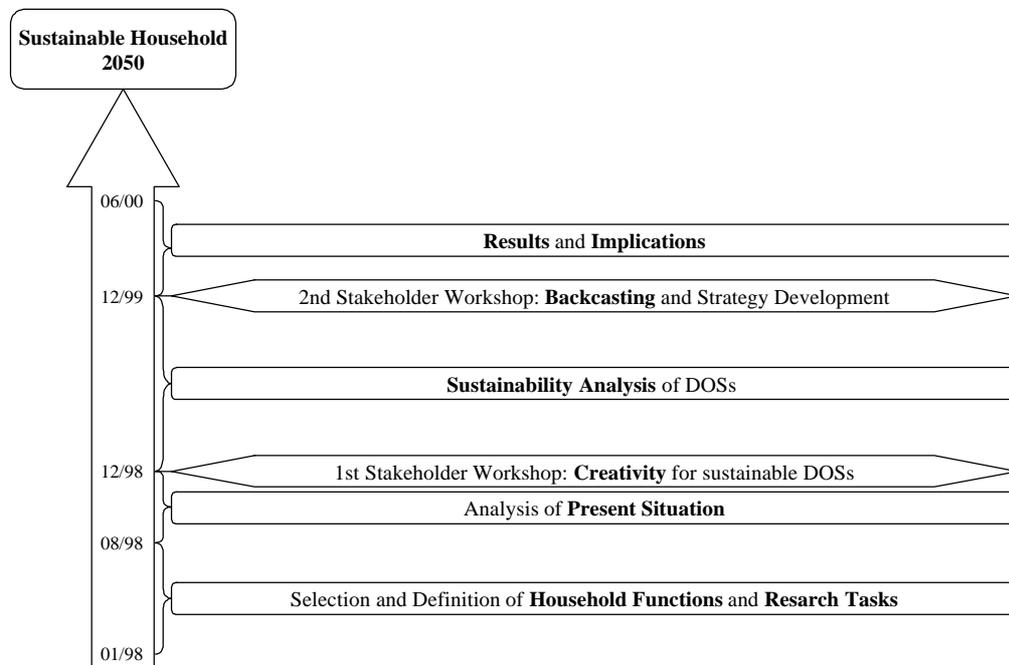
Figure 3: The SusHouse Methodology Matrix



2.3.2 The SusHouse Research Process

The SusHouse research process was carried out in several steps. Each working phase started and ended with a meeting of all SusHouse research partners that served to compare the work of the different teams and to take crucial structural decisions. The working phases were supported by the Task Leaders and co-ordinated by the respective Function Leaders. The research process is illustrated in figure 4.

Figure 4: The SusHouse Research Process



⁵ See chapter 2.3.3 for a further description of the first two functions which were studied in Germany.

The project started with the selection and definition of household functions to be analysed and research tasks to support this analysis. The Function and Task Leaders had to work out formats, which were agreed upon during the first two partner meetings. Based on these formats, the backcasting process started with a country specific stocktaking for the different functions by the Project Researchers. This included a description of the present situation and prevailing trends as well as the identification of existing problems and possible solutions. During this phase, the foci of the three different sustainability analysis tasks, i. e. the environmental gains, the economic success and the consumer acceptance, were already leading the research. Additionally, to prepare the 1st stakeholder workshops, important stakeholders were identified and addressed, and a feasible workshop programme was developed. These first workshops, which were organised in every country for each function (thus, 9 workshops for the whole project), served to trigger the creativity of the stakeholders. The ideas produced during the workshop were clustered into different consistent variants of a possible future - the DOSs. The research on the DOSs according to the formats of the three sustainability analysis tasks have been subjected of the longest work phase. Their main results were the most important part of the input document for the 2nd stakeholder workshop. The participants of this workshop had first to evaluate the description and analysis of the DOSs to start the backcasting from common ground. Core goal of this workshop was to find strategies that link the present to the desired future. These strategies and the assessment results were further developed during the report writing in the final phase. Here, as well as before during the partner meetings, inter-national and inter-functional comparisons played a major role for the interpretation of results and implications.

2.3.3 The SusHouse Functions

The selection of the three main areas of household activities, the so-called household functions, was based on the assumption that also in the future the household will have to meet certain needs of its members. As mentioned above, in the first phase of the project "Clothing Care", "Shelter for a Sustainable Living", and "Shopping, Cooking, and Eating" were selected and defined as functions for the SusHouse research. The first two of these had been studied in Germany and are described in terms of their focus and boundaries in the following chapters.

2.3.3.1 The SusHouse Function "Clothing Care"

The Clothing Care function, which was studied in Italy, Germany, and the Netherlands, was dealing with all activities concerning the care for the clothes of the household members. This was done taking the whole life cycle of the clothes into account laying special emphasis on the use phase. So the following activities determine the function's boundaries (Vezzoli, 2000).

- Acquisition: purchasing or renting of clothes
- Maintenance: cleaning, drying, ironing, ordinary substitution of wear parts, storing, etc.
- Adaptation and up-grading: clothing care as required after change of external or individual conditions (e. g. new geographical location, physical growth)
- Reparation: fixing damages due to wear or improper use
- Reuse: use of clothes or parts of them in a different market or in a secondary use (e. g. as rags for household cleaning)
- Collection/destination of de-missed clothes. recycling, combusting or landfilling
- Also connected activities like transportation to the service site will be considered

All these clothing care activities have a considerable environmental impact. As main unsustainabilities there are to be mentioned (Vezzoli, 2000):

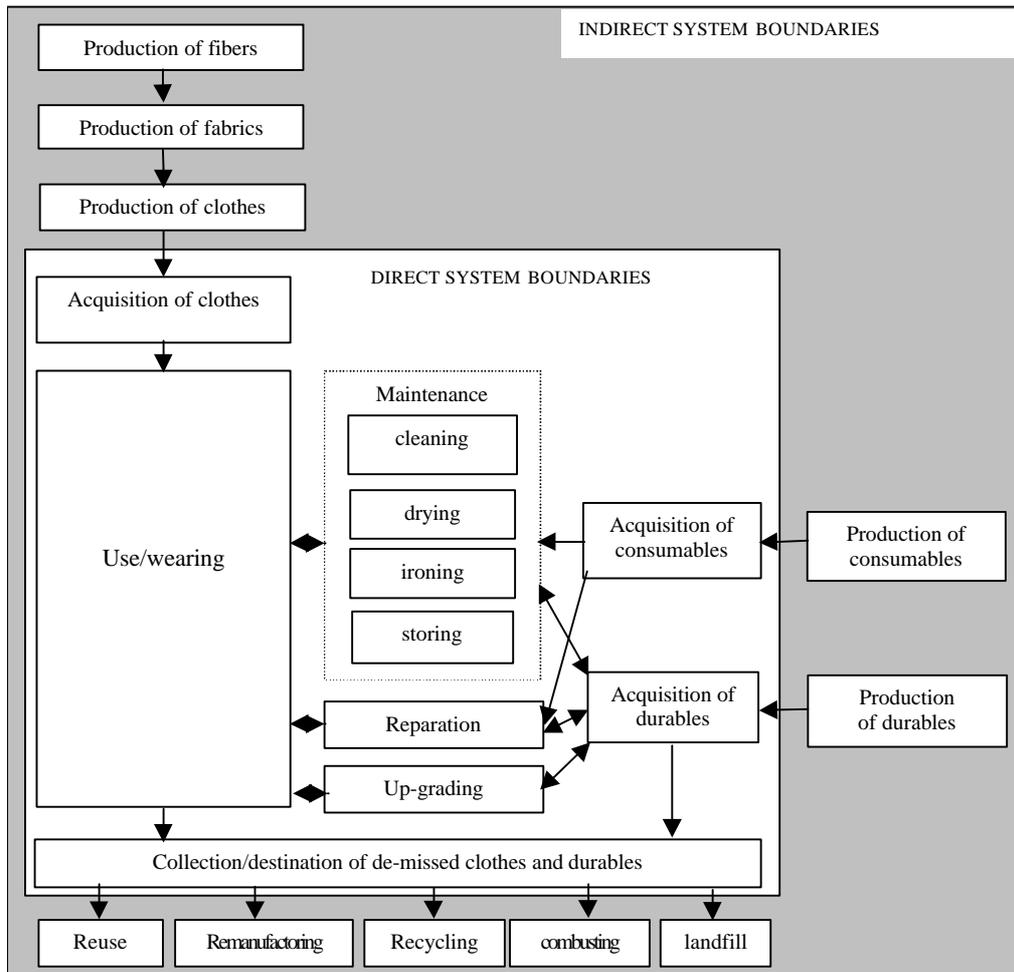
- Energy consumption for cleaning and drying
- Water consumption for cleaning
- Emissions of various consumables for caring
- Energy consumption
- Transportation and the solid waste due to clothes' purchasing

Among these aspects washing, drying, and ironing are the most important unsustainabilities.

It is important to mention that besides technological or chemical factors of domestic appliances and the used consumables social aspects like culturally influenced fashions or the social convention of washing frequency determine to a high degree substitution and washing habits and thus affect the degree of unsustainability of the function's fulfilment in private households.

Figure 5 visualises the boundaries and the chain of actives within the Clothing Care function.

Figure 5: System Boundaries and main Activities of the Clothing Care Function



2.3.3.2 The SusHouse Function "Shelter for a Sustainable Living"

According to the structure of the SusHouse project each household function was studied in three of the five partner countries.⁶ For Shelter these were the UK, Italy, and Germany. The project team defined "Shelter" in the following way: Shelter means the function of a household that is related to the residential dwelling's indoor conditions focusing on

- indoor temperature (including heating and cooling dwellings),
- and lighting.

⁶ See matrix in the previous chapter.

This focus was selected in line with the need orientation of the project and with regard to the environmental importance of these aspects (Pfeiffer, 2000a, p. 6-8).

The quantitative relevance of providing a comfortable indoor temperature is considerable. In Germany for instance 75.8% of all final energy consumed by private households, i. e. of 2.069 PJ, are used for heating or cooling the rooms (BMU, 1997). From the quantitative point of view lighting is far less important than heating. However, it has an interesting potential for conservation as energy for lighting is currently used inefficiently and the technical solutions are rather simple and easy to apply compared with the more complex thermal efficiency measures. Besides, the consumers themselves consider lighting to be very important for their energy balance (Reusswig, 1994). Regarding this high perceived importance lighting can be expected to have an influence on the energy saving behaviour in general. This position is underlined by labelling the lighting sector as "psychological catalyst", a lead-in to energy saving (Altner et al., 1998).

The boundary of the function Shelter was drawn as close around the household as possible. So primarily the following activities were to be considered:

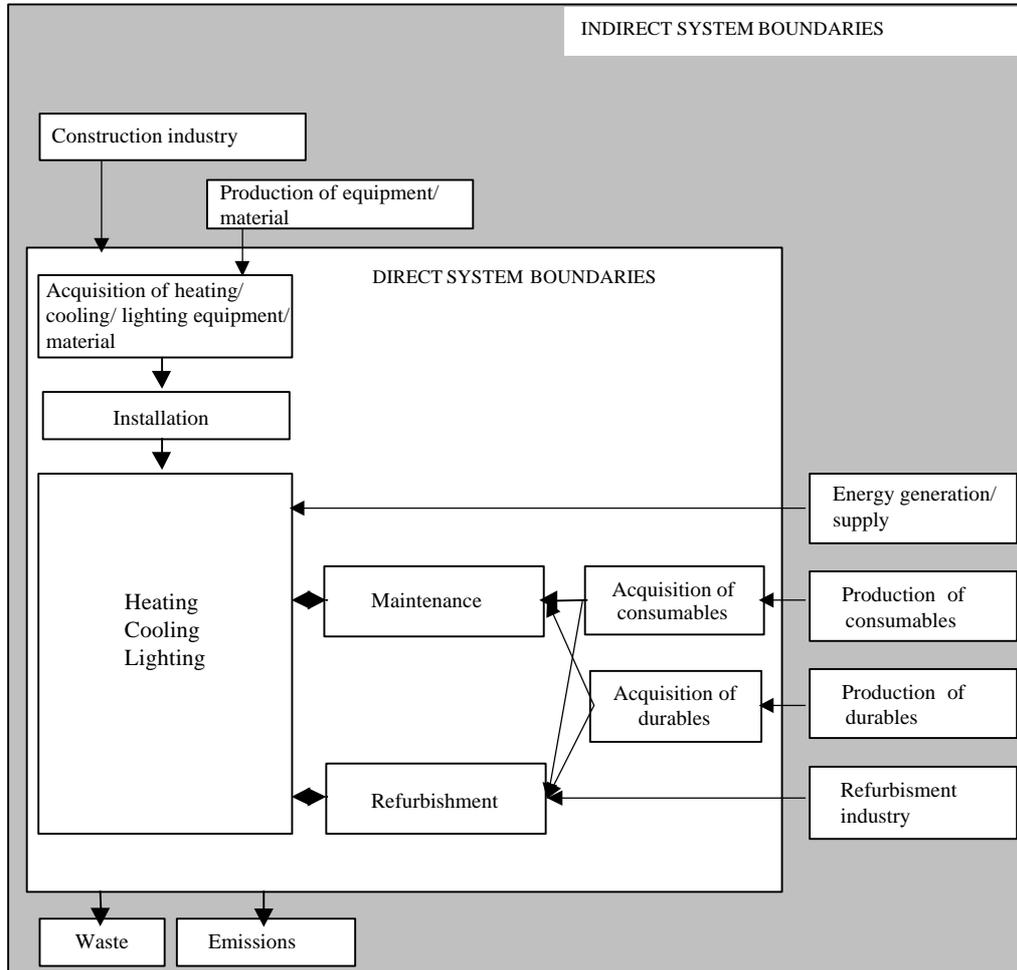
- All household activities dealing with the acquisition and the installation of heating, cooling, and lighting appliances or material (e. g. including insulation material),
- the actual running of the heating, cooling, and lighting systems,
- their maintenance and
- related refurbishment activities as well as
- the purchase of consumables for maintenance and refurbishment (such as incandescent light bulbs or lubricants) and
- the acquisition of durables for these purposes (for instance new windows or thermostats).

All these aspects were always related to heating, cooling, lighting for the *private* demand of the household members only. The items were completed by secondary aspects relevant for either the framework of the function or for the future of the function. To these aspects within the indirect system boundaries belong the chains of

- construction of residential dwellings,
- production of equipment and material,
- energy generation and supply for the domestic sector,
- production of consumables and durables for maintenance and refurbishment, and
- refurbishment of residential dwellings as well as
- any waste and emissions resulting from the above listed household activities related to heating, cooling, and lighting the residential dwelling for private use.

Figure 6 illustrates the boundaries of the function.

Figure 6: System Boundaries of the Shelter Function



In some DOSs the boundaries had to be widened due to functional changes in the future settings, namely changes related to work organisation and to neighbourhood structure.

Aspects that were considered in this respect were:

- Use of energy, durables and consumables for heating, cooling, and lighting residential rooms which are used for paid work but lie within the spatial boundaries of a household (e. g. for tele-work),
- Use of energy, durables and consumables for heating, cooling, and lighting residential rooms which are located in the neighbourhood provided the fact that the locus of the at-

home feeling has at least partially shifted (e. g. to facilities used by members of various households),⁷

- self-production of energy within this neighbourhood zone used for communal demand of heating, cooling, and lighting and
- durables and consumables used therefore.

With regard to the sustainable solutions that the Shelter function aimed at the often mentioned efficiency revolution played a minor role; emphasis was rather placed on a sufficiency evolutionary approach. This is because on the one hand, recent innovations are often seen as able to reach a factor ten of resource saving from their technological potential; on the other hand however, it must be realised that in numerous cases the highly energy-efficient technology fails to reach its aim. As the American researchers Yates and Aronson clearly stated this efficiency gap "can no longer be viewed as a purely technical or economic problem but a people problem as well"(Yates/Aronson, 1983, p. 435).⁸ Thus, examining sustainable ways of heating, cooling, and lighting residential dwellings, the main interest of the Shelter DOSs was on cultural, social, and psychological factors that may promote sustainable use of Shelter related energy-efficient systems or services.

2.3.4 The SusHouse Tasks

2.3.4.1 Scenario Development, Stakeholder Management, and Workshop Organisation

One main objective of the SusHouse project was the evaluation and development of strategies for transitions towards sustainable households. In this sense, the iterative and shared process of developing scenarios touches the core of the whole project and is closely intertwined with the Stakeholder Management and the Workshop Organisation. Together they constitute the above-mentioned "process support tasks".

⁷ Reducing "living or being at home" to the flat itself would not correspond with the people's perception of "their home". As empirical studies have shown the surroundings of the residential dwelling is seen as part of the home as well: In a survey carried out in Berlin respondents were asked where they start to feel at home when returning from work or a journey. The majority answered with "while entering our street" or mentioned even a farther point; only 12 % responded with "while entering our house or flat" (Harloff et al. 1993, p. 165).

⁸ An example are the caring habits of low and passive house residents which lead to heat losses and thus reduce the energy saving potential considerably.

The normative scenarios should incorporate solutions for a sustainable function fulfilment.

These scenarios comprise two basic elements:

- a *vision* as a short dense abstract picturing the effect of the implementation of the solutions and the resulting atmosphere in the general context and
- *proposals* for product-service systems that contribute to the realisation of the sustainable function fulfilment described in the scenario.

These normative scenarios are not understood as pure technical approaches. Rather in a process-related way they are the result of a broadened design process that included the active involvement of stakeholders in two workshops and attendant interviews. In this sense the scenarios were thought of as multi-actor constructions. In a content-related way the integration of the stakeholder knowledge and experiences was intended to reach future visions that should be credible for different stakeholder groups. We understood the enrolment of and co-operation between social actors, resp. stakeholders as a central issue for the achievement of drastic changes in production and consumption patterns and arrangements.

The starting point for this process was the identification of relevant stakeholders. Here three reference points were used (Quist/Pacchi/van der Wel, 2000): the household function, the scenario, and the possible changes by the scenarios. In this way stakeholders were identified that could be subsumed under at least one of the following three categories:

- Stakeholders that are involved in the need fulfilment of the present household function
- Stakeholders that are central to the scenarios
- Stakeholders that could become important in the realised scenario future

An on-going stakeholder management throughout the project - including informing on interim findings, and offering possibilities for feedback - complemented the identification. Here the role of the workshop came into play as a tool to achieve a stakeholder involvement. The first workshop was defined as a *Creativity Workshop*. The aim was to develop broadly endorsed settings of a future sustainable need fulfilment. Methodologically creative techniques like brainstorming were applied to generate new ideas. The course of events were structured according to the following phases:

- Current problem analysis
- Uninhibited idea generation
- Focused idea clustering and first elaboration

On this basis, the Project Researchers identified core ideas and elaborated them into consistent and comprehensive scenarios. The second workshop was defined as a *Strategy Workshop*. Here the elaborated and tested scenarios were presented and discussed with the stakeholders. During the discussion the stakeholders again modified the scenarios, this time under the premise of a pragmatic and strategic point of view. The overall goal of the Strategy Workshop was to formulate concrete, short term oriented steps towards the implementation of viable concepts and to identify barriers and technical, cultural or political conditions (Quist/Pacchi/van der Wel, 2000). Here the important steps were:

- Modification of the scenarios
- Detecting concrete reference points for realisation
- Identification of prerequisites and barriers as well as relevant actors
- Coming to a consensus, developing commitment and identifying potential for stakeholder co-operation

By the involvement of stakeholders relevant for the three household functions important insights for the research process and eventually for potential system innovations could be gained.

2.3.4.2 Environmental and Economic Analysis

Environmental Assessment

It is a prerequisite for the SusHouse methodology that the selected future solutions have significant environmental merits. All the more as the starting point was the need for a far-reaching strategy to attain a factor 20 environmental efficiency gain over the next fifty years. Based on this ambitious aim the Environmental Assessment functions as a framing device for the iterative development of the final future settings.

The main objectives of this task were (Bras-Klapwijk, 2000):

- To give an indication of the environmental impact of individual scenarios in a future situation.
- To identify strong and weak parts in each separate scenario to improve their environmental gain.
- To compare the different scenarios on their environmental merits, leading to conclusions which of the scenarios is more desirable.

This task was important in different phases of the project. It started with the Environmental Assessment of the current state of the function fulfilment. This was important not only to get an overview of the positive and negative environmental trends for the function but also to gain an insight into the relative importance of each function process in terms of its environmental burden. This resulted in a "weighted problem map" that was used as an a priori assessment for the selection of thematic clusters and preliminary scenarios that resulted from the Creativity Workshop.

In the actual assessment phase the Environmental Assessment - together with the Economic Analysis and the Consumer Acceptance research - had the function to give the stakeholders a reference point for the discussion in the Strategy Workshop. The intention was to give indications for scenario specific improvements in comparison with both the current situation and in comparison with the other scenarios as well as to give an indication for the internal stronger and weaker parts in order to modify the scenarios.

The methodology was developed by the Dutch Environmental Assessment team. As the basis for the Environmental Assessment a scope definition was the shared reference point. This comprised the definition of:

- a *functional unit* (e. g. clothing consumption in kg per head and per year),
- a delineation of the whole *process chain with system boundaries* (e. g. see chapter 2.3.3.1, Figure 5), and
- *indicators* (e. g. for shelter the indicators energy, consumables (like conventional light bulbs, lubricants), durables (like oil platforms, insulation material), and waste)

A rather significant challenge was the systemic level of the assessed object and the orientation towards a far reaching future with the need for detailed data in order to assess the potential environmental burden. Insofar traditional LCA (Lifecycle analysis) - approaches were not applicable. Also the method had to be practised by Project Researchers with a very diverse background. In the end the SusHouse team favoured two approaches:

a) the quantitative approach

Here it was tried to develop a quantitative assessment as far as possible. For each of the DOSs the current indicators and the DOS related changes were calculated. These figures can be only estimations, based on secondary research data, exemplary calculations and projections. The final data enabled the researchers to develop detailed statements about the environmental benefits of the DOSes. On the other hand the results relied heavily on a complex set of

assumptions and run the risk of communicating a false sense of certainty. This approach was used by the Clothing Care research team.

b) the qualitative approach

Within this approach the estimations were not aggregated and processed into numerical figures. Here the level of the supply-chain was taken as the final reference point. Instead of an absolute quantification the broad changes by the DOSs were tried to identify per environmental indicator. This approach stressed the point that the final data should be relevant and manageable for the stakeholders. Also the sensitivity of the final results in reliance on the assumptions should be made more open to the stakeholders. On the other hand a thorough Environmental Assessment and inter-functional comparison was impeded. This approach was used by the Shelter research team.

Both approaches shared the conviction that the results should be seen as a tentative indication of environmental impacts.

Economic Analysis

The goal of the Economic Analysis was the detection of a structured map of stakeholder opportunities and risks in each scenario. The results were used as input for the discussion in the Strategy Workshop. This is reflected in perspective focussing on the changes for the relevant companies. On the other hand the assessed changes in the market structure were supposed to give relevant information for policy recommendations. Insofar the Economic Analysis had four aims, which may be organised into two groups (Young et al., 1999):

- Yielding arguments for enrolment of supply side stakeholders:
Identifying which aspects of the supply chain are relevant for the identification of stakeholders
- Assessing the acceptance of scenario proposals by supply-side stakeholders:
Yielding insights concerning how the industry structures will (have to) change concerning the scenario proposals, and whether the proposals are viable from a macro-economic point of view

The basic idea was to detect prospects of double-dividend of competitive advantage and environmental improvement. Usually this win-win scenario is discussed in the cost-saving perspective. So a reduced waste output can provide cost-savings and environmental improvements. The SusHouse research goal was to go beyond these narrow view and tries to see the new market opportunities of sustainable solutions.

The method was descriptive and qualitative in nature. It comprised a detailed questionnaire that was used as a checklist for the Project Researchers who gathered available expert assessments and public figures to give an informed personal view on possible changes implicated by the scenario. For the development of the questionnaire first the range of economic indicators was determined. These indicators had to a) capture the set of economic changes for each scenario and b) had to be manageable and relevant for the researchers and the prospective users, the stakeholders. In the end the questionnaire contained sections on the following subjects, that were checked for the function specific stages in the supply network:

- Competitiveness
- Consumer and producer arrangements
- Industry structure
- Employment
- Government policies
- Trade

2.3.4.3 Consumer Acceptance

The German research team was responsible for the development of the Consumer Acceptance methodology. Therefore the main emphasis in the theoretical and empirical work was put on this task in Germany. This is also reflected in the extended treatment in this working paper.

The general role of the Consumer Acceptance research was to ensure that besides environmental gains and a business stakeholder interest the scenarios also have the potential to be adopted by the consumers.⁹ In this sense the adoption of the scenarios can be understood as the acceptance result. The significance of this assessment is related to the general perspective of the SusHouse research approach. Too often the development of sustainable solutions stressed scientific and technical solutions, while the transformation into workable solutions was relegated to secondary status. This led to a neglect of the most important mechanism of transforming these answers into reality: the consumer as an actual actor (Street, 1997, p. 143). By focusing on the Consumer Acceptance of sustainable scenarios this project made a shift away from the overstressed supply-side perspective.

⁹ It might be added that the consumer acceptance also has a vital impact on the final environmental and economic analysis. This connectedness did not lead to a formal methodological consideration because of the simultaneousness of the three assessments.

The acknowledgement of the consumer role was twofold. First, the consumer knowledge was activated by the *participation* of consumer representatives in the development of the scenarios to make certain that technological ideas were coloured by the perspective of the future adopter. Insofar this consumer-centred approach recognises people's roles, responsibilities and knowledge with respect to the environment. Second, as the consumer input in the scenario building could only be partial and selective, a diverse range of consumers were involved in the *evaluation* of the scenarios.

The Consumer Acceptance task emerged out of the Sustainable Washing project in the Netherlands (Vergragt/van der Wel, 1998). Here the research question was stated as a normal marketing question: Is there a market potential for these solutions? In the SusHouse project this question was further elaborated and methodologically refined. This started with the basic research objectives:

- to determine the evaluation of the scenarios by the consumer,
- to develop a profile of possible adopter groups,
- to identify possible inhibitors for consumers to adopt the scenarios, and
- to get indications for modifying the scenarios in order to increase the probability of adoption.

Based on this set of objectives the method was developed in two steps. First, the construct was defined and theoretically positioned. Second, the operationalisation of the construct gave rise to an adequate research design.

The Construct "Consumer Acceptance"

There is no established field of "acceptance research". So in order to operationalise this construct one has to look first for related constructs and research areas. A first construct evaluation focused on the similarity with the "attitude" construct. In general attitudes are defined as enduring dispositions to consistently respond in a given manner to a specific object (Mowen, 1990, p. 226). This implies that a positive attitude towards the scenario will lead to a behavioural modification in order to put the scenarios into practice. In reviewing the literature on environmental research approaches it was concluded that a positive attitude toward the scenario is only a weak indicator for the behavioural tendency to adopt a scenario. An important reason is the infamous attitude-behaviour gap. In national and international meta-analysis it is stated that the environmental attitude can only explain on average about 10% to 15% of the behaviour variance (Kuckartz, 1995; Hines/Hungerford/Tomera, 1986/87; Van

Liere/Dunlap, 1980). There are indications that this gap can be explained by the quite heterogeneous environmental behaviour (Derksen/Gartnell, 1993, p. 434), that a positive attitude is not a sufficient requirement for an environmentally responsible behaviour and that there are incidences of an environmentally responsible behaviour without a corresponding positive attitude (Kuckartz, 1998, p. 70).

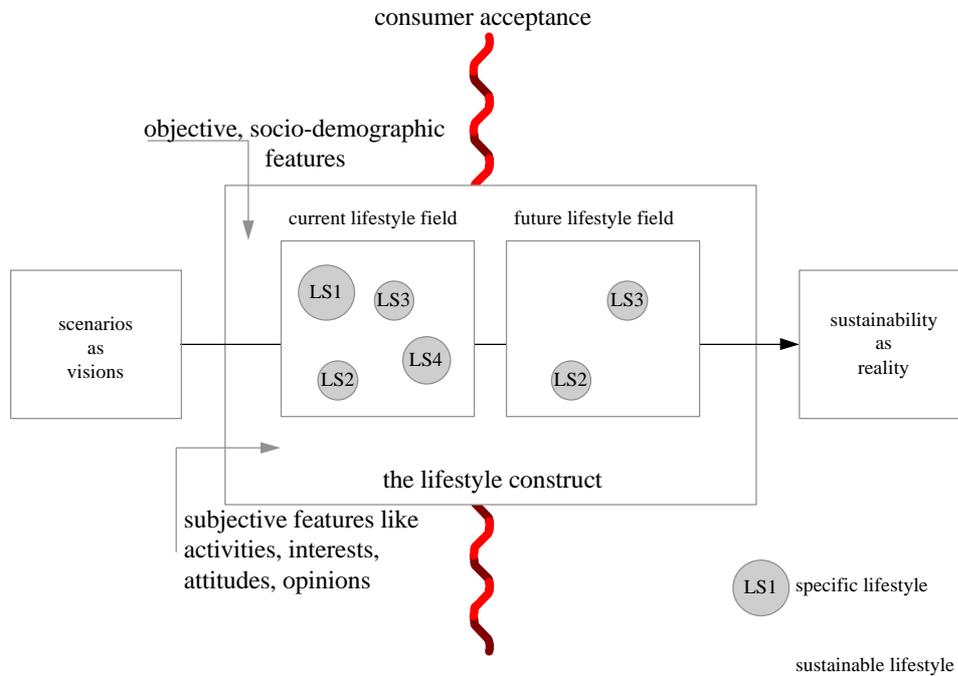
For the SusHouse team, encompassing different countries and therefore different social and cultural contexts, the most promising orientation to a changed theoretical base for the construct was to shift away from an individual and cognitive attitude perspective towards a more socio-cultural oriented approach. This takes into consideration that an environmentally responsible behaviour is directed toward and influenced by issues and concerns that can have a wide variety of meanings for different people and involves individual responses to a socially-developed and socially-maintained concern (Petkus, 1992, p. 861). Therefore as the theoretical reference point to operationalise the construct "consumer acceptance" the lifestyle approach was chosen, depicting the aggregation of people who share specific patterns of behaviour and traits. Lifestyle denotes a construct that combines objective features of social class and subjective features like experience, values and wishes (cf. Lüdtkke, 1992). The appropriateness for measuring consumer acceptance can be justified by the following points:

- To determine the likeliness of a future adoption of scenarios a positive evaluation of a scenario has to be based on an everyday level of behaviour (Billig/Briefs/Pahl, 1987). The lifestyle construct can guarantee the connections of the scenarios with the concrete way of living.
- The transformation of environmental concern into environmental responsible behaviour is dependent on the subjective frame of reference (Pofertl/Schilling/Brand, 1997, p. 68). The lifestyle construct incorporates the subjective meanings in constructing group-specific lifestyles and can shed a light on adopting barriers.
- Environmental dispositions are very heterogeneous and can be articulated in different forms (Reusswig, 1994, p. 113). The lifestyle construct is based on the pluralisation of lifeworlds in current societies (Hansen/Bode, 1999, p. 180, 233ff) and can therefore allow to describe groups with shared objective and subjective features.

Based on this theoretical background as the final definition of the Consumer Acceptance was stated: Consumer Acceptance comprises the positive evaluation of the scenarios and the tendency to apply the ideas in everyday life. To improve the assessment validity a refinement of the definition led to an interpretation of the construct as "lifestyle congruity" as it is depicted in figure 7. This means a positive evaluation of the DOS and a perception that elements in the DOS can be integrated in actual lifestyles or new, modified lifestyles, based on the actual lifestyles. As a resulting hypothesis it can be stated: A positive evaluation of the

scenarios will lead to a behavioural tendency towards adoption, when there is a perceived way of linking the actual lifestyle with the scenario related future sustainable lifestyle.

Figure 7: The Consumer Acceptance of Scenarios as Lifestyle Congruity



The Research Design

As a research methodology a combination of individual questionnaires and focus groups was applied. The session programme had the following format:

- Welcome/ briefing
- Oral and visual presentation of two DOSs
- Individual questionnaire
- Break
- Focus group discussions
(dependent on the group size two parallel sub-group discussions were possible)
- Debriefing and feedback
- Close

As stimuli the scenarios were presented visually and verbally as an everyday life description. In each focus group two randomly selected scenarios were presented. In the *questionnaire* the first individual impressions as well as a lifestyle profile of the participating group were analysed. The *focus groups* led to a detailed look into the group specific interpretations of the

scenario and the group Dynamics of this process. The combination of quantitative and qualitative methods is increasingly applied under the name of "triangulation" (Denzin, 1989; Flick, 1991). In this perspective, the different methods can help to acknowledge the phenomena in its multi-faceted way. In the words of Wolff/Knodel/Sittitrai (1993, p. 124): "the qualitative method inevitably adds a degree of contextual nuance that is impossible to extract from the cold parsimony of a statistical analysis."

The sampling process applied the technique of theoretical, purposive sampling.¹⁰ In the SusHouse project this sampling strategy implicated to look for a broad representation of environmental lifestyle types. Three different groups were tried to identify a priori:

- *Green group*: This category represents the "most likely to adopt environmentally friendly options" - group. If the project wants to succeed in generating new sustainable product and services, then this group might be the first target group.
- *Mainstream group*: This category represents the typical late adopters or non-adopters of environmentally friendly innovations. For realising the overall aim of the project, to develop ways towards a sustainable future, it is not enough to initiate change just for a niche group. There have to be also solutions for a broader group of consumers that are not necessarily high-involved in environmental issues.
- *Dynamic group*: The Dynamic group represents the idea of "future adopters", analogous to the business side of "future stakeholders". The selection of this group is justified by the idea, that the scenarios might also have an impact on consumer groups that will be constituted or become relevant in the future. In the SusHouse project as Dynamic groups were mostly chosen rather younger or older consumers. Younger consumers might be the actual adopters in 50 years. Older consumers might be a very important adopter group in the future, first because they take a bigger share in the future population and second because the scenarios might be especially suitable for the needs of elder people. So both groups might be filed under the category of the Dynamic group as the dynamic development will increase their scenario specific adopter relevance. The adjective "dynamic" should not be confused with a possible trait of the respective group representatives.

The selection of the groups was based on the country specific perception of the most likely group representatives. Deliberately it was not tried to develop an exact criteria profile a priori for the identification of the groups. Though European lifestyle typologies are existing (see e. g. Euro-Socio-Styles by the GfK, without year), the project specific applicability might be questioned. Here the criteria of information richness and the utilisation of the local knowledge of the Project Researchers were more important. Besides, the selected groups were profiled in

¹⁰ Glaser and Strauss (1967) initially developed this technique in the context of the Grounded Theory. It is directed at a deliberate choice of informants in view of the potential for new insights.

their actual environmentally-related lifestyles (called "eco-lifestyle") afterwards with the questionnaire data.

The Questionnaire

The structure of the questionnaire included three sections. It started with a first interpretation and evaluation of the presented two scenarios. Using the visual depiction of the scenarios the participants were asked for associative remarks on the scenarios and for indirect and direct lifestyle projections. This section finished with a weighted overall evaluation of the scenarios, including their current situation.

In a second section the specific group lifestyle was investigated based on the level of agreement and affinity to a widely used set of statements. Here a tripartite structure was used. The questions were focused on an *evaluative lifestyle factor* (with the basic dimensions of materialistic and postmaterialistic orientations), an *interactive lifestyle factor* (with the basic dimensions of the main everyday orientations like family, career, social activities) and an *expressive lifestyle factor* of everyday-aesthetic schemata (in this case with a focus on environmental schemata).

Finally the objective lifestyle features comprised the traditional socio-demographic variables in form of fixed-alternative questions.

The Focus Group

As the individual adoption of a scenario will be normally influenced by the interaction with other people, the focus group reproduces these processes. It is therefore a socially oriented approach, taking human beings as social creatures. The group environment can foster a willingness of the participants to be open with their feelings, beliefs and ideas and to discuss them with other group members. This self-disclosure among participants is one of the advantages of this method. The focused, moderated discussion is furthermore flexible enough to explore new, evolving point of views that are not possible to anticipate with a structured questionnaire (Krueger, 1994; Morgan, 1993; Stewart/Shamdasani, 1990).

The focus groups were composed of 5-12 participants. The discussions lasted usually about 60 to 70 minutes. The questioning route began with an opening question about recent experiences with the respective function to foster the conversation and interaction among the participants. Introductory questions followed about the group specific interpretation of the

current function-related state. With transition questions about differences between the current and the depicted future state of the function the conversation was moved towards the key questions:

- "Could you imagine yourself in the presented future scenarios?"(referring to the adoption)
- "Where do you see the specific advantages of the future scenarios?"(referring to benefits)
- "Where would you see the specific problems for your own adoption of the future scenarios?"(? referring to barriers)
- "What would you like to use already today?" (referring to outstanding aspects)
- "How would you improve this future scenario?" (referring to improvements)

The focus group sessions ended with summarising questions by the moderator and the possibility for a group feedback and additional remarks:

- "All things considered, where do you see the most preferable future?"
- "Is it adequate to say, that XXX summarizes your position?"
- "Have we missed anything?"
- "What advice do you have for us?"

The analysis was based on personal notes by the researchers and tape-based transcripts. A summary interpretation was developed according to prescribed codes (primarily based on the above mentioned key questions) and generated major themes.

The final analysis incorporated both the quantitative and qualitative analysis. This proved to be worthwhile as it especially helped to:

- clarify ambiguous questionnaire results by means of the focus group analysis,
- detect specific interpretations of scenario aspects in the focus group discussion, and
- frame group-dynamic processes with first individual impressions as documented in the questionnaire.

3 Strategies towards Sustainable Clothing Care

3.1 The Un-Sustainable Present as the Starting Point

The Clothing Care function, which was studied in Italy, Germany, and the Netherlands, is dealing with all activities concerning the care for the clothes of the household members. This is done taking the whole life cycle of the clothes into account laying special emphasis on the use phase (see chapter 2.3.3.1).

The discussion referring to the German clothing consumption is often based on figures between 20 and 25 kg per person. But these figures can be misleading, as they lump up quite different objects, like clothing, fabrics, home textiles or even carpets. The Enquête-Kommission criticised these figures and came up in an elaborate material flow analysis with an average clothing consumption of about 12-kg per person (Enquête-Kommission, 1994, p. 111). Though one should consider the significant differences, as only 20% of the German consumers are responsible for about half of the clothing consumption. In West Germany the different clothing segments are distributed (measured in weight) as 42% women's outerwear, 24% men's outerwear, 10% men's underwear (incl. shirts), 7% T-shirts and vests, 5% women's underwear, 4% sportswear and 8% other. Based on the figures for German clothing production, natural fibres are still dominant with 54% cotton, 9% wool, and 37% chemical fibre (with a worldwide ratio of 51% chemical fibre, 45% cotton, and 5% wool (Schmidt/Rosenkranz, 1995, p. 26). Based on the amount of textile consumption and disposal, it is estimated that clothing in average is worn 20 times, with the wearing period ranging from a few months to a few years. The average wearing period of 3 to 5 years can be supported by the UBA (the German Federal Environmental Agency) data for women's clothing, with 4.75 years wearing period for coats, and 3 years for trousers and skirts (Enquête-Kommission, 1994, p. 136).

The washing behaviour is related primarily to the detergents, the textiles and the durable facilities. For the material flow analysis of washing the UBA collected and calculated the following status quo data as average data in the year 1993.

Table 1: Yearly Washing Behaviour Data (Grießhammer/Bunke/Gensch, 1997, p. 106)

	Per Household	Per Capita	Germany Total
Laundry	500 kg	221 kg	17.85 Mt
Machine Filling	2.75 kg	2.75 kg	2.75 kg
Wash Frequency	182	80	6.5 million
Power Consumption Washing Machine	235 kWh	104 kWh	8.39 TWh
Power Consumption Tumbler	96 kWh	42 kWh	3.43 TWh
Total Power Consumption	331 kWh	146 kWh	11.82 TWh
Water Consumption	17.3 m ³	7.7 m ³	617.6 million m ³
Laundry Detergents Consumption*	18.75 kg	8.3 kg	670.000 t
Laundry Aids Consumption	5.97 kg	2.64 kg	212.955 t
* Assumed mix: general purpose detergent 20%; compact detergents 55%, colour compact detergent 10%, liquids 10%, modular system 5%			

Based on expert interviews (see Appendix B.1) the following aspects were given as main reasons for a less sustainable situation than possible in the Clothing Care sector in Germany:

- Deterioration of clothing quality ("clothes are designed for selling but not for using them")
- Cheap clothing as a standard ("consumer do not appreciate quality clothes anymore"; "they throw clothes away before they invest energy in repairing it"; "clothes are only so cheap because of sweat-shops and child work")
- Fast-moving fashion / consumerism ideology ("consumers are motivated by 'shop-til-you-drop' and 'throw-away-society' attitudes")
- Clothing care is seen as too complicated, strenuous, and unattractive
- Hygiene standards are too high ("the actual clothing care intensity is more than necessary"; "the cleanliness standards are manipulated by the industry")
- Consumers do not know or do not care enough about clothing care, respectively about the environmental burden ("this is mainly an 'information problem'; "the reason is the missing feedback between individual behavior and environmental impact"; "it's simple laziness")
- Changed demographics ("single households [young and old] are increasing"; "there are more working women nowadays and clothing care is still seen as 'women's work'; "the increasing wealth decreases the motivation for lifecycle extension"; "low income classes can not afford quality green clothes")
- Existing solutions are not applied

3.2 The Development of Design Orienting Scenarios for a Sustainable Clothing Care

In the following section the developed DOSs are described. These DOSs can be seen as one of the main results of the project. They do not represent theoretical proposals developed by the participated researchers for the "best" solutions towards a more sustainable future. They

rather stand for a joint process of developing more or less consensual solutions by a wide array of involved stakeholders during two workshops.

3.2.1 Stakeholder Workshops

The workshops played a vital role as a tool to achieve a stakeholder involvement, as the main vehicle for interaction with stakeholders and as the process to co-design of the scenarios.

The *Creativity Workshop* took place in Hannover on January 26 to January 27, 1999. For the workshop 16 persons agreed to participate. In the end 13 persons (8 women and 5 men) took part.¹¹ The aim was to develop broadly endorsed settings of a future sustainable need fulfilment. The main output of the workshop was a set of current unsustainabilities and their reasons (first breakout group session), several clusters of ideas for possible future solutions (second breakout group session), and three scenarios (third breakout group session).

The *Strategy Workshop* took place in Hannover on December 2, 1999. For the workshop 14 persons agreed to participate. In the end 10 persons (6 women and 4 men) took part. The elaborated and tested scenarios were presented to and discussed with the stakeholders. During the discussion the stakeholders again modified the scenarios, this time under the premise of a pragmatic and strategic point of view. The overall goal of this second workshop was to formulate concrete, short term oriented steps towards the implementation of viable concepts and to identify barriers and technical, cultural or political conditions. In the consensus phase all of the three subgroups could identify with the core ideas of the DOSs, but changed some surrounding ideas. The tendency of modification was (in their own language) "to make it more realistic" and to increase the adaptation chances. This resulted first in trying to soften some of the basic assumptions and second to incorporate some ideas of the other DOSs.

3.2.2 Clothing Care DOSs in View

In the Creativity Workshop the stakeholders developed core ideas for a more sustainable future. These core ideas were evaluated and clustered. Afterwards the Project Researchers elaborated these thematic clusters into consistent and comprehensive scenarios. For the German Clothing Care function three scenarios were selected and developed that are summarised in the following table.

¹¹ See appendix B.1 for a list of the participating stakeholder groups.

Table 2: Clothing Care DOSs examined in Germany

	Core Idea	Proposal(s)	Studied also in
Outsourcing	The consumer does not have to take care anymore. All clothing care activities are done by experts outside the household	Clothing Care service centre	Italy, Netherlands
My Clothes, My Friends	The consumer cares intensively about a reduced set of customised clothes.	Limited wardrobe with basic suits and individualised modules	Netherlands
Collective Clothing Care	The consumers care about each other. The clothing care activities are part of the social activities.	Community Clothing Care service centres	Italy, Netherlands

In the following these three DOSs are summarised in regards of vision and essential characteristics.

3.2.2.1 DOS "Clothing Care Outsourcing"¹²

Vision:

The primary clothing care activities take place outside the household. The consumers do not have to take care anymore about clothing care. Instead, *Clothing Care service centres* take care of washing, cleaning, ironing, finishing, repair, modification, disposal and exchange. The consumers have a relaxed and playful relationship with their clothes. Except underwear and special items, they do not own clothing anymore. They do not have to feel guilty anymore by trying out new clothes. While the environmental quality, longevity and prices have drastically increased, the household budget share has decreased with the leasing of clothing. As the bonds between the consumption of fashionable clothing and personal income has loosened and the services comprise also style advice, clothing is no longer the primary status and identity marker.



¹² The images in this and the following sections are by Francois Jegou. They were used as visual stimuli in the focus group discussions.

Essentials:

The Consumers can choose between complete clothing care sets with a premium price (with full delivery service) and cheaper offerings by performing some tasks like local cleaning, dropping the laundry and picking up the clean clothes at service points.

The new market structures as well as the new service offerings are mixed. There will not be one monopolistic company, but centralised centres with decentralised service points and a sophisticated logistic system. The former "big players" in clothing and clothing care have expanded by forward and backward integration. New companies emerged out of existing, smaller green markets that have gained market power and access to the new technologies by forming strategic networks. The advantage of centralised clothing care incorporates the utilisation of scale effects and the bundling of expert knowledge and competency.

3.2.2.2 DOS "My Clothes, My Friends"

Vision:

The consumption of clothing has decreased. Each piece of clothing is appreciated much more. Seen as a second skin the identification with each single piece of clothing is high and emotionally charged. What was taken to be "mine" is now realised as "me". To increase the identification process from the beginning on, the rare clothing consumption acts are ritualised events. The prospective customer takes part in the production process and



promises to take good care of the new piece of clothing. The owner performs the clothing care activities. These activities changed their character from burdensome work to forms of "psychic investment" or from "care" to "caress". By each of these acts clothing becomes more and more singularised and personalised. Fashion turns from a social to an individual phenomenon. Individual dressing is more concerned about the different experiences, stories, emotions and biographies that one relates with each piece of clothing. When clothes become older they "ripen" with the user and are valued even more.

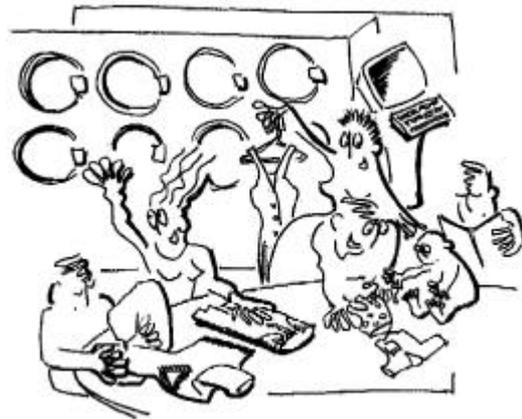
Essentials:

The quality of clothes has increased. They are produced and finished regionally with a mix of natural fibres and synthetic, intelligent features. So clothes are more dirt-resistant and adjust to the climate. To support different development phases and rites de passage they are easily modifiable and are sold as ready-made *basic suites with customisable modules*. The core idea is to gain environmental benefits by use intensification. The lifestyle options are restricted by the reduction of clothing consumption. The idea is to initiate changes not by so much by object diffusion but by lifestyle changes, combining environmental values with individual pleasure seeking. The clothing care activities are split into two groups. The clothing owners perform one group of regular activities. Professionals perform the specialist tasks, including extensive cleaning, repair and upgrading.

3.2.2.3 DOS "Collective Clothing Care"

Vision:

New forms of living, working and spending the leisure time have emerged. People enjoy the new living arrangements that have opened up the single, closed household in connected households with shared facilities. The character of work has changed from the employment-model to temporary networks. There are neighbourhood pools of office appliances and technologically advanced centres of adjusting



demand and supply of professional competencies and availability. The overwhelming values that are cherished are global and local partnerships and connectedness. The changes occurred when the communal life lost the associations with narrow and restricted forms of communities. When self-organisation became much more important, experiences showed, that there are quite different options than the old forms of oppressive collectivism. The communities are self-chosen according to life stages and interests and allow a diverse set of lifestyles.

Clothing and clothing care is organised jointly in neighbourhoods. Clothes in itself became less important. The importance of functional aspects like longevity and easy cleaning and

repairing increased. Creativity is highly valued. People do not assess each other according to what they have (like clothing) but what they have made out of it. In so far the shared aspects of living and working do not lead to a grey uniformity but to individuality celebrated in the group

Essentials:

The *community Clothing Care centres* offer advanced technologies to share and knowledgeable experts. The most important aspect of the centre is the enjoyment of the shared clothing care. Here it is possible to exchange clothes, wash, repair and dispose them. These centres are lively places of social gatherings. The neighbourhood owns the centre as well as the machinery and the clothing. While the traditional clothing production and clothing care sectors will decrease in significance, the demand for new services will increase: like communal management, Clothing Care educators, infrastructure supply and maintenance. The community centres are voluntary co-operations. Though it is not assumed that the whole society is organised into communities, they still have an impact on the whole society.

3.3 Sustainability Analysis

3.3.1 Environmental Assessment

The Environmental Assessment of the DOSs aimed at generating insights in the saving potentials of the DOSs and at identifying strong and weak points of the DOSs. In the Clothing Care research group the quantitative approach was used (see 2.3.4.2). This chapter only summarises the results of the assessment.¹³

The environmental impacts of the Clothing Care function for one average German household per year have been assessed for the current situation and for the DOSs. All results have to be considered with care because of the uncertainties in the underlying data and the many assumptions that had to be made concerning the DOSs. Data were gathered from literature.

The methodology was based on the environmental problem-benefit map, developed by the Dutch Task Leader Environmental Assessment (see also 2.3.4.2). This map structured the Clothing Care function according to the function phases and the relevant environmental indicators. The assessment focused on ten environmental indicators for the various phases of

¹³ For the detailed Environmental Assessment see Bode, 2000c.

the Clothing Care function: the consumption, acquisition, maintenance, cleaning, storage and disposal. Though the main focus was on the consumption side, the environmental impacts on the production side are incorporated by resulting changes required by the scenarios. These impacts are related to the use of energy (production of fibres, production of textiles, production of clothes), the use of pesticides (for the production of natural fibres, especially cotton), the use of water (the growing of cotton and textile treatment processes), the use of dyes and chemicals (textile treatment), the use of non-renewable resources (synthetic fibres), process-emissions and large transport distances. The most important environmental impacts in the consumption phase are related to the washing, drying etc. of clothing (energy, detergents, water and sewage water) and to the disposal of clothing.

3.3.1.1 Current Situation

In the *current situation*, an average household¹⁴ uses 26.4 kg new clothing per year. Each year, an average household washes 500 kg clothing per year, and dries 282 kg clothes per year. Based on this situation an environmental assessment was done to have a reference point for the DOS changes:

Table 3: Environmental Assessment of the current Situation for Clothing Care in Germany

	Quantity [kg]	Energy [MJ]	Materials [kg]	Water [m ³]	Transport [tkm]	Pers. Travel [km]	Household Sewage [m ³]
Production of Materials and Clothes	26.4	7264 (58%) <i>(incl. transport)</i>		272	<i>(see energy)</i>	0	0
Acquisition	26.4	0	0	0	0	379	0
Washing	500	1850 (15%)	Negligible	12.5	0	0	22
Drying with Dryer	282	3122 (25%)	0	Negligible	0	0	0
Dry clean	97	41.4	-	-	-	Negligible	Negligible
Ironing	-	200 (2%)	0	Negligible	0	0	0
Total	-	12477.4 (100%)	26.4	284.5		379	22

¹⁴ An average German household consists of 2.2 persons, with a trend towards smaller households and less children. On average in this household are living 0.47 children (Statistisches Bundesamt, 1997).

Table 4: Environmental Impacts of the Clothing Care Function per Household per Year in Germany

	Quantity	Emissions	Durables	Consumables	Waste
Production of Materials and Clothes	26.4 kg	N ₂ O (natural fibres and Nylon) water pollution (synthetic fibres and textile finishing) air pollution (synthetic fibres and textile finishing) Pesticides, herbicides and fertilisers (for production of natural fibres) and other chemicals for finishing treatments.	Not included	Not included	Not included
Acquisition	26.4 kg	0	0	0	0
Washing	500 kg	Detergents, dyes and bleach widely	Washing Machine	16.84 kg per household, per year ¹⁵	Negligible
Drying with Dryer	282 kg	n. a.	Dryer	Negligible	Negligible
Dry clean	97 kg	No data available, probably important	Dry clean equipment	No data available	Negligible
Ironing	n. a.	200	Iron ore	Negligible	Negligible
Disposal of Clothes	23.5 kg				11.3 kg garbage incinerated or landfill 12.2 kg re-used as clothes, rags and raw material 2.9 kg unknown
Total	-	-	-	-	26.4 kg

Energy

The total energy demand of the clothing care function adds up to over 12477 MJ per household per year (energy for travel, transport, durables, consumables, and for waste processing is not included). It is important to note that the production of clothes is responsible

¹⁵ Based on the data of the IKW, 1998 and Hirschl, 2000.

for the major part (58%) of the total energy demands in the clothing care function. Washing, dry clean and drying is responsible for the rest (42%). The drying process is responsible for the major part (60%) of the energy demands in the usage phase.

Resources and consumables

The use of resources in the clothing care function consists of 26.4 kg of textiles and 16.84 kg detergents per household per year. In addition resources are needed to produce washing machines, dryers, iron ores and dry clean equipment. The use of detergents appears to have a large share in the use of non-renewable materials. As concerns water, almost the whole use is due to the production of cotton. This is a surprising result, since one would expect that the washing process would be the major water consumer. In households the use of water for washing is about 20% of the total water usage (Knot/Bras-Klapwijk, 2000).

Waste, sewage water and emissions

In the clothing care function, the waste of textiles adds up to 23.5 kg per household per year. In addition, washing machines, dryers, iron ores and dry clean equipment is disposed of after a number of years. As 2.9 kg of waste is unaccounted for, it is unclear how many clothes are reused as clothes or in another way and how much is incinerated or landfilled. As concerns household sewage, the washing process is responsible for almost the whole household sewage in the clothing care function. Emissions of dyes and detergents take place. As concerns other emissions, probably the most important (quantity, toxicity) occur in the fibre production and textile finishing process.

Durables

Washing machines, dryers, iron ores, dry clean equipment are used in the usage phase. These need to be produced which costs materials and energy, and causes emissions and waste. While the total amount of 2.78 million washing machines existing in the moment in German households, the environmental burden of production and disposal is by far not that important as the usage of washing machines

In different life cycle analysis it became obvious, that about 90% of the total environmental impact (energy consumption, air pollution, water pollution, solid waste and water consumption) is contributed by the usage phase. One of these research projects took place for

the Energy Efficiency Labelling, initiated by the European Commission Directive on the energy labelling of washing machines. It came in force 1996 and makes information on the energy consumption of washing machines mandatory. The basic points of the research on European washing machines can be summarised as follows (ethical consumer, 1995):

- Washing machines account for 10% of the carbon dioxide produced by electrical appliances in the home
- The water used by washing machines accounts for 12% of the domestic water usage
- The main share of energy consumption (86%) while using washing machines goes into heating the water
- Energy saving of recycling washing machines (the steel main body) are up to 76%
- Washing machines have an average life of 10-12 years

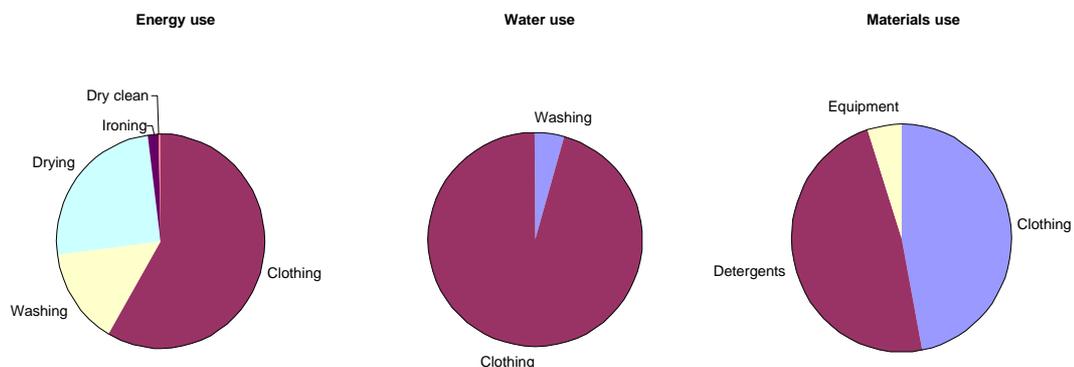
Travel and transport

Production of clothes is an international business. The average transport distance for clothes has been estimated at 15.000 km/kg. The amount of energy needed for this transport depends on the transport mode and its energy-efficiency. An efficient transportation mix is more important than the actual length of kilometres. Total personal travel to shops is approximately 379km per household. The environmental effects of this depend also strongly on the transport mode.

The figures in the table are only a tentative, global indication of the environmental burden of the current clothing situation.

The following figure gives an overview of the shares of different function phases.

Figure 8: The Shares of different Function Phases in the total Energy, Water and Materials used in the Clothing Care Function (for an average German Household in the current Situation)



3.3.1.2 DOS "Outsourcing" Assumptions

In this DOS the longevity of clothes is increased because of the far better recycling and disposal by the service centres that are renting most of the clothes to the end consumer. It is assumed that the average rate is 10 years in the DOS. The quality standard is raised and environmental production is a necessity. Also the clothing consumption is reduced to 17.2 kg per household. This is due to a slight slowing down of the speed of fashion cycles and an improved use of clothes. The material and immaterial input-output relation of clothing care is optimised by the substitution of individual washing technology by efficient industrial clothing care systems. There is no change assumed in washing behaviour regarding drying and ironing.

3.3.1.3 DOS "My Clothes, My Friends" Assumptions

The focal point for a more sustainable solution in this DOS is the strong reduction of the total clothing consumption and an increased local production. The limited wardrobe will comprise about six basic suits with different modules and accessories. With the increased appreciation and personal investment in clothes the durability is extended to ten years. This means on average the household is buying one new piece of clothing every two years with ca. 0.53 kg per household / per year. The washing process is still located in the private household, though it is performed more knowledgeable than today. There is no electrical drying or ironing of the laundry. The recycling is drastically increased, by behavioural changes but also by the reduced variety of different materials for the basic suits. The ideal of a closed cycle is nearly fulfilled.

3.3.1.4 DOS "Collective Clothing Care" Assumptions

Here the main environmental impact is caused by the substitution of individual washing acts with collective washing technology and the reduction of the total clothing consumption by the shared clothing pool. The overall clothing consumption will be reduced because the neighbourhood clothing pool will shift the focus on fashion-based clothing more towards high quality clothes with a 15 years longevity. This leads to a household clothing consumption of 15.8 kg/year. With the shared washing the environmental improvements are based on better filling rates and reduced washing machine consumption. The actual washing takes place in close by, neighbourhood centres, though additional transport for washing is considered.

3.3.1.5 Comparison

Based on the assumptions the following table shows the calculations for the selected environmental indicators in each DOS:

Table 5: Overview of Saving Potentials

Indicator	Current situation	Outsourcing	My Clothes, My Friends	Collective Clothing Care
Energy	12477MJ	5528 MJ	202 MJ	3200 MJ
Clothing Materials	26.4 kg	17.2 kg	0.53 kg	15.8 kg
Water	284.5 m ³	224.5 m ³	4.6 m ³	153 m ³
Travel	379 km	190 km	30 km	790 km
Household Sewage	22 m ³	12 m ³	2 m ³	10 m ³
Detergents	16.8 kg	7.9 kg	2.7 kg	6.1 kg
Clothing waste	26.4 kg	17.2 kg	0.53 kg	15.8 kg

The saving potentials of the *DOSs* are summarised in the table below.

Table 6: Compared Saving Potentials

Indicator	Current situation	Outsourcing	My Clothes, My Friends	Collective Clothing Care
Energy	12477.4 MJ	++	+++	++
Clothing materials	26.4 kg	++	+++	++
Water	284.5 m ³	+	+++	++
Travel	379 km	++	+++	---
Household sewage	22 m ³	++	+++	++
Detergents	16.84 kg	++	+++	++
Clothing waste	26.4 kg	++	+++	++
Emissions	Pesticides Chemicals for finishing Dyes and detergents during washing	++	+++	++
Saving potentials of DOS compared to the current situation				
'+' means a reduction of 0-33%, '++' means a reduction of 33-66% '+++' means a reduction of 66-100%, compared to the current situation				

As concerns *energy use*, the "My Clothes, My Friends" DOS scores best. This is due to the strong reduction of clothing consumption and the large share of clothing production in the clothing care energy use. It is interesting to see that the "Outsourcing" DOS and the "Collective Clothing Care" DOS rates equally well with the energy reduction. While the "Outsourcing" DOS is based primarily on technological changes the "Collective Clothing Care" DOS is based primarily on behavioural changes in washing with an additional technological improvement. A main uncertainty is the evaluation of the maintenance of neighbourhood centres in terms of energy in the "Collective Clothing Care" DOS. Instead of clothing care at home here collective rooms are used for storage and clothing care. This might increase the energy consumption (constant heating, airing) though data about the energy input for individual clothing storage is not available.

As concerns the *use of textiles*, the most obvious saving potential has the "My Clothes, My Friends" DOS with the textile use reduction as the core idea off the whole DOS. While the "Outsourcing" DOS is only moderately reduced in the clothing consumption, the "Collective Clothing Care" DOS has a more considerable impact. This is due to the clothing pool and the changed attitude towards fashion.

As concerns *travel*, the "Outsourcing" DOS has a positive impact by substituting the individual consumption transport with centralised transportation systems. This can also overcompensate the additional transports for washing with the delivery service. A main uncertainty here is the arrangement of the logistic system for the Clothing Care centres. For the assessment one has to consider first the reduction in transport energy consumption because of the substitution of individual consumption acts by home based renting decisions. But the pivotal question will be the logistic system of the additional transport between the service centres and the private households for the laundry collection and the new clothes delivery. The reference points are the mix of the service offers the used transportation vehicles and the logistical efficiency of the distribution systems. In an exemplary calculation (Hirschl, 2000) of the primary energy consumption of individual washing and laundry washing, an advantage of the professional laundry (with the assumption of a similar drying in laundries and the private household) could be overcompensated if the customer uses a car for the transport to the laundry and back home (starting with a distance of 3 km [though based on individual transports and not with a central transportation system]). The drastic travel reduction of the "My Clothes, My Friends" DOS is due to the strong reduction of clothing consumption and a prolonged longevity of the clothes. Here the "Collective Clothing Care" DOS rates rather badly as it increases the transport in comparison with the current situation.

Here a recommendation would be to organise a shared laundry transport by the neighbourhood centres to minimise the additional individual transport.

The quantity of *sewage water* is significantly reduced in all three DOSs, the most in the "My Clothes, My Friends" DOS due to the overall clothing consumption reduction. In the "Outsourcing" DOS the reason is mainly the industrial washing technology. Even if there would be no technological improvements in the future, alone the substitution of individual washing by industrial washing would have a very significant impact here. In the "Collective Clothing Care" DOS the reduction reason is partly due to behavioural changes but mainly also because of the technical advantages of larger washing technologies.

All three DOSs yield large reductions in the use of *detergents* (due to the technological advantages of larger washing machines, behavioural changes and regarding the "My Clothes, My Friends" DOS with the overall clothing reduction) and in *emissions*.

3.3.2 Economic Analysis

The goal of the Economic Analysis was first the detection of a structured map of opportunities and risks for the involved companies and second to give a reference point for economic recommendations on a macro-economic policy level. In cooperation with the Clothing Care research team the *Manchester School of Management* developed a systematic and detailed questionnaire with the function relevant supply-side structure. The Project Researcher developed the qualitative assessments on the basis of literature research and the expert knowledge of involved stakeholder.

3.3.2.1 DOS "Outsourcing"

Clothing Producers:

It is quite reasonable to assume that for this DOS the speed of fashion cycles will be slightly reduced and the recycling quota will increase because of the service centres. Insofar Clothing producers will be confronted with a demand reduction in terms of pieces of clothes per year and per head. Also a significant change from the consumer to the business-to-business market will occur. In this DOS it is assumed that to a large extent clothing will be rented in the service centres and clothing producers have to focus on the service centres as their clothing customers. This involves the establishment of new distribution systems. Though the end

consumer will still be the reference point for the marketing activities of the clothing producers. Especially communicative activities will not change that much, as the targeted end consumer has a pull-impact on the service centres, demanding specific brands to rent. The main opportunity is based on changed price sensitivity for the end consumers the more clothing will be rented and not bought. Therefore new target groups could develop for high quality clothes.

As service centres require a certain size, their market position will be relatively strong with close relations to clothing producers. This could be a market entry barrier for smaller clothing producers. To strengthen their market position they could establish co-operations and strategic networks.

Washing Machine Producers:

The use of service centres will decrease the traditional washing machine demand. Washing machine producers might concentrate on the supply of industrial washing technology for the service centres. Innovations in this sector are inevitable. In the moment the industrial washing technology is not yet suited for the efficient and environmentally friendly cleaning of normal clothes. A reference point is seen in the sector of working clothes cleaning. To develop these technologies for the service centres an intensive co-operation between the fabrics, clothing, detergents and washing machine sector is required. There will be more system related innovations like a new clothing design minimising the need for different washing programmes or computerised identification of clothing types in the washing process.

Detergent Producers:

The detergent industry is confronted with a strong decrease of the traditional end consumer demand. There are two options to balance this market loss. On the one hand they can focus more on the detergent supply for service centres. On the other hand there will be new markets for end consumer demand. Consumers could be in need of intermediate cleaning solutions besides the service centre cleaning. Examples are local dry cleaning of stains or clothing refresher as a soft alternative to the extensive cleaning of the centres.

Retailing:

Traditional retailers for washing machines and clothing will lose market shares because of the change from clothes buying to renting and the outsourcing of private clothing care activities. As for the new service centres retailer competencies will be a focal point, it is assumed that many traditional retailers will integrate forward into the service sector.

Services:

Quite a few new service companies will emerge with a broad variety of offer packages. One can think of a full-service offers (including e. g. style advice), reduced offers (instead of home delivery with customer contacts at central service points), or theme-related offers (pre-selected clothes for work, job interviews, social events, dates etc.). It is unlikely that smaller to medium-sized business units can offer the necessary services in this market. A first barrier is the larger amount of investments in technology and logistics. Strategic networks or co-operations might be an alternative for these smaller companies. On the other hand the larger clothing producers and retailers will try to dominate this market.

3.3.2.2 DOS "My Clothes, My Friends"

Fabrics Producers:

Fabrics producers will create new consumer relations by trying to integrate the consumer into the production process. With increasing regional fabrics cultivation new smaller companies can enter this market. At the same time the significance of synthetics will further increase with the specific demand for longevity of textiles in this DOS.

Clothing Producers:

The DOS will lead to a strong reduction of clothes production while the average quality will increase. The more regional production is applied, the more production costs will increase. Consumer relations might intensify as consumers are more integrated in the production process. There will be only a few clothing producers left in the market. The survival chances are the least for the low price segment with a low cost production and logistics strategy. There will be a steady and solid market for the high quality segment.

Washing Machine Producers:

This DOS will bring only slight changes for this industry. The increased clothing quality might require some adjustment processes and the market might focus more on high quality washing machines.

Detergent Producers:

The changes will be marginal in this sector as well. Though the social and emotional positively charged clothing care activities could modify the positioning of detergent products. Now the products can be more individually differentiated with added values. Less and less

detergents will be seen as convenience goods. The specific quality demands of the high involved consumers can transform them into speciality goods.

Retailing:

The primary retail activities in the textile sector will be drastically reduced. An option might be the concentration on modules and accessories.

Services:

Traditional companies in this sector like repair services will become less important as they lack in the required technical, social and marketing competencies. But the strong identification with clothes and more clothing activities in the home might trigger a demand for new services. One can think of professional "repair clinics" (the qualified substitutes for simple repair services), modification of basic suits or rental of specific clothing care devices.

3.3.2.3 DOS "Collective Clothing Care"

Clothing Producers:

The overall clothing demand will be slightly reduced. On the other hand there will be a very solid and stable demand for high quality, less fashion based clothing by the neighbourhood centres. These centres will be very profitable target groups for clothing producers. Though the intensive Clothing Care education in the neighbourhood centres will increase the consumer knowledge and competence. Therefore these groups will develop very specific and knowledgeable demands for the clothing production. As the fashion aspect will not dominate the clothing market any longer new market entries are to be expected, like working clothes producers. On the other hand the more knowledgeable consumers might accentuate more the environmental, social and ethical aspects of the clothing products and companies (like local production, no sweat shop production, no child work etc.). This can significantly improve the market position of smaller producers, dedicated to a sustainable company strategy. They could pass the retail stage and enter direct relations with the neighbourhood centres.

Washing Machine Producers:

Neighbourhood centres will lead to an increased demand for larger washing machines. This could be articulated directly as a demand for washing machines or indirectly as a demand for leasing contracts, including maintenance and service contracts.

Retailing:

The clothing retailers will sense the slight reduction of clothing consumption. The market position will be even more endangered by the direct relations between producers and the neighbourhood centres, resulting from the steady demand.

Services:

The neighbourhood centres will have a demand for new services. One can think of maintenance services for the Clothing Care technology in the centres (probably in the form of leasing contracts) and new services in the sector of Clothing Care advice and education. Though traditional services like repair and tailoring will become less significant. They could change their market focus in offering seminars in the centres.

3.3.3 Consumer Acceptance

The *Consumer Acceptance* research is intended to paint a picture about possible adopter groups, how they interpret the DOSs and how they can be described. The applied methods are a quantitative questionnaire in combination with a qualitative focus group discussion (see 2.3.4.3). For the German Clothing Care function the following groups were selected:

- *Green consumers:* The chosen participants took part in a course qualifying them as environmental accountants. This was the a priori criterion selecting them as Green Consumers. As it turned out the participation was not necessarily chosen voluntarily by the participants. For some this was the only chance to get further unemployment benefits. In the empirical analysis of their actual lifestyle they turned out to be less environmentally motivated than assumed. Their eco-related lifestyle was critical and differentiated.
- *Mainstream:* The chosen participants were pupils in a business vocational school. In the German education system the vocational school is a part of the apprenticeship. For one day per week the apprenticeship in a company is supplemented by one day in school.
- *Dynamic group:* Based on the assumption, that the ratio of elder people will increase and that e. g. the "Collective Clothing Care" and the "Outsourcing" DOS might be appropriate for these consumers, the chosen participants were younger seniors. There were mainly members from the "German Housewife Association" and the "Graue Panther" (a senior activist group).

The following table gives an overview of the participants in the German Clothing Care Consumer Acceptance research. As the participants were selected a priori on the basis of the given categories. With the questionnaire data an actual lifestyle profile was developed. In the following table a lifestyle summary is added.

Table 7: Participants in the Consumer Acceptance Research

	Green	Mainstream	Dynamic
Number	14	17	9
Female / Male	3/11	8/9	8/1
Age	Ø 36 (28-47)	Ø 21 (19-25)	Ø 59.2 (55-65)
Values	Critical – social value orientation with an individual integrity focus	Postmaterialistic-individualistic	Social value orientation, slightly critical with a traditional – postmaterialistic mix
Way Of Living	Active and cultural way of living, work sphere is important if work is personally relevant	Active, leisure orientated way of living	Living is centered on health and home, but with an active orientation
Eco-Lifestyle	Critical-differentiated eco-orientation	Heterogeneous, partly eco-interested, partly eco-uninterested	Active eco-orientation
DOS "Clothing Care Outsourcing"		X	X
DOS "My Clothes, My Friends"	X	X	
DOS "Collective Clothing Care"	X		X

The following analyses focus on the interpretation of the DOS. Therefore the coding and developing of themes from the focus groups are emphasised with supplements by the DOS-related part from the questionnaire.¹⁶

Table 8: Global quantitative Evaluation

	Green	Mainstream	Dynamic
DOS "Clothing Care Outsourcing"		3.7	2.8
DOS "My Clothes, My Friends"	1.1	1.0	
DOS "Collective Clothing Care"	1.6		3.2
As today	7.3	5.2	4.0

The first overall evaluation is based on the questionnaire, which was filled out before the focus group discussion. The question was: "And now please tell us, how would you prefer to see your own future in the area of Clothing Care. You can allot up to 10 points amongst the following three options." The three option referred to were the specific two DOSs presented in the groups and the current situation. These results often had high standard deviations and do not represent a clear-cut evaluation (see Bode, 2000a). Furthermore the evaluation could

¹⁶ For the detailed analysis of the group lifestyles see Bode, 2000a.

change in the discussion with the other participants in the group or different forms of reasoning for the evaluation were detected.

3.3.3.1 DOS "Clothing Care Outsourcing"

From the consumer point of view this DOS is a quite attractive DOS. There were subgroups in the Dynamic and Mainstream groups that articulated a strong preference for the service option. In general the congruence with actual trends towards a service society were especially rated as positive. Besides the less radical behavioural changes added to the attractiveness. It can be said, that in general the aspect of outsourcing at least some of the clothing care activities was accepted in all groups.

The Interpretation of the Mainstream Group

For the Mainstream group the outsourcing was the main positive aspect. This was interpreted as a reduction of clothing care activities and therefore meaning less work, a relief and increased comfort. In further elaboration this meant for the group saving time for more important activities. Though it must be remarked, that for most of the participants in this group this time saving is a hypothetical construct as most of them are still living with their parents with the mother being responsible for most of the clothing care activities. Insofar the identification of the participants with the DOS can be seen to a certain degree as a continuation of the present state. This projection into the future of the Mainstream group is also reflected in the questionnaire, when participants were asked to associate the presented DOS with the most suitable adopter group. Here the answers showed a relatively high standard deviation, that indicate the option for the DOS to be targetable to different lifestyle groups. Nevertheless the Mainstream group saw a fitting cluster for the DOS described as younger, working couples (and less so for elder people), that enjoy an active pastime (like sport, travelling etc.). For most of the young Mainstream participants this is the aspired next lifecycle step.

The most severe barrier for adoption is the rent of clothes. The Mainstream group felt both a loss in owning and using of owned clothes. For the using aspect the group articulated the feeling of a restriction in articulating the personality. This was explained by a less intensive relationship with someone else's clothes. Though it must be added, that the group rated the relationship with clothes in the "My Clothes, My Friends" DOS as negative. In line with the statements in regard of the latter DOS the rent model was criticised for increasing the variety of clothes and therefore increasing the "decision pressure" of what to wear. As another negative aspect hygiene was mentioned. Especially female participants were used to lend

clothes, but only with close friends. The anonymous lending was associated as potentially unhygienic. A proposal to improve the DOS referred to the identification of clothes so that without owning the clothes the option of using clothes for a longer time period would exist.

The Interpretation of the Dynamic Group

For the Dynamic group the outsourcing option would be a very positive option, only when the factors "trust" and "good value for money" are guaranteed. In contrast to the Mainstream group the Dynamic group focused in their interpretation more on the aspect of clothing care and less on clothing and renting clothes. In this group the environmental advantage of summarised individual washing acts with the newest technology was mentioned as the most positive aspect of the DOS. Additionally the group found the enrichment of services like repair, recycling and disposal very attractive.

Potential barriers for this group are the costs. They interpreted services as something "in addition", making the offer more expansive. This interpretation is supported by the visual associations in the questionnaire (see one of the two used images in chapter 3.2.2.1). Here the depicted people were described as typical members of higher income groups and nobody described the person as a "housewife" (like members of the mainstream group).

Partly negative associations also emerged: some services are paid for while one could do this for oneself. If one can afford it, one does not have to do it anymore: services as luxury. In a related interpretation services meant: one is not able anymore to do it for oneself. This was reflected in the statement: "the older one gets, the more services one needs, but the less money one have".

Besides costs the "trust" aspect was seen as the other barrier. While the Mainstream group associated clothing care with burden, for the (older and mostly female) Dynamic group clothing care was positively framed. On the one hand this is caused by the positively charged role of the "family provider" in doing the clothing care for the family. On the other hand clothing care was connected with health and environmental behaviour. So to guarantee specific standards is a necessary requirement before this group will outsource clothing care activities. To improve the DOS it was strongly recommended to introduce some transparency of the laundry process quality. This could be done by independent examinations. Though the basic feeling was sceptical: "there will always be a black sheep, controlling doesn't mean enforcement and there's no absolute security". When asked about the most fitting adopter group the Dynamic participants tended to associate this DOS mostly with younger people. This can be seen as a support for the critical assessment of the DOS. On the other hand when asked about the fit between their own group with the DOS the answers were the most

heterogeneous (the answers ranged from "perfectly" to "not at all". This leads to an interpretation, that besides the general improvements the DOS might have an acceptance potential in the group of elder people. But one should not target this group as a homogeneous group and one should look further for specific subgroups.

3.3.3.2 DOS "My Clothes, My Friends"

This DOS was rated as the most negative one. Overall as a reason for this evaluation was mentioned the close relationship with clothes and the reduction of clothing consumption.

The Interpretation of the Green Group

The Green consumers could detect some positive details. They mentioned the increased quality of clothes, the regional, environmentally sound production and the resource reduction. Also the participation in the production process was seen as attractive. Though some positive details could not change the overall impression of evaluating this DOS as unrealistic and not desirable.

Negatively the aspect of a reduced clothing consumption was interpreted as a compulsory measure blocking a desired diversity and variety. A softening of this reduction was mentioned as a vital improvement of the DOS. Also the close relationship with clothes was seen as very negative and implausible. A very strong interpretive scheme emerged in the discussion. Human relations were identified with "positive" and "healthy" attributes, while the relation with objects represented the opposite, using terms like "negative" and "pathological". In this scheme "clothes as friend" could only mean a substitute for missing human relations. This was also reflected in the projection that this DOS could only be attractive for younger and older singles. The same interpretive scheme was applied (and enlarged) in the case of clothing care activities. Here the logic of the "zero sum game" was relevant. More time for clothing care activities necessarily means for this group less time for human relationships. Though in the discussion the participants could identify own experiences with "favourite pieces of clothes", meaning a strong relation with these objects. But this was interpreted as an exception of the rule, and perhaps more important with younger people, more interested in fashion. For themselves they preferred to see clothes also reflecting a changing personality. Insofar the idea of a prolonged use of clothes was partly problematical. The described options to vary the basic suits were not enough perceived or interpreted as not sufficient. The continuous change in clothes was also supported with the societal norms that relate a reduced set of clothes with

individual carelessness and thoughtlessness. While in the end this DOS does not seem to be an attractive DOS, it is interesting to see that the participants assessed the DOS not as an abstract idea but in relation to their own lifestyle. In the questionnaire they associated the DOS with different lifestyle groups and mentioned mostly positive associations in connection with depicted persons living this DOS. A likely interpretation can be phrased as "I don't like it personally but I can imagine people liking it."

The Interpretation of the Mainstream Group

Similar to the Green consumers the Mainstream group mentioned the environmental quality of clothes and natural fabrics as positive aspects. Though a negative impression was overwhelming. Here the problematic relationship with clothes was also mentioned, but only as a minor aspect. The criticism was focused on the reduced clothing consumption. Interestingly this comprised the shopping / buying act as well as the use of clothes. For this group the act of buying clothes (screening, trying on new clothes, deciding) often together with friends is an important leisure activity. So less clothing consumption meant less variety and more monotony. Associations led also to terms like "conformity" and "uniform". Some participants felt reminded of their army service.

For the group variety, change and diversion was related to fashion. They used consciously fashion as a medium for expressing their identity and individuality. A certain set of clothes is therefore a prerequisite. On the other hand fashion was also criticised. Fashion together with advertising was mentioned as a very strong societal force, working against this DOS. If this force gets too strong this was felt as social pressure. To judge a person according to her/his clothes was explicitly condemned. In this case an interesting change in the evaluation of a clothing variety occurred. Some participants mentioned the daily decisions about what clothes to wear as a burden. A slight, socially accepted reduction could therefore potentially ease this situation.

Like the Green group the questionnaire answers showed a different assessment between the DOS itself and their own personal lifestyle relation. Here they mentioned overwhelmingly white-collar persons (mainly as singles) that could live in this DOS in a positive way.

3.3.3.3 DOS "Collective Clothing Care"

The DOS "Collective Clothing Care" was rated moderately. Here the answers given were rather mixed, even in relatively homogeneous groups. Another tendency was to rate the DOS as attractive not for themselves but for other target groups.

The Interpretation of the Dynamic Group

The Dynamic group highlighted the social and communicative aspect as a very positive feature. This was confronted with a postulated tendency in our society towards loneliness and isolation, especially for elder people. Explicitly the participants saw a connection between a collective clothing care and getting to know each other better, re-building a social fabric starting on a neighbourhood level. The combination of saving money and at the same time doing something for the environment was another positive aspect mentioned by the group. As the predominant barrier to accept the DOS the loss of individually owned clothes was criticised. Sometimes this aspect was combined with the fear of possible constraints for individual behaviour. Also there were hygiene concerns in regard of collective washing.

When asked for the possible adopters the group assumed the DOS to be attractive for younger people or families with younger children. The group thought collective thinking would be less prevalent with elder people. In their view the propensity to act together with other people would be decreasing with growing up, perhaps gaining a bit strength again when getting old. Though this was said to be born out of necessity, because old people would be more dependent on other people. It is interesting to see that the Dynamic group did not have any of the traditional prejudices with the collective and sharing way of living (like "leftist drop-outs"). They associated the people living in this DOS more as members of the new economy who do not confirm the traditional 9-to-5 office job image.

Asked for personal connections to some of the DOS's aspects, the participants could nevertheless relate to these aspects. Among other things there were experiences with shared washing rooms, which in principle were evaluated as positive. Only the effort to co-ordinate the shared use was seen as negative. On the other hand there were negative experiences with shared and public washing, like experiencing social pressure (what was washed, how and when). Also the group saw in general their own washing behaviour as inferior from an environmental point of view compared with the collective washing. One of the reasons mentioned referred to old habits (if for instance the old family washing cycles are still in effect, though children have left the house and some washing will be done with only half filled washing machines). Insofar the participants could see at least a positive option in a well organised, shared washing facilities in the neighbourhood.

The Interpretation of the Green Group

The evaluation of the DOS by the Green group was less ambiguous than that of the Dynamic group. The group perceived the DOS as a straightforward negative solution. The criticism was focused mainly on its unlikely realisation and the difficult organisation. While for the group

the social aspect was positive, they preferred to call their position on it: "co-operation yes, but only to a certain degree". The main environmental advantage was not seen in the collective washing but in the prolonged life cycle of textiles by recycling, modifying and repair. The rejection of this DOS is also reflected in the rather low values for assumed groups that might fit to the DOS. Only families with younger children were seen as a suitable adopter group. This supports the interpretation that the Collective Clothing Care DOS might be seen as an option for smaller groups of families, where one knows each other, the sharing is self-chosen and kept within manageable limits.

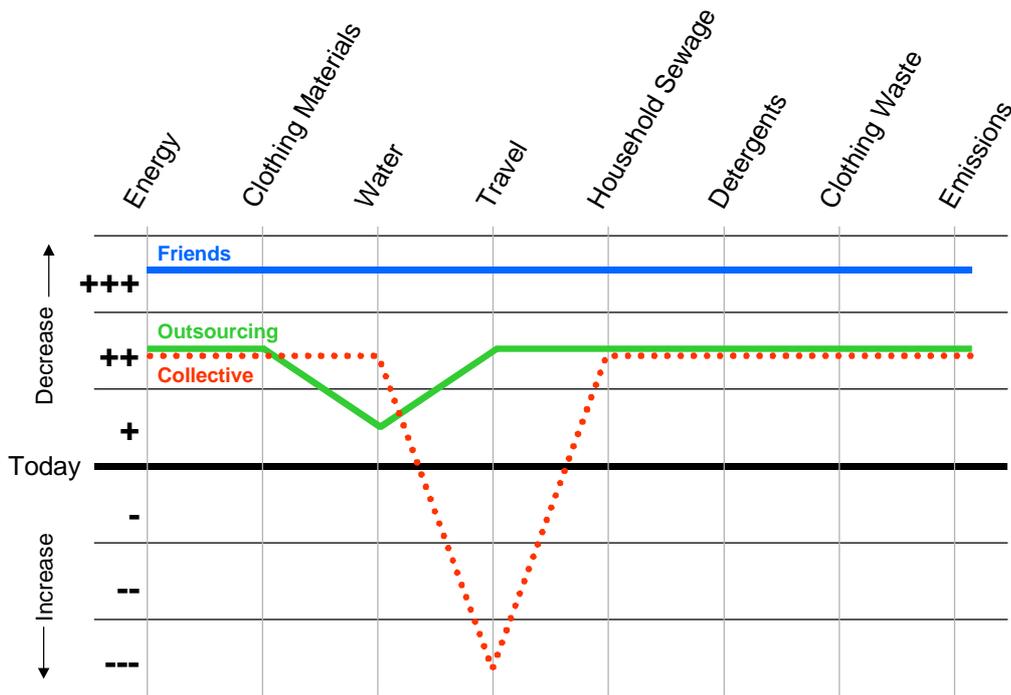
Based on the high priority of privacy in this group the critical statements were mostly centred on assumed restrictions based on group pressure. Also the clothing pool was not accepted. Clothing per se was not a focal point in their everyday life and functional aspects were far more important than fashion. Nevertheless the group used clothing also in its role for the perceived and articulated individuality. Therefore shared ownership was interpreted as deficient in this context. Over and above that the group assumed that preferred clothes would not always be available at the time they would need it. For this group the attractiveness of the DOS would be highly increased by reducing the component "clothing pool". Like the Dynamic group the Green group added some hygiene concerns in regard of shared washing.

By and large the Green group evaluated the DOS "Collective Clothing Care" as an exaggeration of clothing care. In their view too much time would be spent for clothing care. Also the trend towards individualism would speak against its realisation. At the end it turned out, that the group related to this trend with mixed emotions. As an ideal, they did like the idea of co-operation, but with some regret they could see this ideal in reality only in exceptional situations, like Germany after the war or today in poor countries.

3.3.4 Synopsis of the Assessment Results

In the *Environmental Assessment* all DOSs showed a considerable improvement in comparison with the actual situation. The largest consequences were detected in the "My Clothes, My Friends" DOS. This was due to the strong reduction in clothing consumption with a subsequent impact on all of the selected indicators. The advantages of the "Outsourcing" DOS were mainly due to technological changes, e. g. the substitution of individual washing technology by efficient industrial Clothing Care systems. A main uncertainty of this DOS assessment is the logistics system. The behavioural changes were primarily responsible for the environmental advantages of the "Collective Clothing Care" DOS. Though here additional transports have to be considered to the neighbourhood centres.

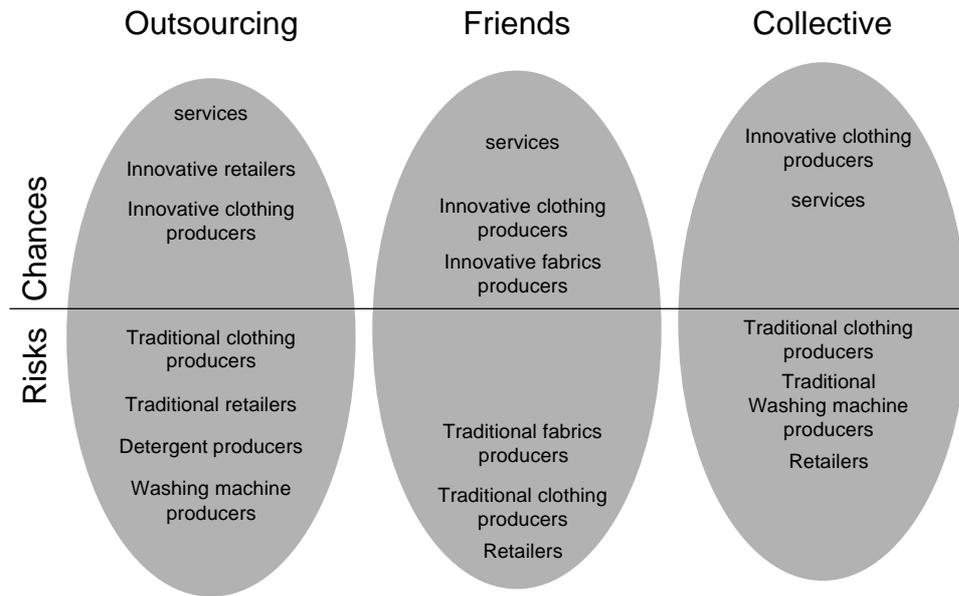
Figure 9: Overview of the Environmental Assessment



Legend: +/- decrease / increase up to 33%
 ++/-- decrease / increase up to 66%
 +++/-- decrease / increase up to 100%

The *Economic Analysis* led to the positive result that each DOS has new advantages for certain marketers. Though the degree of required market changes is quite varied. The "Collective Clothing Care" DOS will have the least changes in the market structure. Here the chances are primarily related to an attractive niche for high quality clothing producers. The "Outsourcing" DOS requires the change from a business-to-consumer model to a business-to-business model for clothing, washing machines, and detergent producers with a new market potential especially for the service companies. The "My Clothes, My Friends" DOS will change the market more radical by reducing the clothing consumption. Chances are especially related to the high involvement of the consumers for clothes and clothing care appliances.

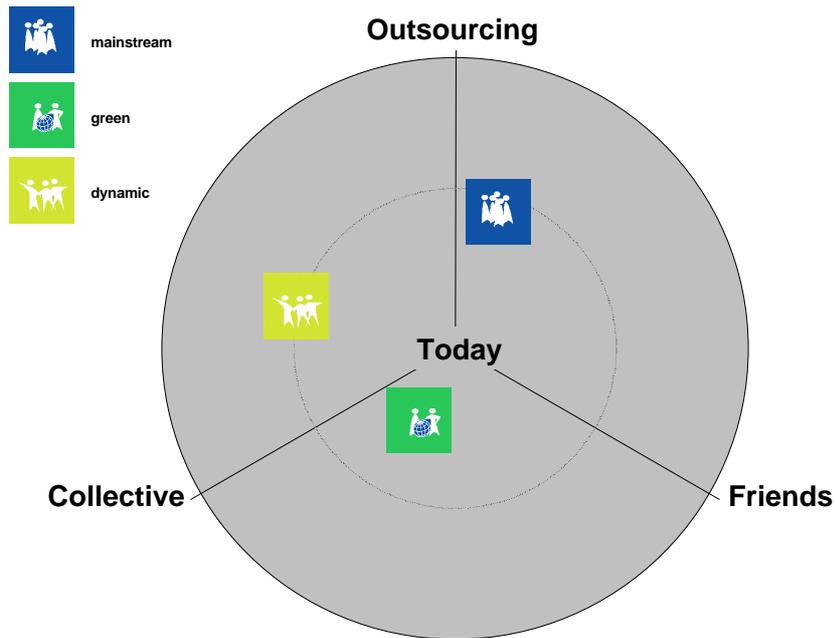
Figure 10: Overview of the Economic Analysis



On a global scale, in the *consumer assessment* the "Outsourcing" DOS was rated as the most positive one. The "Collective Clothing Care" DOS showed moderate and mixed results, while the "My Clothes, My Friends" was rated as the least favourable one. Especially the positive rating of the "Outsourcing" DOS by the Mainstream group is important, as this acceptance indicates a realisation potential for a broader market, not restricted to some adopter niches. The outsourcing is positively seen as in line with current developments towards a service society and therefore as most likely to happen. This likelihood was the main barrier for a positive assessment of the "Collective Clothing Care" DOS. While there was a preference for more societal values (especially with older people), there was a concern about the possible organisation. The least rated DOS "My Clothes, My Friends" suffered by a strong rejection of a reduced clothing consumption and the perceived over-identification with clothes.

The following overview depicts the preferences for the respective groups as a spatial position. The closer the groups are positioned to the rated situations, the higher are their preferences. All three groups shared the current situation ("Today"), here depicted as the center of the circle. They varied in their assessments of the DOSs, as each group assessed only two DOSs and not all of the three. So the group assessments are bound to the respective third of the circle.

Figure 11: Overview of the Consumer Assessment



3.3.5 Comparisons with Results in other Participating Countries

The cross-country comparison is only in parts possible as there are differences in the DOS interpretation and elaboration. First, there were differences in the system delineation (while some DOSs covered all functional activities others were rather restricted on the cleaning aspect). Second, the DOSs differed in their concrete elaboration (e. g. the Dutch "My Clothes, My Eternal Friends" DOS added with a clothing pool elements from the "Collective Clothing Care" DOS, and the Dutch "Outsourcing" DOS integrated disposable underwear in the tested DOS). Third, not all DOSs were shared (Italy developed also other DOSs only for the Italian situation and the Netherlands tested also a specific DOS combination). The Italians also combined the Dynamic and Green group.¹⁷

The following table gives an overview of the tested DOSs and the respective consumer groups in the participating countries:

¹⁷ For a cross-cultural analysis of the Consumer Acceptance results in all functions see Bode, 2000b.

Table 9: The Consumer Acceptance Research Design in Germany, the Netherlands, and Italy

	Germany	Italy	The Netherlands
My Clothes My Eternal Friends	mainstream green		dynamic green
Clothing Care Outsourcing	mainstream dynamic	mainstream	mainstream dynamic
Collective Clothing Care	dynamic green	dynamic/green	mainstream green

One interesting aspect here is the comparison between the Dutch and German Economic Analysis of the shared "My Clothes, My Eternal Friends" DOS. To a great amount the assessment was similar. Though in one aspect they showed divergences. While in the German DOS the production of clothes is significantly reduced, the Dutch researchers had a different assessment. They assumed that the clothes production sector would not change significantly in size. This was reasoned with a decrease in the production quantity that is compensated by higher labour intensity and higher added value.

The "My Clothes, My Eternal Friends" DOS was rated as the least attractive one in Germany and rather low by the Dutch Dynamic consumers. Though the Dutch Green consumers could appreciate this DOS. The German consumers rejected especially the idea of strong bonds with clothing. They saw it as substitute for real, human relationships. Though it has to be mentioned, that the DOS had a different elaboration in the countries. The identification with clothes was less emphasised in the Netherlands. The Dutch DOS differed also in the enrichment by service elements from the German equivalent.

The idea of living in the "Oursourcing" DOS was accepted in all of the participating countries in a quite positive way. The outsourcing was positively related to the current trend towards a service society. As the main problem the substitution of shopping by renting was mentioned in each country. Some consumers could see the chances of having more variety with leased or rented clothes, while others valued more individually bought and owned clothes. Especially for the Italian consumers this would imply a drastic cultural change. It seems that in general consumers who use clothes as a way to express themselves showed more reservation towards renting clothes than others.

The "Collective Clothing Care" DOS was rated rather low, though even in homogeneous groups the answers given were mixed. The Dutch Green consumers were an exception who were much in favour of this DOS. It seems that a positive acceptance is likely to be related not to a general green motivation but to personal experiences with community solutions and social activities. Though the characteristics of the Dutch DOS version has also to be taken

into account. Here the DOS focused only on kids clothing. Unambiguously the consumers appreciated the social and communicative character in this DOS. The main reason for the rejection of the DOS was the shared feeling that a community solution would be unrealistic. With some regret social values were seen generally in decline. Also the technical and organisational feasibility was questioned. In all countries the consumers mentioned some hygiene anxiety with shared washing.

3.4 The Improvement of the Investigated DOSs

In the final Strategy Workshop the goal was to reflect on the DOSs in regards of implementation options. This comprised the discussion of the several assessments and the impact on the DOSs. In the following chapter these recommendations from different stakeholders supplemented by the assessment results are summarised.

While the stakeholders could identify with the core ideas of the DOSs, they changed some surrounding ideas. The tendency of modification can be seen as reversing the development by the Project Researcher. While the Project Researchers concentrated on making the DOS more coherent internally and distinct in regard to the other DOSs, the stakeholders tried to soften some of the basic assumptions and to incorporate some ideas of the other DOSs. The participants regarded this modification as "making it more realistic" and as an increase of the adaptation chances (e. g. not all of the clothing care activities were transferred out of the household or the strong reduction of clothes owning was softened).

3.4.1 DOS "Clothing Care Outsourcing"

The main problems with the "Outsourcing" DOS concern the systemic and the socio-psychological framing.

The question about *systemic framing* is based on the thought that this scenario is only hardly imaginable and realisable as an island solution. It needs a networking on different tiers. In a comprehensive frame, this relates first to the city structure that determines the potentials of shared solutions as an external frame. In a second step however the external frame also could become changeable, if the criterion "social cohesion" plays a more important role in the urban infrastructure planning. In a narrower frame, the systemic framing also touches the ecological consequences of the scenario. The logistic questions are in particular relevant; as a shared clothing care can lead to a rise of transports. In addition to the rather long term planning component, an important requirement for the improved scenario is the connectiveness to available transport structures. Also The idea of systemic framing is also related to the

conception of the scenario as an emerging, constantly developing one. The networks and links can not be realised by one, big central plan. Rather, it needs a dynamic process with which initial projects attain an elementary importance in the sense of a "crystallisation heart" here.

This evolution interpretation is closely related to the second central problem of *socio-psychological framing*. Unlike an efficiency strategy with which primarily technological modifications should increase the sustainability, this scenario is based on the sufficiency strategy. In this case, the basic idea consists of a modified social behaviour. Now the consumer assessments resulted in a rather reserved appraisal to the social values presented here. Often there was a contradiction between a positively interpreted intensification of social values, but a sceptical and critical stance towards the likeliness and feasibility of communal forms of organisation. Here a conclusion like "the time might not (still) be ripe for such scenario" might be too shortsighted. Rather, transformation processes within the framework of values and attitude in a society are complex processes. So a scenario "with each other" needs a certain value resonance within the society. At the same time it has also a value impact on the society. This means that the realisation of the scenario does not need to wait for a different value structure but is in itself one component of such modification processes. Concurrent social mechanisms are necessary beyond, that consider that people are indeed social, however not perfect, altruistic beings. Incentive systems which can positively support change and which increase social integration were addressed therefore. Also at least equally important are instruments for handling conflicts. They are necessary for the establishment and lasting mode of operation for exemplary projects.

Based on these central problems the following *modification* of the DOS were recommended by the experts:

- Mitigation of the nuclear idea, in particular in the implementation phase as an additional offer and not as a substitute.
- Hybrid type of owned and shared clothing.

This led to the following *action recommendations*:

- Promotion for social values and individual predisposition to communal solutions
- Development of pilot projects
- Incorporating instruments and mechanisms for conflict solution and integration
- Integration of the offers towards an attractive Service and Function Mix
- Guarantee of technical support for scenario organisation and administration

With more concrete action recommendations the socio-psychological framing received the highest priority. This makes sense, as the systemic framing represents a cross-section requirement, targeted on all actors, from the abstract first planning up to the more concrete technical arrangements. Within the framework of the socio-psychological framing - in addition to the mentioned instruments for integration and conflict solution - actors were addressed with action requests, that have a starting point in the scenario "Outsourcing", however going far beyond in their consequence. It may be obvious that social value changes can not be defined project-specifically. However, one might consider that concrete action always requires localisable reference points. Otherwise, the danger of platitudes exists with broadest acceptance and least impact. This is reflected in the accentuation of pilot projects for further work on the scenario "with each other". In the end also the question has to be posed, to what extent an action recommendation of promoting social values has not only to be localised, but also to be formulated in a group-related way. Here, it is not only important to find a target-group specific form of communication. One is equally required to investigate thoroughly, how communal values are interpreted and experienced in different groups.

3.4.2 DOS "My Clothes, My Best Friends"

A tendency shift might be a worthwhile improvement, like it was proposed very early in the Strategy Workshop. Here the group opted for a title change from "clothing as friends" to "clothing as second skin". This means that the core idea of use intensification is still dominant. But the emotional relationship level between clothing and consumers is interpreted as neither logically necessary nor positive for the realisation of the scenario. So as a basic tendency an intensified relation could be proposed, but interpreted in a new way on the offer and the psychological side.

The *relationship intensification on the offer side* includes the tendency of an individuation of relationships from the scenario between clothing and consumers. However, this is defined more via processes by the producer and product modifications. The customers should receive clothes that are optimally adapted to the consumer. Via an industrial measure production individualised products are offered which are seen as an optimised second skin. In this way, a link with actual trends occurs as they manifest themselves in relationship marketing and "one-to-one" marketing, as they are already partly practised in the industry.

The *psychological relationship intensification* receives a different emphasis. In the DOS "My Clothes, My Friends " the use intensification was intended in such a way, that the consumers

build up a relationship to the garment. Here one can argue that this might only be possible as an exception, might be refused by many consumers and that in this scenario clothing would play a too strong part in everyday life. An alternative is seen in linking the core idea of the scenario to experiential and event trends. In this case, an increased event character is given to the entire process of clothing consumption.

So for instance the integration of the consumer into the production process with "open-door plants" (consumers can be actively or passively integrated in the production process) or "optical laser measuring cabins" (consumers are measured to get individualised clothes) should be marketed more strongly as a value in itself, to increase the clothing consumption attractiveness.

Based on these central problems the following *modification* of the DOS were recommended by the experts:

- The scenario is less characterised by emotionalising the object relationship but rather by the event character of the clothing purchase and the clothing care.
- The market changes of the scenario become less combined with an offer reduction, but rather with the aim of a sustainable mass production.
- The scenario is a substitute but should be conceptualised as an additional offer. The scenario should focus first on specific clothing types such as business clothing or evening wardrobes
- The combination of clothing and clothing care must be considered more strongly, e. g. with service contracts for repairs, interrelated washing technologies and new, soft repair technologies like liquid-cotton.

This led to the following *action recommendations*:

- Guarantee of a midrange price for the individualised products
- Create more acceptance for sustainable high-quality products
- Progress in the production - and consumption related clothing technology
- Supporting means for the customer contacts (like a guarantee of a high quality customer support and consultation)

The necessary means for relationship intensification addressed above focus on two closely related core issues. The recommendations first aim at the *consumer side* in sense of an acceptance promotion. It was said to manage create primarily a new price and high-quality consciousness through communicative measures. In this case, information politics is imbedded into value dissemination. Here all actors, from politics/administration via research, media, associations up to industry and retailing are addressed. This value modification is to be interpreted similarly as in the above-described scenario "with each other". However, the

targeted acceptance increase is directed equally strongly towards a modified *offer structure*. In this case, the realisation of a comprehensively individualised and sustainable mass production is striven for. In addition to the criterion of sustainability, cost reduction is a further success criterion. Even a successful information and value campaign is no realisation guarantee if the scenario can only offer high-price products. Insofar the technical prerequisites have to be met, in manufacturing, measurement technology and interface technologies, in particular to improve the data flow between consumers and production.

The different action recommendations shared in a processual way the demand for a more intense co-operation of the actors, especially for fibre producers, clothing producers and retailers. With regard to the content the emphases on the closer co-operations were on technological modification of the production process and supporting measures for the customer contact (e. g. through an improved qualification of the sale personnel). In this case, the role of the washing machine and detergent manufacturers was estimated as lesser relevant.

3.4.3 DOS "Collective Clothing Care"

The central problems for the "Collective Clothing Care" DOS are the psychological and the technological barrier.

The *psychological barrier* of the scenario "Outsourcing" is first based on the outsourcing of all clothing care activities. Included is the storage of clothes, therefore leading to the clothes-for-rent model. Based on the consumer assessment the "loss of ownership model of clothing consumption" is not very likely. With such an offer, the psychological disadvantages would dominate the consumers' perception. One of them would be especially the loss of a longer-term use for preferred garments close to the consumers' identity. A flexible, graded offer structure for the scenario was in this respect recommended. Moreover, a personalisation like individual laundry bags should be carried out and the option of a longer-term use of leased and/or rented garments should be included. In this case, the optional offer of rented clothing can also have the longer-term impact, to anchor the advantages of renting - as greater selection with simultaneous saving of expenses - more strongly in the perception of the consumers by trials and first experiences. A further psychological barrier can be seen in latent fears concerning hygienic shortcomings of a laundry service cleaning. Here one can propose different measures of confidence formation like independent hygiene checks or guarantee contracts from the service providers.

The *technological barriers* are primarily the not yet currently available industrial washing technology for private clothing. For this, a more intense co-operation between clothing producers and washing service providers is necessary. Developments to support can be seen in a changed clothing production reducing the necessity of different washing processes and in an individualised cleaning on industrial basis through an information technological co-ordination between washing machines and garments (e. g. electronic labelling). In the case of recommendations for the washing technology one has also to consider the graded outsourcing of clothing care activities. Instead of a concentration on industrial washing processes, the further development of the private washing technology has to be included as well. It depends on the market acceptance, to what extent the technologies will have rather an alternative or complementary character (industrial washing: focus on comprehensive cleaning and private washing: small cleaning activities). In addition to washing technology another technological barrier was seen in the question of service logistics. Here network solutions are to be preferred that require a more narrow co-operation and intense use of new information and communication technologies.

Based on these central problems the following *modification* of the DOS were recommended by the experts:

- Mix of owned and rented clothing
- There is no absolute outsourcing of clothing care activities. Therefore, washing technology and storage furnishings are still in the private household.
- To increase the acceptance a flexible offer structure is preferred, that also includes as cleaning objects bed linen or carpets.

This led to the following *action recommendations*:

- Creation of a legal frame which does not hinder the start-up of new service concepts but supports it.
- Development of a marketable service bundle at an acceptable price
- Work on the services image problem (both on customers- and employee side)
- Co-operative work on adequate washing technologies

In the stakeholder group, the technological barriers had a rather subordinate role to play. The research situation was estimated rather optimistically. Not the question "whether such technologies can be developed" was foregrounded but the question about the "when" and "how". Here the stakeholders assumed that a main prerequisite would be the co-ordinated co-operation in the R&D field of fibre producers, clothing producers, as well as washing machine

and detergent producers. Only via an adjustment of washing process and clothing, the technological problems can be solved in close future.

More strongly the concrete problems of the market penetration of washing services were discussed. The action recommendations focused on current obstacles of the German market. Especially the legal frame is seen as very restricting and obstructing in the development of new service concepts. Also German consumers are seen as very hesitant in accepting new services. The psychological barriers addressed above were concretised here. First criteria for an optimal service bundle were discussed on the offer side. In addition to the personalisation of the offer (tailored to the needs of different consumer groups) the main aspects were the perception of the price-quality ratio. Services are defined by the integration of the external factor, the consumer. As a result, standardisation and mechanisation is rather difficult for services. Furthermore, service quality is strongly dependent on the consumer itself. In the action recommendations therefore it was highlighted, that consumers would lack a consciousness for these special features, complicating the appropriate price and service perception. This position was combined with recommendations for the improvement in the public image of services. Consumers are not only addressed here at least separate equally strong employee in the service sector, a problem not only related to Consumer Acceptance but also to get qualified employees in the traditional service sector. The image of "Mc Jobs" is still prevalent.

4 Strategies towards Shelter for a Sustainable Living

4.1 The Un-Sustainable Present as the Starting Point

The current situation for Shelter in Germany is dominated by two developments which are both related to the legal framework of the function: first, the liberalisation of the national energy market starting with the *Energiewirtschaftsrecht* (Energy Business Act) coming into force on the 29th of April in 1998 and second, the introduction of an energy tax in 1999.

The liberalisation was followed by fundamental changes for the supply side actors and step by step also for the demand side, primarily for business customers, but – starting from summer/autumn 1999 – also for private households. While the liberalisation resulted in price reductions the energy tax on electricity, gas, and heating oil almost ruled out this effect for the private consumers.

The situation of the Shelter function in German households shows the following main features: Currently, households are the most important final energy consumption sector in Germany (BMW_i, 1999, p. 24). 82% of the gross electricity production in Germany in 1998 was provided by nuclear power and both hard and brown coal. In comparison to 1997 wind energy had enlarged its share by 36%, but still generated only 1% of the total gross electricity production in 1998. Hydroelectric power plants contribute with 4% of the national gross electricity production the biggest share among the regenerative energy sources (BMW_i, 1999, p. 11).

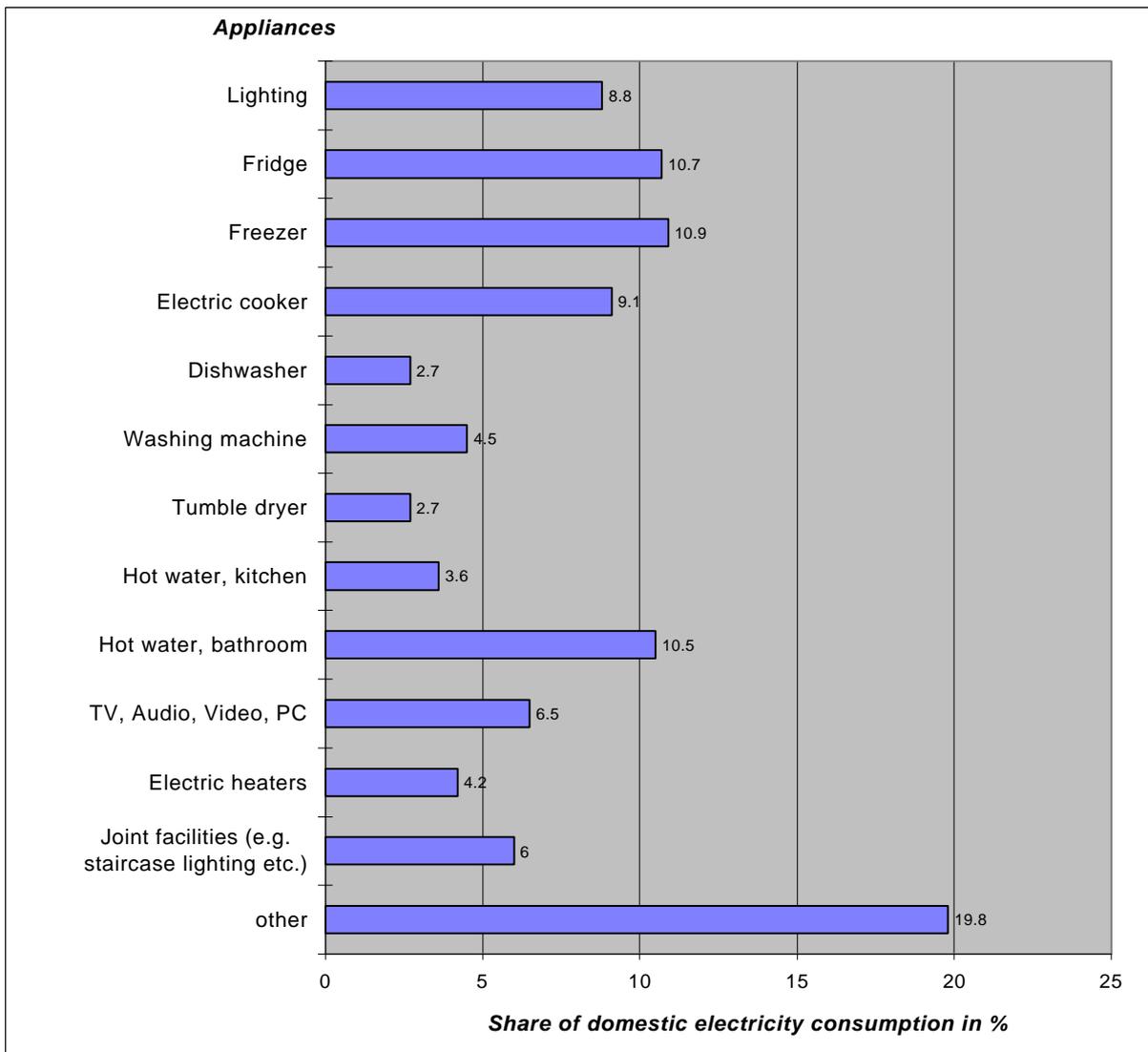
Within the households the biggest share of the final energy consumed¹⁸ is used for heating, i. e. 75.8%. On average, in Germany annually 240 kWh of heating energy are consumed per square metre. Being 170 kWh/ m²a above the average of a low energy house of current standard this reveals a considerable potential for refurbishment. Fossil energy carriers for heating like fuel oil and coal are still very widespread. The latter, for instance, is with a share of almost 40 % still the final energy carrier number one for heating in the East of Germany (Statistisches Bundesamt, 1997). Cooling the dwelling – e. g. by air-conditioning – plays a minor role due to the climatic conditions in Germany. With improving insulation and air tightness of buildings like in low and passive houses, however, airing technology and thus energy consumption for airing is seen to become more important in the future.

From the quantitative point of view lighting is far less important than heating: In Germany it takes only 1.7% of the final energy consumed in private households. However, as mentionend

¹⁸ Without energy used by the households for transport.

above energy for lighting is used very inefficiently: Merely 6% are converted into light (Umweltbundesamt, 1997). A comparison of the electricity consumption in the household according to appliances and consumption sectors shows lighting on a mid-position as indicates.

Figure 12: Domestic Electricity Consumption in Different Consumption Fields in 1996 (source: VDEW, 1997)¹⁹



An increase in the use of compact fluorescent lamps can be stated; however, inefficient incandescent bulbs are still very widespread.²⁰ Furthermore, energy saving bulbs need a

¹⁹ Homepage of the Vereinigung Deutscher Elektrizitätswerke (VDEW), 1997. Data is from 1996 and excludes weather dependent fields like electricity consumption for electric storage heaters and electric heat pumps which both came to 22387 million kWh in 1996.

²⁰ There was no statistical data available on the diffusion of energy saving bulbs in German households. The information here is based on an expert interview with a representative of the Vereinigung Deutscher Elektrizitätswerke (VDEW) on the 14th of January, 1999.

higher energy input in the production process which can only be regained by their long life expectancy. Cheap brands, however, often work only for a fifth of the time period of quality products (Stiftung Warentest, 1998). Another relevant aspect for the residential energy consumption for heating, cooling, and lighting is the size of the household and the residential space occupied or used per person. Statistically, in 1996 an average household in Germany consists of 2.2 persons occupying 85 m² of living space (Bundesbauministerium, 1997, p. 101).²¹ There is a strong trend towards smaller households (Statistisches Bundesamt, 1997). In the early nineties this development ruled out any positive energy saving effects by energy-efficient improvements (DIW, 1998). On average a person in Germany occupies 37.9 m² or 1.9 rooms. 1.22 million singles live in five or more rooms; among these the age group of the over 65-year-olds is of particular relevance (Bundesbauministerium, 1997).

Adding to these unsustainability spotted for the function Shelter in Germany the application of energy-efficient technology is often incorrect or not optimal, such as wrong airing behaviour or non-economising thermostat setting (Eicke-Hennig, 1998). The residents' behaviour in identical dwellings can result in a difference in energy consumption for heating up to a factor between three and nine (Fraunhofer Institut für Systemtechnik und Innovationsforschung et al., 1997, and Eicke-Hennig, 1998).

The experts and stakeholders who were interviewed and involved in the Creativity Workshop (see chapter 4.2.1) evaluated the following aspects of the current Shelter situation as core problems and barriers for a sustainable development in this field (Pfeiffer, 2000b, p. 27):

- There is a user investor dilemma: The person who would have to invest in energy-efficient modernisation often does not have any (financial) advantage from the investment (e. g. in rented dwellings). Compared to other industrialised nations the number of owner-occupiers is - historically determined - fairly low in Germany: Whereas Spain has the highest share of people living in their own dwelling (85%) in Germany there are only 40% of owner-occupiers which is the second lowest rate in Western Europe and North America (Institut der deutschen Wirtschaft, 1998). This situation makes this aspect especially important in Germany.
- The user do not have the knowledge about the correct application of the technology as it is too complex or badly described; there seems to be a crucial false estimation of the engineers about the effort and time which consumers are willing to spend for understanding and maintaining the appliances. Besides, the energy consumption rate is invisible to the consumer.
- Furthermore, the habits ("I always did it that way"), the consumption-orientation of the users (trend to more comfort) and too little motivation (e. g. less feeling of personal responsibility) are problematic.

²¹ Data based on the micro census.

- The actors have too little knowledge about energy-efficient and at the same time financially interesting technology. Thus, e. g. manual workers often recommend conventional appliances; further dissemination of energy-efficient devices is hindered.
- An over-all co-ordinating management during the construction and refurbishment process is often missing so that saving potentials are overseen and not put into reality.
- There is still a gap between technology design and user needs and preferences (too little innovation; rather sale- than need-oriented),. Systems with more automation easily get very complex and error-prone.
- Energy prices are too low so that in comparison with conventional technology investment in energy efficiency hardly pays off. They do not show the ecological truth (ecological damages are mostly not measurable).

4.2 The Development of Design Orienting Scenarios for a Sustainable Shelter

The development and test of normative scenarios for a sustainable future is one of the core aspects of the methodology of the *SusHouse* project.²² Their development was an iterative process in which stakeholders central to the very function were involved.

4.2.1 Stakeholder Workshops

In Germany before the Creativity Workshop a broad stakeholder list was set up with 183 entries comprising numerous actors that are currently involved in the area of the Shelter function in Germany and - in addition to that – of those who will play a major role in the future. Next, institutions and companies for a series of 29 expert interviews were chosen.²³ Between and after the workshops participants and stakeholders were informed about the project, its findings, and the next steps. With several stakeholders personal meetings were arranged in order to discuss aspects of the research more in depth.

The actual workshop organisation task consisted of three major steps:

First, a *test workshop* taking place in July 1998 with ten attendees (undergraduate students and postgraduates). The aim of this pre-workshop was to test and improve the workshop methodology.

The evaluation of the test workshop led to the following conclusions: The definition of the function proved to be broad enough. The workshop method was manageable as a whole; some specific (e. g. structuring) tools had to be modified though.

²² For more details see chapter 2.3.4.1.

Second, a *Creativity Workshop* in January 1999 with 17 representatives of various actor groups (energy producers and suppliers, designers and planners, equipment and material manufacturers, the construction industry, household members, and representatives from administration, the media, academia, and NGOs). The aim was to start a so-called backcasting process (see chapter 2.3.4.1.), i. e. to collect ideas for how to overcome the most important barriers to a sustainable Shelter and to formulate creative future stories depicting a sustainable setting in 2050.

The main output was a set of current unsustainabilities and their reasons, several clusters of ideas for possible future solutions, and four preliminary scenarios. Participants evaluated the workshop process as creative and inspiring; it resulted in interesting ideas which were further elaborated in the scenario task and then tested in the three assessment tasks.

Third, a *Strategy Workshop* in December 1999 with ten representatives of most of the stakeholder groups relevant for Shelter Germany and mostly from a high hierarchy level within the organisations and institutions they were representing. The aim was to continue the backcasting process started in Workshop I and thus to come to concrete strategic steps that have to be undertaken in order to move from the present unsustainable situations towards the tested design orienting scenarios (abbreviated DOSs),²⁴ based on that spin-off projects should be initiated. Besides, it was intended to set up contacts among stakeholder groups that usually do not meet.

The main outcomes of the workshop were improvements of the DOSs, a collection of current trends and projects that already show elements of the DOSs and could serve as starting-point for an implementation, and the identification of prerequisites, barriers, and relevant actors for the implementation. Concluding the break-out group sessions which made up the main part of the workshop, activities were recommended to the various stakeholder groups that could help to promote an implementation of the DOSs. In the plenary, each participant positioned him- or herself in a triangle of the DOSs showing his or her preferred future scenario for future co-operation. Last but not least, participants vividly made use of the opportunity to network. The workshop was evaluated positively by the stakeholders; the aim of formulating concrete strategies and of coming up with spin-off projects was undoubtedly too ambitious for a one-day-workshop though.

²³ For a list of the Shelter stakeholders involved in the expert interviews and the two workshops see the appendix B.2.

²⁴ For a description of the DOSs see chapter 4.2.2.

4.2.2 Shelter DOSs in View

The project team clustered the above mentioned ideas and preliminary scenarios from Workshop I and chose three DOSs for further elaboration which included the formulation of the DOSs' vision, concrete service and/ or product proposal(s), and essential features. These DOSs were assessed in the next phase of the project. The following table shows the Shelter DOSs examined in Germany, their core idea, and proposals. Besides, a cluster is named which was developed to compare the fundamental idea behind the DOSs in the different functions. This categorisation shows that the German Shelter DOSs cover a broad range of basic future options. The column on the right indicates in which of the other two countries that were involved in the Shelter function the DOS was studied simultaneously.

Table 10: Shelter DOSs examined in Germany

DOS Title	Core Idea	Proposal(s)	Studied also in
“Comfort Management Service” (briefly “Comfort”)	Full home management service provided by comfort companies using energy-efficient, intelligent technology	Comfort Service Company providing energy-efficient, intelligent home management technology	Italy, UK
“Edumation”	Education and information on Shelter for the private users by visualisation of personal energy consumption, consultation, and incentive programmes	Visualisation measures (chip-card, electronic energy meter, dwelling energy label) Energy centre (information, recommendations, incentives, i. e. prizes and discounts)	Italy
“Come Together”	Sharing facilities combined with a decentralised energy supply structure	Shared facilities (quarter rooms, flexible flats, neighbourhood office buildings, decentralised power stations, and device pools) Quarter centres (communal events, exchange of services)	–

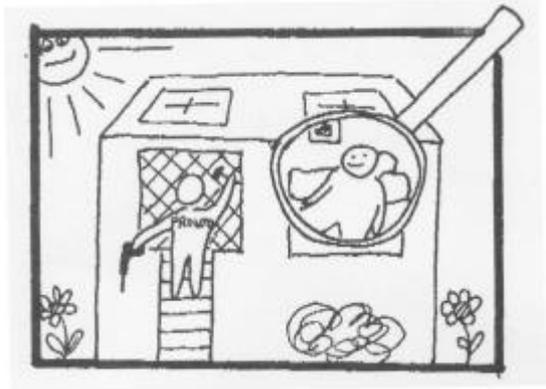
Subsequently, the three DOSs are described with regard to their vision, containing the core idea, and essential characteristics which show the future scenario more in depth.²⁵

²⁵ For a detailed overview of the Italian and British DOSs and the scenarios' storyboards see Pfeiffer (2000c).

4.2.2.1 DOS "Comfort Management Service"²⁶

Vision:

This scenario is characterised by a high level of comfort for the customer and a full home management service offered by private companies. Thus, the customers do not have to care about what is necessary for a sustainable shelter - they simply get it delivered.



Essentials:

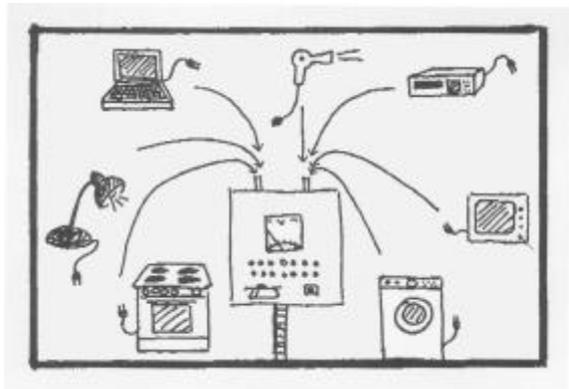
A comfort management company provides the household with highly energy-efficient and easy to handle heating, cooling, and lighting services not just with gas and electricity. According to seasons, to laws, and to personal requirements, the dwelling is modified in order to reach a set of energy parameters in a flexible and efficient way. An automatic control system compares the client's "comfort order" to the actual data performed by the appliances that were delivered. Any faults are reported automatically to the comfort management provider and are immediately fixed by a 24-hour-service.

The comfort manager assesses the payback time of any intervention; it designs for the customer a strategy to keep the home comfortable and efficient. Low income households get support for the subscription fee by social sponsoring and from public funds.

4.2.2.2 DOS "Edumation"

Vision:

This scenario is characterised by information and motivation programmes: An energy meter and possibly additional displays on the technical devices make energy consumption transparent and



²⁶ The images in this and the following sections are by Christian Wilke. They were used as visual stimuli in the focus group discussions.

visible to the private user. The amount of energy required in the household is bought via a smart card system, thus increasing further the awareness of the user for his personal energy consumption rate. There is a low rate of automation, i. e. offering easy-to-use devices combined with a high degree of personal freedom for the residents. A personal consultation system is installed to improve further the personal energy saving behaviour.

In general, the need for energy in private households has been dropped by the wide-spread use of passive or low energy house technology. This was reached by enhancing motivation of house owners to invest in the energy performance of their real estates. Performance parameters are independently controlled and certified with an energy label for the dwelling. The level of the energy price has been risen considerably (mainly by fiscal measures).

Essentials:

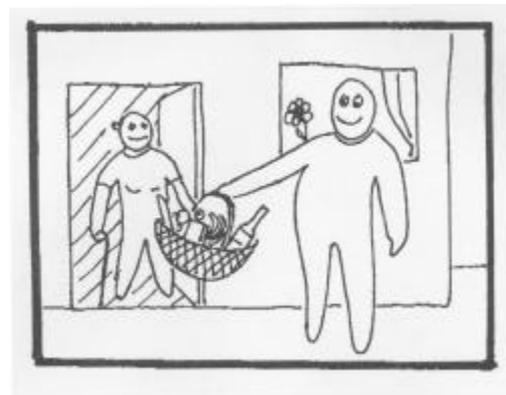
Each private household owns a pay-before-use chip-card that allows buying energy at special offer prices. At home the chip-card is put in an electronic energy meter. This meter can be fed with the information on the dwelling by an energy service company of the client's choice. Visually, the meter than shows how much energy is used by which devices and where energy is wasted.

By this system, the customer avoids a high energy bill once a year; he or she rather gets the possibility to react and save energy where necessary and possible. If wanted, the data is also sent to an information centre of the chosen energy supplier from where the customer gets discounts for a good saving performance or recommendations for improvements.

4.2.2.3 DOS "Come Together"

Vision:

In this scenario various forms of communal living as well as quarter pools for office devices, tools, and a whole variety of services and events have been established. As well the energy supply structure has been decentralised. Partnership and sharing are highly valued.



Essentials:

The joint facilities are designed to be attractive for a wide range of lifestyle groups: e. g. for elderly people, for business couples, for young families, for single households etc. The quarter rooms, neighbourhood offices, and device pools are supervised by headmasters whose wages as well as the equipment are paid by the companies that produce and/ or deliver the interior and - in case of quarter offices - by the employers of the residents working there.

Privately run quarter centres organise a lot of events in the neighbourhood by which personal contacts, identification with the quarter and thus a sense of responsibility are enhanced. As well they support the exchange between quarter residents as improvement of the LET system developed in the last century. The at home feeling is widened from the private dwelling to the quarter which is also possible by a high security standard. A side-product of this is the reduction of leisure mobility.

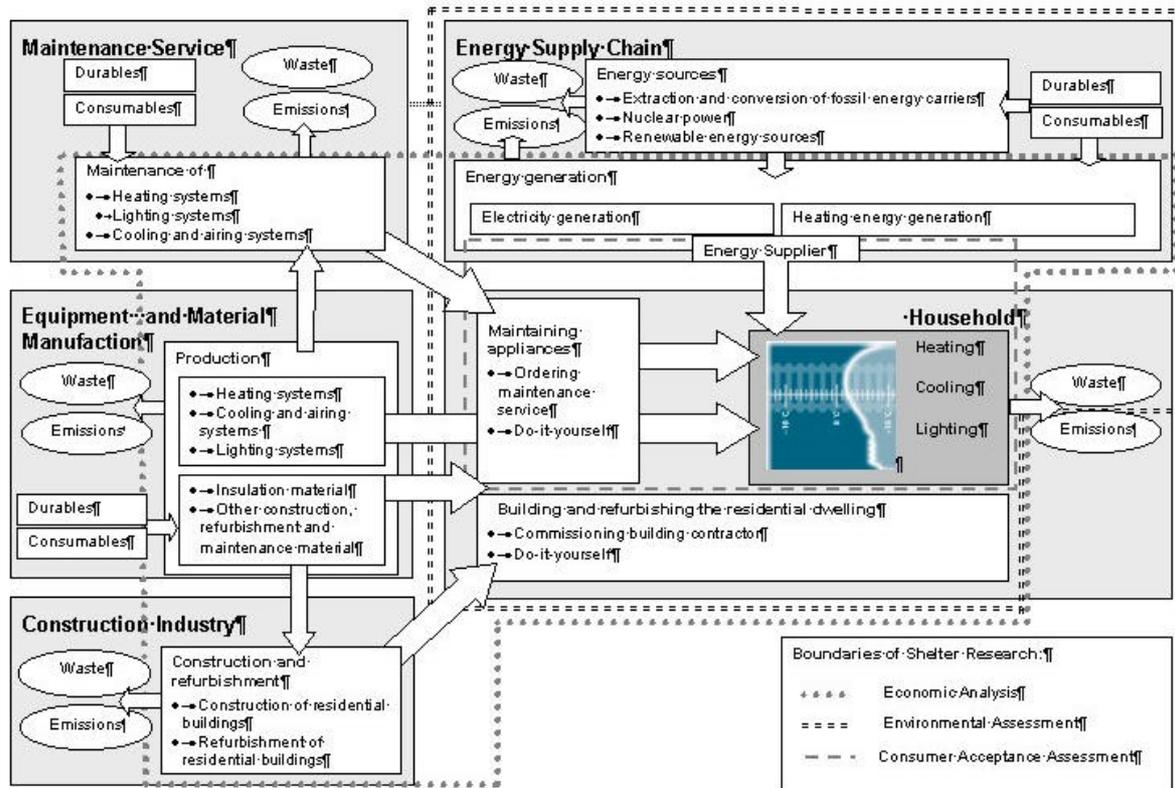
4.3 Sustainability Analysis

Having formalised the DOSs, the SusHouse researchers conducted a series of evaluations. The results of this sustainability analysis were intended to provide participants in Workshop II with a basis for improving the DOSs. Figure 13 depicts the aspects that were studied in the three assessments. Centred all around the household as focus of the investigation the assessments differed slightly in terms of the aspects that had to be included from the indirect system boundaries: While the Consumer Acceptance was merely interested in the role of the private householder and hence could stay closest to the household, the Environmental Assessment - looking at energy as the principal indicator - also included energy sources, generation, and supply. The Economic Analysis, finally, as defined as covering the whole supply chain of the household functions, also had to analyse maintenance service providers, equipment and material manufacturers as well as the construction industry.²⁷

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²⁷ It has to be kept in mind that the relevance of refurbishment is regarded higher than the impact of construction. In Germany for instance, new buildings have an annual share of only about 1% (Enquête-Kommission, 1997); in the refurbishment of the building stock, however, lies a huge potential for improving the energetic parameters of the building stock as was shown in chapter 4.1.

Figure 13: Aspects included in the three Assessments for Shelter



The following sections summarise the findings of the threefold sustainability analysis for Shelter.

4.3.1 Environmental Assessment

As explained above, the assessment of the environmental effects of the DOSs aimed at identifying ecological pros and cons of the three future settings under investigation. The methodology that was applied was based on the qualitative approach co-developed by the TU Delft and UMIST Manchester (see chapter 2.3.4.2). The following indicators were taken into account for the Shelter research:

- energy
- consumables (e. g. conventional light bulbs, lubricants)
- durables (e. g. oil platforms, insulation material)
- waste

These indicators were assessed on the household level and additionally on the level of the previous phases of the energy supply chain, namely energy supply itself, energy production/networked electricity generation, and (extraction and conversion of) primary fuel. The focus, however, was laid upon the household as central investigation object of the project. In the following sections the findings of the Environmental Assessment are presented DOS-wise.

4.3.1.1 DOS "Comfort Management Service"

By means of a higher energy efficiency and by the immediate correction of errors in the Shelter system the energy consumption on the household level can be reduced by one to two thirds in comparison to today. The consumption of durables will increase since the comfort management service providers will both use energy efficiency improving installations as well as control appliances. This might also result in a higher consumption of consumables such as water or oil; the further dissemination of energy saving bulbs will compensate this so that all in all no significant change with regard to consumables is expected.

In the transition to this DOS the amount of waste will grow considerably due to the replacement of obsolete devices like heaters, airing, and lighting systems. In the long run the higher longevity of the new products will balance that out. In the previous phases of the energy supply chain the lower energy consumption will show its effects and lead to reductions of about two thirds in comparison to today, i. e. the saving potential here is even higher than on the household level which can be explained by the possibility to take inefficient parts of the energy generation system, today required for consumption peaks, off the grid. This will affect the consumption of consumables and durables as well as the production of waste so that reductions there will be in the same range, i. e. between one and two thirds.

Table 11: Environmental Assessment Table for the DOS "Comfort Management Service"

Supply-Chain Phase	Indicators	Increasing				No Change	Decreasing			
		Over 100	67 → 100	34 → 66	0 → 33		0 → 33	34 → 66	67 → 100	Eliminated
Household	Energy						X			
	Consumables					X				
	Durables			X						
	Waste					X				
Fuel/Energy Supply	Energy						X			
	Consumables						X			
	Durables							X		
	Waste						X			

Supply-Chain Phase	Indicators	Increasing				No Change	Decreasing			
		Over 100	67 → 100	34 → 66	0 → 33		0 → 33	34 → 66	67 → 100	Eliminated
Electricity Generation	Energy									
	Consumables						X			
	Durables								X	
	Waste						X			
Primary Fuel	Energy								X	
	Consumables								X	
	Durables						X			
	Waste								X	

4.3.1.2 DOS "Edumation"

On the household level the energy consumption can be reduced by more than two thirds in comparison to today.²⁸ This reduction is expected because of the higher awareness for the personal consumption rate, a higher motivation, personal and more frequently used consultation, and the improvement of the building structure accomplished by the incentive of an energy passport.

For the consumables the increased use of energy saving bulbs will show its impact: It is expected that due to the sector specific analysis of the personal consumption data, energy saving potentials will be more transparent for consumers and thus become more behaviour relevant. Thus, a wide diffusion of energy saving bulbs was assumed. This replacement of simply one incandescent bulb by an energy saving bulb in every German household would result in 9.4 MT of CO₂ emissions less over the anticipated average life of the compact fluorescent bulbs taking a constant CO₂ factor of 0.64 kg/ kWh as given,²⁹ that would be 14.8% of one year's residential CO₂ emissions today.

The need for durables will rise slightly because appliances for data transfer between domestic devices and energy meter as well as between energy meter and energy centre are required in that DOS. For waste no change is expected; emissions, however, could decrease significantly.

²⁸ On the basis of the energy data of the BMWi, 1999.

²⁹ On basis of Altner/Michelsen/Dürr, 1998.

In the previous stages of the energy supply chain the lower energy consumption on the household level will result in reduction of one to two thirds in comparison to today. Accordingly, consumption rates in the other categories will diminish alike.

Table 12: Environmental Assessment Table for the DOS "Edumation"

Supply-Chain Phase	Indicators	Increasing				No Change	Decreasing			
		Over 100	67 → 100	34 → 66	0 → 33		0 → 33	34 → 66	67 → 100	Eliminated
Household	Energy							X		
	Consumables						X			
	Durables				X					
	Waste					X				
Fuel/Energy Supply	Energy						X			
	Consumables						X			
	Durables						X			
	Waste						X			
Electricity Generation	Energy						X			
	Consumables						X			
	Durables					X				
	Waste					X				
Primary Fuel	Energy						X			
	Consumables						X			
	Durables						X			
	Waste						X			

4.3.1.3 DOS "Come Together"

The energy consumption on the household level will almost be halved. There are several arguments backing up this assumption: Due to the improved adjustability of the dwellings to the living situation the average square metre inhabited per person can be reduced: Flexible flat grounds and a higher living quality – accompanied by trend-following higher prices per square metre – will lead to a reduction of the average number of square metres occupied per person in the range of 20% in 2050 compared with today. This will lead to 10-20% less energy consumption. The range of reduction here is assumed to be a bit lower than the reduction in square metre since in bigger dwellings not all of the rooms are equally heated/cooled or lit.

However, it must be pointed out that the DOS has a clear limit as far as owner-occupiers of detached houses are concerned: In this case there are less options for adjustments as long as owner-occupiers do not accept to take in other residents in parts of their dwelling.

Furthermore, the upgrading of living quality in dense housing schemes retards the trend towards the detached family house in the suburbs. The joint use of facilities reduces the duration in which a room is lit, and heated or cooled for one single person.

This assumption is based on the following background information: Of the time in the evenings on a normal workday about one hour and 20 minutes are spent alone (full-time workers) (Statistisches Bundesamt, without year of publication, figure 2.5, without pages). For the 12.89 millions of single households (i. e. 15.7% of all German households) (Niemeyer, 1997, p. 288) this rate is presumably higher. Additionally, one has to take into account the 4.4 millions of persons over 65 years who live in single households (Bundesbauministerium, 1997, p. 15) of which the majority is retired as well as part-time workers (Statistisches Bundesamt, without year of publication, figure 2.8, without pages). This led to the assumption that 20% of the leisure time currently spent alone will be spent in the neighbourhood rooms in 2050 under the "Come Together" DOS. This development will lead to 15-20% less energy consumption. The range of reduction here is assumed to be a bit lower than the reduction in time spent alone at home since the neighbourhood facilities have to be heated/ cooled and lit as well.

Besides, there will be considerable positive environmental effects on the energy demand for mobility. These were not included in the assessment though which was related to Shelter aspects only.

Less consumables like water for heating systems or light bulbs will be needed due to the smaller rate of square metres per capita. Regarding the durables, it is anticipated that the neighbourhood facilities required in that DOS will be provided by conversion of already existing buildings. Furthermore, in the long run the private dwellings becoming smaller can compensate the risen demand for communal facilities. Besides, security installations (like cameras, alarm systems etc.) might be necessary to meet the need for a safe environment especially of elderly people; however, it is assumed that under the DOS most of the security standard is guaranteed by personal responsibility or neighbourhood guards, so only a few supplementing durables are needed. With respect to waste no changes are assumed; emissions will drop in line with the energy saving effects.

In the previous stages of the energy supply chain the lower energy consumption in the households as well as the decentralised supply structure linked with a reduction of

transmission losses will show a considerable effect. From today's point of view due to spatial limits neither wind nor hydro energy are likely to be used within the neighbourhood estates, but rather cogeneration plants or solar energy. Energy supply from cogeneration plants instead of from conventional power plants, for instance, reduces CO₂ emissions by one third; a housing scheme of 300 dwellings can thus save 400 tons of CO₂ a year (Klima-Bündnis/ Alianza del Clima, 2000).

Table 13: Environmental Assessment Table for the DOS "Come Together"

Supply-Chain Phase	Indicators	Increasing				No Change	Decreasing			
		Over 100	67 → 100	34 → 66	0 → 33		0 → 33	34 → 66	67 → 100	Eliminated
Household	Energy							X		
	Consumables						X			
	Durables						X			
	Waste					X				
Fuel/Energy Supply	Energy								X	
	Consumables						X			
	Durables								X	
	Waste								X	
Electricity Generation	Energy								X	
	Consumables							X		
	Durables					X				
	Waste						X			
Primary Fuel	Energy								X	
	Consumables								X	
	Durables								X	
	Waste								X	

4.3.2 Economic Analysis

The Economic Analysis Task was based on desk research and results from the expert interviews. A questionnaire developed by the UMIST Manchester was filled in by the Project Researcher for each of the future product or service proposals (see chapter 2.3.4.2). Again the findings are presented DOS-wise.

4.3.2.1 DOS "Comfort Management Service"

For *energy producers and suppliers* as well as for equipment and *material manufacturers* there are good opportunities to create new product market combinations. At the same time an increase of co-operations with other companies is probable. Due to both the increase of solar energy appliances in the households and reached energy saving effects the number of employees in the energy producing and supplying sector will drop. For these firms, on the other hand, the possibility is seen to make use both of their core competence in consulting private customers and of their already existing relationships to the private households and thus to successfully position themselves on the market as provider of the new comfort management services.

In the transition phase the number of employees of equipment and material manufacturers will rise; this is especially based on the assumption that the comfort management companies will have to modernise the building stock with regard to its equipment and material standards. In the long run, however, there is a reduction of employees predicted since for the comfort managers it is economically sensible to use rather long-lasting products.

Maintenance service providers can take considerable advantage from the development if they succeed in position themselves as comfort manager. This could lead to large increases in the number of firms and of co-operations with other firms (especially for standard formulation). The employment rate would grow (as more equipment has to be maintained) which could especially stimulate local employment as mostly on-site services would be required. Furthermore, the relationship to the private customer would have to be strengthened what would require new skills and training for the employees in this respect.

The *construction industry* is seen to gain from such a DOS since the comfort management activities have to fit to the very building and must be adjustable according to user needs and seasonal conditions. Therefore in this sector also more - especially local - employment is predicted.

The *households'* do-it-yourself activities decrease considerably due to the service-orientation of the DOS which affects the DIY-sector.

4.3.2.2 DOS "Edumation"

Energy producers and suppliers can take advantage from their core competences with regard to the visualisation and consulting of the private customer. Energy savings on the household level as well as the increased competition resulting from the energy card system (in case of free provider choice) lead to a reduction of the number of companies active in the field. A higher interest in building co-operations might be one consequence, for instance in order to standardise the energy meters and the interpretation of their protocols. All in all, for energy producers there is a reduction of work activity; energy supplier might balance this out by offering energy centres.

Equipment and material manufacturers will profit from the demand for various visualisation measures. They can co-operate with energy suppliers for implementing data transfer from the household appliances to the energy meter or for formulating product recommendations together with the energy centres. As response to an increased clarity on the energy consumption for specific household activities demand for energy-efficient appliances and material will rise.

In the *construction industry* co-operations will increase in number since the standards for dwelling energy labels must be set. This certification system is likely to stimulate modernisation of the building stock which leads to more employment in the sector.

4.3.2.3 DOS "Come Together"

The *energy production and supply* structure will change considerably under this DOS. Besides, the energy demand on the household level will be reduced. For example, the joint use of facilities and the self-production of energy would worsen profitability of existing energy production plants, i. e. efficiency would decrease. This could lead to a lower number of energy producers as well as to a reduction of total work activity in this sector. The decentralisation would reduce the importance of energy import and trade. There will be a large shift to new consumer and producer arrangements: In most cases the counterpart will not be the single household any longer but several private households from a quarter or housing scheme; besides, customers will appear as co-producers of energy.

Equipment and material manufacturers can increase their efficiency since R&D efforts for business appliances are likely to be transferable to (long-lasting and jointly used) domestic

appliances; as well business appliances can be produced on a wider scale. Moreover, there lie chances for innovation for equipment for the proposed flexible flats, for the communal facilities and for the quarter events.

Maintenance service providers could profit from the development under this DOS if the control over the communal facilities becomes part of their business. Due to on-site servicing local employment could be strengthened.

Construction firms face a broad variety of opportunities: revolutionary product market combinations, innovative solutions for jointly usable dwellings or rooms, flexible dwellings, and the quarter events i. e. there is more room for product as well as market development strategies.

Households are forced to co-operate with other households. Near-by offices help to improve working conditions for household members; the daily effort and time for commuting is reduced and there are better possibilities to combine family and job. The services offered via the neighbourhood centres lead to a change in the kind and amount of housework done by the residents themselves. There is a large shift to new skills such as sharing, and co-ordination with others. There might be a considerable increase of governmental intervention needed in form of higher energy prices or CO₂ limits to make sharing more attractive; in the same line it could be necessary to introduce significantly higher energy and petrol prices in order to make communal events near the home more attractive.

Besides these effects on the Shelter supply chain actors, due to less (leisure and job) mobility and to different leisure habits (i. e. spending more time in the quarter) there will be big changes for the whole mobility sector (individual as well as public transport) and for the leisure sector.

4.3.3 Consumer Acceptance

The *Consumer Acceptance* research was designed in order to gain information about possible adopter groups and their reactions on the DOSs. The methodology was a mixture out of quantitative elements (questionnaire) and qualitative ones (focus group discussions) (see 2.3.4.3). For the German Shelter function the following consumer groups were selected:

- Green consumers: The participants were identified by the snowball technique. Therefore eight institutions and organisations (such as the district section of the green party or local ecological initiatives) as well as private persons with a declared ecological interest had been contacted. Finally, representatives of the Hannover section of "Friends of the Earth", of the Local Agenda 21 group on "living", and of a students' and graduates' initiative on economy and ecology (*Ö-Team*) took part.

- **Mainstream group:** For practical reasons it was decided to set up the discussion round by young representatives presumably holding mainstream positions. For the enrolment of participants several groups and institutions were contacted. Finally, a class of a vocational school in Hannover was taking part. In the German education system the vocational school is a part of the apprenticeship. For one day per week the apprenticeship in a company is supplemented by one day in school.
- **Dynamic group:** This group was designed to represent a currently growing and relevant group in the country's society. . Based on current statistical trends, elderly people were spotted as such a significant group for the German context. The participants were younger senior citizens, i. e. mostly just recently retired persons. This group was also enrolled by the snowball technique based on personal contacts and references via the *Institut für Entwicklungsplanung und Strukturforchung an der Universität Hannover* (Institute for development planning and structural research connected with the University of Hannover).

The following table gives an overview of the research design for Shelter in Germany and throws a glance at the participating consumer groups. The listed lifestyle profiles were the result of the questionnaire analysis which helped to check the a priori categorisation of the participants in the above mentioned consumer groups.

Table 14: Overview of the Research Design for the Focus Groups for Shelter in Germany

	Green	Mainstream	Dynamic
Number	11	22	10
Female / Male	7/ 4	10/ 12	6/ 4
Age	Ø 30.2 (24-60)	Ø 21.2 (19-25)	Ø 62.2 (55-65)
Values	Critical-social values and values of commitment (consideration, helping, being critical, taking responsibilities for others)	Post-materialistic-individualistic values (enjoy life, self-realisation, exciting life, do what one wants)	Traditional values (duty, accomplish, security) mixed with social and postmaterialistic values
Way Of Living	Active and culturally interested lifestyle, job can be relevant for self-actualisation	Active, leisure-oriented lifestyle	Health and home oriented lifestyle with active tendency
Eco-Lifestyle	Homogeneous; critical-differentiating, active eco-orientation	Heterogeneous; partially eco-oriented, partially not interested in ecological topics	Heterogeneous; partially environmentally conscious without active eco-orientation
DOS "Comfort Management Service"		X	X
DOS "Edumation"	X		X
DOS "Come Together"	X	X	

Subsequently, the evaluation of each DOS is described highlighting differences and similarities between the opinions held by the two focus groups that were evaluating the DOS in question.³⁰

Taking the result of the first overall evaluation of the presented DOSs that the respondents had given in the questionnaire as a starting point the "Edumation" DOS was the most preferred future option. This holds especially for the Dynamic consumer group. Green consumers rejected most clearly the view that the current conditions could be an option for the future. On average the Mainstream group distributed the ten points in a balanced way among the three answering options.³¹

Table 15: Overall Evaluation of the Future Options by the three Shelter Focus Groups³²

	Green	Mainstream	Dynamic
DOS "Comfort Management Service"		3.4	2.4
DOS "Edumation"	4.4		4.8
DOS "Come Together"	3.9	3.3	
As today	1.6	3.3	2.7

The core emphasis in the following chapters was placed on the qualitative interpretation of the DOSs; DOS-related results from the questionnaire are included where necessary.³³

4.3.3.1 DOS "Comfort Management Service"

For the DOS "Comfort Management Service" in general both consumer groups rated the service aspect positively. The predominant associations, however, were negative: In the questionnaire, almost half of the Dynamic group could not see a single positive aspect in the DOS. Both consumer groups felt that living in this DOS was too much dominated by

³⁰ It must be pointed out that, of course, each group evaluated the DOS in question in contrast to the other DOS that was presented in its session.

³¹ The evaluations of this group showed high standard deviations though ranging from 1.4 for the evaluation of the "Comfort" DOS to a standard deviation of 2.4 for the mean evaluation of today as future option.

³² Each respondent was asked to distribute ten points among the three answering options (two presented DOSs and "as today") with higher scores indicating a preference of the very future option. The scores in the table give the mean for each of the consumer groups. A grey cell indicates that the DOS was not tested in the group.

³³ For the detailed analysis of the group lifestyles see Pfeiffer/Bode, 2000.

technology and was too isolated from natural conditions such as seasonal temperature changes.

The comfort aspect rose mixed feelings: on the hand as positive relief, on the other hand as disadvantage as it was seen as hindering personal creativity, manual skills, and useful activities like DIY. The automatic control of the Shelter parameters of the dwelling was disapproved as too much intruding into the private sphere.

The Interpretation of the Mainstream Group

In this group having the possibility to decide on one's own and to express one's individuality also in the outlook of the house were seen as very important. Hence, any notions of "complete packages" in the DOS "Comfort Management Service" were evaluated negatively.

On the one hand, the provided convenience was seen positively, especially for business people, for elderly persons and for families. Also in the questionnaire, nearly half of the participants (46%) ranked the service and comfort offer as a striking positive aspect. On the other hand however, participants saw too much convenience as a trap. It makes you too lazy and makes you lose your creativity, your abilities, and manual skills was the attitude widely shared in this group. As well the 24-hour-service was seen as improvement of today where consumers have to wait too long for the repair services, but still it was seen as important that manual workers from the comfort management company do not intrude in the private sphere.

The DOS was seen as too much alienated from nature (e. g. from the natural change of seasons and temperatures). Several participants associated it with an artificial indoor life that is severely shielded and thus protected from the outside. This qualitative result can be matched by the quantitative data: In the questionnaire, technology dominance ranked high as negative aspect of the DOS, close to the aspect of the over-concentration on the indoor life (if this answer is interpreted in the sense of "estrangement from nature" it comes close to the technology dominance meaning).

The Interpretation of the Dynamic Group

In comparison, the Dynamic group's response to the "Comfort" DOS was even more restrained according to the qualitative analysis. They still wanted to be active themselves and felt that this DOS would lead to too much limitation of personal options and to too much control. This included a sceptical position towards recommendations of the service provider e. g. for a certain technological device as environmentally friendly: Participants were afraid of becoming too dependent on producer companies. Instead they had preferred standardised

labels as orientation for their own decision on the Shelter equipment and material used in their dwelling. This negative assessment of the DOS also became obvious in the questionnaire where, on average, only 2.4 of 10 distributable points³⁴ were allocated to this DOS.

The all in all rather negative evaluation of the "Comfort" DOS was partially due to the selective perception of the DOS: The association with an utopian setting which appeared in both subgroups and which was equated with heteronomy and control was very strong although not intended in the design of the DOS at all. This might be due to the rather radical changes this DOS requires in comparison to the "Edumation" DOS.

The argument of satisfaction by DIY, which was seen as becoming obsolete in the "Comfort" DOS, played an important role in this group. As well the cost factor was discussed vividly: The "Comfort" DOS was seen as easily becoming too expensive. In contrast, several participants showed a preference for a certain degree of service which relieves from having to care personally for heating, cooling, and lighting. They uttered that they were willing to pay more for such a service; hence, not low but adequate costs were seen as important. This was explained with post-war experiences and the need of elderly people for brighter light and higher indoor temperature.

4.3.3.2 DOS "Edumation"

The DOS "Edumation" was evaluated best among the German Shelter DOSs. The transparency and clarity that it provides seen as most important positive feature. Combined with that, the opportunity to act according to one's own Shelter preferences which is offered in that DOS was underlined as another crucial point. The Green consumers welcomed the possibility for everybody to behave environmentally friendly, whereas for the Dynamic group the option of financial savings was the main incentive.

The electronic energy meter was mainly seen positively due to the better overview it provides compared to today. The personal energy consultation by the online energy centre played a minor role. The smart card system was evaluated divergently in the two consumer groups as is shown below.

³⁴ The exact question was: "And now please tell us, how would you prefer to see your own future in the area of Shelter. You can allot up to 10 points amongst the following three options." The three options referred to were the two DOSs presented in the groups and the current situation. See also Table 15.

All in all, both consumer groups in which this DOS was tested showed a high interest in it. This, however, could partially be explained by the fact that this DOS is the one that is closest to the respondents' present life and thus asks the least changes of them.

The Interpretation of the Dynamic Group

The qualitative analysis found that in the Dynamic group the "Edumation" DOS was evaluated more positively than the "Comfort" DOS for the overview it provides and the possibility to react according to personal preferences. Several participants clearly supported this DOS due to these advantages both for a money saving and an environment protecting motivation. The fact that this DOS is rather close to today and does not require radical changes may have also influenced this high acceptability; especially, since the liberalisation process of the electricity market around the time of the session had just started to reveal its impact for the private user. So this DOS might have been easier to imagine and to accept than the other DOS presented to the Dynamic group, the DOS "Comfort Management Service".

A part of the Dynamic group opted for a combination of the pros of the "Edumation" DOS with the pros of the "Comfort" DOS resulting in a "Comfort with clarity" or "Comfortable Edumation" DOS. The reason here was a too high degree of self-control they associated with the energy meter in the "Edumation" DOS: The overview of the personal consumption rate was seen as urging to self-control and energy saving which was equated with foregoing consumption and comfort. Any limitations for the personal consumption rate were strongly rejected.

The quantitative data also showed a clear preference for the "Edumation" DOS: "Having an overview of the energy consumption" was seen as the striking positive aspect of the "Edumation" DOS. "More stress" was the only negative feature mentioned in the questionnaires of two participants. In the focus group discussions, however, another aspect turned out to be seen rather critical: the energy card system. The Dynamic group associated it with negative experiences like coin-machines on showers on camping-sites. The more elaborate answers for this DOS compared to the "Comfort" DOS indicate a higher involvement and interest. This is also reflected by the more varied assignment of life stages for the DOS. The DOS was seen as most adequate for single working persons and older couples, less so for families with children. The aspect of the affinity of the "best fit group" with the participants themselves is strengthening the positive evaluation of this DOS by the Dynamic group.

The Interpretation of the Green Group

In the Green group the energy meter was evaluated outstandingly positively. Especially, its overview function was seen as an important improvement of the current situation which is experienced as little transparent for the consumer: The reason for the energy meter being rated so attractive could be that participants nowadays find orientation for ecologically correct consumption decisions lacking. Especially, for this group for whom an environmentally friendly personal behaviour is of high importance this information gap is seen as vital problem and the energy meter as an effective way to solve it. The positive evaluation can also be backed up by the quantitative data: It gained in general a high rating for its overview aspect.

The energy pass of the dwelling played a minor role in the discussion, but was also assessed positively as a guideline for the consumer. Some participants feared that regulation and standardisation could be too difficult to implement or open to manipulation by industrial lobby. The individual energy consultant was also mentioned as improvement of today's situation.

The evaluation of the energy card varied significantly among the group: Several participants rejected the energy card, primarily because it was connected with the possibility of choosing between different energy suppliers. This opportunity was seen as fairly pushing: It forces consumers to inform themselves about a complicated system of a large range of conditions and prices - on which they actually do not want to waste their time. Other participants, however, appreciated the free choice of both the type of energy (i. e. the energy carrier or way of production) and its price. The regular need for uploading the card was taken as further measure for promoting an awareness of the energy consumption and was thus also evaluated as advantage.

Saving was seen as an attractive aim. However, the personal financial advantage was not the most important driving force in this respect for the group: Looking for special offers as described for the energy card system was rejected while an energy meter which gives the reached saving level in Deutschmark was evaluated positively; this is apparently due to its positive impact on the environment: However, the participants realised that for other lifestyle groups the idea of "hunting for bargains" could be very attractive. The "regulation via the purse" was evaluated as a useful strategy.

As well the feeling that me myself can personally do something that brings about a positive environmental effect was stated as a pro of the DOS. It is seen as very likely that this aspect is of particular relevance for green consumers: While dealing with ecological topics they might

often come across the – for them frustrating – point of view that one single person has little or no influence on the environmental situation and its improvement. The DOS "Edumation", however, shows that it is in everybody's hands.

The quantitative analysis of the negative features of the DOS came to an atypical pattern. Though the "Edumation" DOS was in general preferred to the DOS "Come Together", there were more negative aspects mentioned, with the "buying energy units" and the "loss of private sphere" as the most important ones. This was striking since for for the other DOSs and consumer groups the "no answer" category was chosen most often for the negative feature question. A possible interpretation might be that the higher involvement – also reflected in the more positive overall evaluation – triggered a more thorough consideration of the DOS and thus a more comprehensive list of its disadvantages.

4.3.3.3 DOS "Come Together"

Unlike the other two DOSs the DOS "Come Together" was evaluated significantly different in the questionnaire and in the focus group discussion: The Green consumers' score of 3.9 for the overall evaluation in the questionnaire (see Table 15) shifted towards a stronger preference of the DOS "Come Together" in the focus group discussions while the Mainstream group's latent rejection of the DOS "Come Together" was fostered.

The Interpretation of the Mainstream Group

The topics of individual choice and personal freedom were discussed at length with regard to the DOS "Come Together". For some participants these represented the major barriers shortcomings of the DOS.

Community and solidarity were seen as a desirable, but partially as an unrealistic aim. The DOS was related with a (negatively evaluated) socialistic system. Different characters, envy, egoism, and contrary preferences (e. g. for comfortable indoor temperatures or for the TV programme that should be switched on) were mentioned as barriers for sharing rooms and facilities; only occasionally also pros were reported (e. g. of joint housekeeping rooms). Quarter workshops or device pools, however, were accepted referring to positive experience within the extended family or in the home village.

The perception of this DOS turned out to be partially biased. For instance, some participants associated with it a scenario in which each town quarter is owned by a company resulting in residents becoming very dependent on their employers. In general, the group took the aspect

of job and leisure time facilities close to the private home as restricting personal freedom and mobility and strengthening social control especially by the boss. Occasionally the DOS was related with an artificial or rebuilt (rather than preserved) environment.

All in all, the Mainstream group was afraid of too much social control – especially as result of the spatial closeness to the workplace – and a limitation for personal mobility. The positively evaluated aspects of community and solidarity were seen as unattainable because of barriers such as envy, egoism, and divergent personal preferences.

The Interpretation of the Green Group

In contrast to the Mainstream group, the Green consumers showed a high acceptance for this DOS and associated it with an improvement of living quality. In particular, the community aspect had a high attractiveness for this consumer group. Participants approved the advantages for families and senior citizens, and also the social change to less anonymity and more security as well as an improved infrastructure, leisure and job facilities close to the residential areas and the anticipated positive environmental impact (e. g. less mobility).

With regard to function-related ecological advantages the reduction of transmission losses by a decentralised energy supply system and the lower heating energy consumption because of joint use of offices, technical devices, and other facilities were mentioned. The services in the quarter were seen as positive for instance for their positive effect on employment. Participants preferred a system that also allows payment to a mere swapping based exchange of services.

Interestingly, negative aspects of the joint use such as decreasing personal responsibility ("social loafing" effect), vandalism or less availability of devices for personal demand were not anticipated. The only items that were emphasised were the private sphere that still must be provided and – relating to the perceived mainstream opinion – the problem of noise in the neighbourhood of workshops or open air events.

The positive evaluation in the focus group discussions was not reflected that clear in the results of the quantitative analysis: The "Edumation" DOS – with a mean of 4.4 – was rated better than the "Come Together" DOS (mean = 3.9; see Table 15).

Similar to the evaluation of the Mainstream group, the community aspect was singled out as *the* striking positive aspect for the "Come Together" DOS. In contrast to the Mainstream group the service aspect was also explicitly highlighted. With regard to the negative aspects, the answers concentrated less on a single topic. Similar to the DOS evaluation of the Mainstream group, half of the participants did not answer the question. The mentioning of the

"too much community" aspect gives perhaps some indication for the widespread value of individuality and the importance of the private sphere.

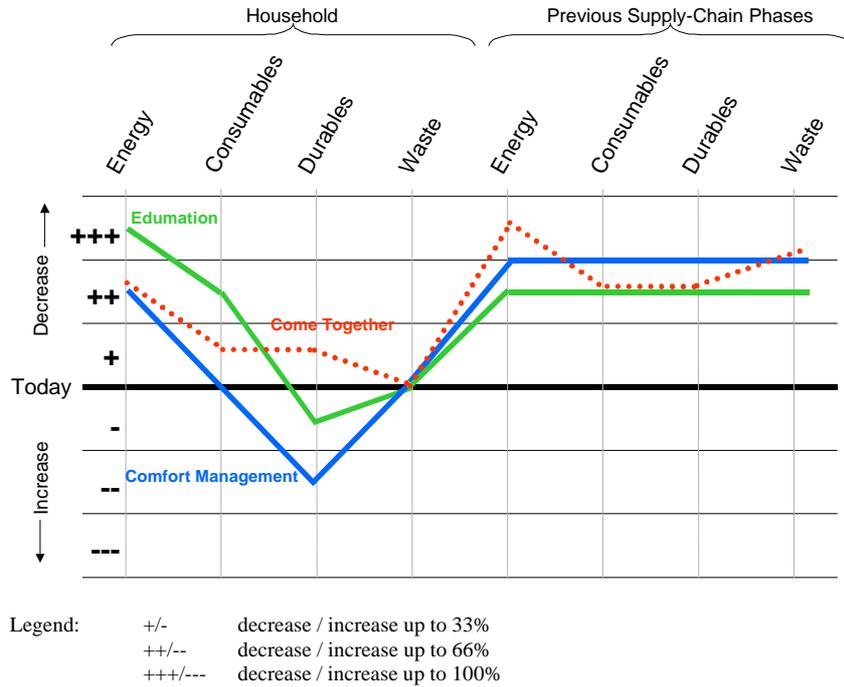
Families with younger children and older singles were mentioned as the most suiting groups here. This corresponds to a more family, home and indoor image of the DOS. Having as well the result of many positive DOS-related associations in the questionnaires in mind, one could have expected an evaluation of the DOS "Come Together" as "a good DOS, but for other people than myself". This, however, as shown above was not the résumé of the qualitative analysis of the focus group discussion. This divergence can be explained by the specific dynamic process in such discussions.

By and large, it can be said that the qualitative results suggest this group as an early adopter for such community related forms of living. This type of consumers appreciated the scenario as an improvement of the current situation, which is seen as being characterised by isolation and anonymity, leading to a higher living quality.

4.3.4 Synopsis of the Assessment Results

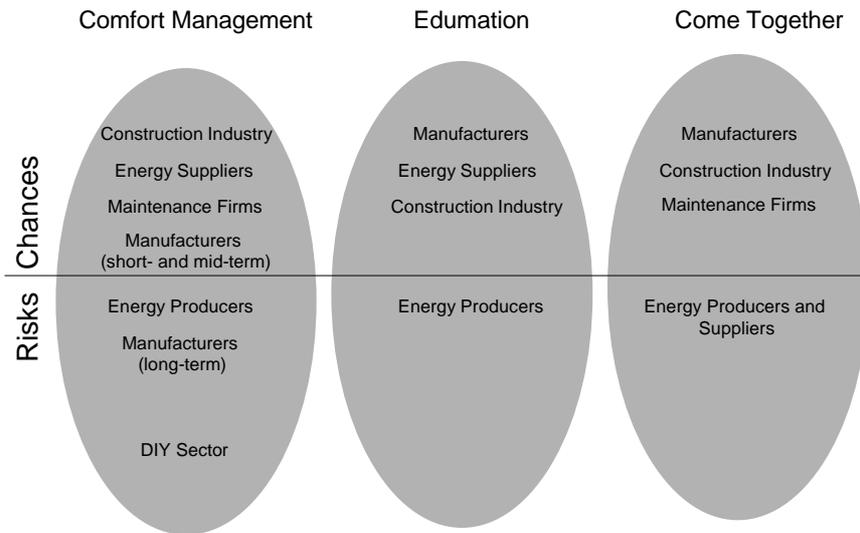
With regard to *environmental gains* the DOS "Come Together" was assessed best (see Figure 14). This was mainly due to savings by less space occupied by one single person at the time and the use of more efficient co-generation plants in the quarters. The highest energy reduction on the household level was seen feasible in the "Edumation" DOS on the basis of strong incentives for refurbishment and the identification and visualisation of areas of (over-) consumption.

Figure 14: Overview of the Environmental Assessment



The *Economic Analysis* mostly showed both advantages for certain supply chain actors and at the same time disadvantages for others like the collapse of the DIY sector in the "Comfort Management Service" DOS (see Figure 15). In general, a higher degree of self-production of energy reduced the demand for energy suppliers, the need for co-operations among actors was seen as growing in order to reach the proposed system innovations, and a more intense and mostly more locally based relationship with the customer was required, especially in the "Comfort Management" and the "Come Together" DOS.

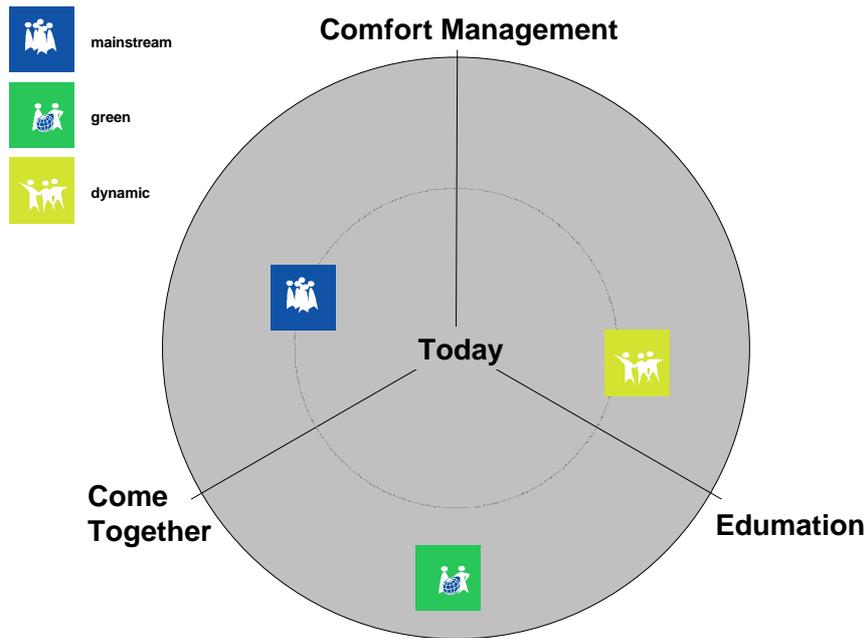
Figure 15: Overview of the Economic Analysis



The *Consumer Acceptance* of the DOS that was closest to the current situation, the "Edumation" DOS, was highest while the "Come Together" DOS triggered very different reactions in the tested consumer groups: the Green consumers tended to evaluate it very positively while the Mainstream group clearly rejected it. The "Comfort Management Service" DOS was generally seen as a rather unpleasant future option.

In Figure 16 for each consumer group one third of the circle comprises the results of the acceptance study: The spatial positioning of the group icon between the three future options, i. e. the two DOSs that were presented to the very group and an "as today" alternative, indicates the preference of the consumer group, i. e. the closer the icon is set to one of the three poles the more preferred this future option was in this group.

Figure 16: Overview of the Consumer Acceptance



4.3.5 Comparison with Results in other Participating Countries

In this chapter the results of the DOS assessments in the three Shelter countries are compared. The evaluation of the common DOS "Comfort Management Service" was very similar in the three countries with respect to its ecological and economic impact: Energy consumption on the household level is expected to drop by one to two thirds in comparison to today. In the UK the increase of durables was supposed to be higher than in the other two countries for the higher demand of refurbishment in the British building stock.

The results of the Consumer Acceptance assessment of the "Comfort Management" DOS, however, yielded clearly different results though the DOS was tested in the same types of consumer groups, i. e. in the Mainstream and in the Dynamic (for Italy a combined Green-Dynamic) group.³⁵ In the UK the general evaluation was more positive than in Italy and especially than in Germany where this DOS – as was shown – had been severely criticised. In Italy the DOS triggered very different reactions: It came to positive and negative overall evaluations.

³⁵ However, it must be kept in mind that the Dynamic group was operationalised differently in the three countries : The reason for this was the task design intending that the Dynamic group should mirror a group of consumers that is significant and of growing relevance in the country in question. Therefore, while in Germany "active senior citizens" had been chosen both the UK and Italy went for the young generation as Dynamic group.

The pro of the DOS in all countries was the comfortable and easy way to get efficient home equipment installed. Like in Germany, in Italy certain misgiving was uttered in relation to the contract ("Will it be flexible enough?"), and the strong influence of single firms ("Will the consultation be independent?"). If consumers were willing to pay a higher price for such a service or not was evaluated contradictorily. In Italy two specific disadvantages were seen: The visible interference with the aesthetic appearance of a building, and the difficulty in applying such a service in multi-story apartments.

All in all, the features which were most important for consumers were an independent consultation, and an individual design of the service and its price. Due to the big relevance of historical buildings and of multiple dwellings in Italy specific requirements must be met there.

For the "Edumation" DOS the effects on the residential energy consumption were assessed slightly differently in Italy and Germany. While in Germany a reduction of more than two thirds was seen as feasible, in Italy the adoption of best available technologies was assessed to result in about halving the energy consumed on the household level.

The Economic Analysis, on the other hand, came to negligible differences. This also holds for the Consumer Acceptance assessment: The DOS was also in Italy evaluated positively thanks to its transparency and financial saving potentials; the smart card system was seen as too complicated though.

4.4 The Improvement and Implementation of the Shelter Scenarios

Developing strategies for an implementation of the previously designed and assessed scenarios in the future is undoubtedly a very ambitious aim. In the SusHouse research it was a secondary objective which was central throughout the last phase of the project. The main research step was the Strategy Workshop. The following chapter comprises potential improvements of the DOSs, barriers to their implementation, and recommendations for the different actor groups as identified by the stakeholders during the second series of workshops.

All three Shelter DOSs studied in Germany gained support for further investigation towards implementation: This holds especially for "Edumation", and "Come Together" which yielded positive results both in the Consumer Acceptance and the Strategy Workshop. For the DOS "Comfort Management Service" the findings were not as clear: It found approval primarily in the other two countries, to a lesser degree in the feedback of the stakeholders in Germany, and was almost completely rejected in the German consumer focus groups. The subsequent sections describe recommendations concluded from the findings of the Consumer Acceptance

analysis and improvements of the DOSs as recommended by the experts to make the DOSs more appropriate for the situation in Germany. In general, for most of the DOSs it was suggested to include elements from the other two DOSs, indicating a belief that whilst, they contained interesting ideas, they were unlikely to be acceptable or practical in their "pure" form.

4.4.1 DOS "Comfort Management Service"

The young professionals of the *Mainstream group* could be a target group for services. However, in communicating the offer any notion of control, isolation, less mobility and less personal freedom as well as merely "package solutions" must be avoided. The emphasis should be laid on an individual service that provides a certain degree of convenience for the user (without discharging him from self-responsibility and the option for personal intervention) and enabling an active leisure time. The adaptation of the service packages to the individual household was also demanded by the experts.

For designing services to be attractive for the active seniors of the *Dynamic group* the right mixture out of comfort and self-action is required. To get everything arranged is seen negatively because it reduces the possibilities for useful leisure time occupations. Moreover, companies would have to ensure consumers of their trustworthiness; independent control boards and labels could be helpful measures that were accepted by this consumer group.

A comfort service that provides consumers with almost all they need with regard to the Shelter function but at the same time allows personal intervention – could be an ideal solution for this target group (that could for instance include a reduction of the subscription fee for DIY with professional consultation). This was also strongly recommended by the experts who thus opted for a service-product combination rather than a mere service scenario. The British experts underlined the necessity of an independent inspection authority for this purpose. In general, the aspects of having an option for fitting the comfort service to the individual preferences as well as attractive prices must be taken into account for the service design.

With regard to the biased perception there is a communicative improvement required so that negative (in the sense of rejection causing) impressions are avoided in future. Such associations which have to be avoided are: any futuristic control measures that lead to heteronomy, spending money on services for things the clients could easily do themselves as long as they are not idle or incapable, and the offering of packages only that do not allow an adjustment to personal preferences.

Additionally, the German experts went for a service variations for first, owner-occupiers versus tenants and second, new versus old buildings. In reaction to the consumer acceptance barriers found in Italy the experts there also recommended the use of transparent materials and variable configurations.

These modifications of the DOS show the great relevance of the actual service design which can be summarised in three slogans: competent comfort managers, tailored offers and independently controlled standardisation.

The main emphasis of recommendations elaborated in the Shelter Strategy Workshops was clearly on policy recommendations. For the "Comfort Management Service" DOS more efficient controls of regulations played a predominant role in all countries. In the UK and in Germany stricter criteria for energy-efficiency were recommended – for the German case a sign that the energy saving directive that was being prepared at the time of the workshop was not supposed to be sufficient enough and that a EU-wide standardisation is lacking. Apart from training and promotion programmes German experts especially emphasised the importance of a higher acceptance for services and a general value shift to which political actors could contribute with educational programmes (introduction of the subject "energy consumption/ saving" in schools) and public campaigns (especially in co-operation with environmental and consumer organisations as well as with academia).

4.4.2 DOS "Edumation"

Having a personal overview and possibility of intervention is important for the *Dynamic group* although they not necessarily would make use of it. Energy saving can hardly be made attractive for this group by environmental arguments as the Consumer Acceptance research had shown. However, the energy saving measure must be designed to help saving costs and to be associated with maintaining a standard that enables an active, comfortable life.

For the ecologically motivated *Green consumer group* any measure that gives orientation for environmentally friendly behaviour is appreciated; this environmentally relevant information, however, must not require an extensive study, but should be easy to grasp (e. g. the groups suggested to express the energy consumption in Deutschmark or to use red and green lights for showing the personal consumption in relation to a sustainable level). Such clear information helps to reduce the dissonance that easily can arouse due to consumption decisions which are not in line with the clearly held ecological convictions. Thus, the personal

influence on a better environmental situation as depicted in the "Edumation" DOS was assessed very positively.

On the other hand, any financial incentive played a rather minor role. Being thrifty is not a high value as such whereas living environmentally friendly is. Thus, any financial advantages brought about by economising for ecological reasons are only seen as positive side effect. In other words: For this group of consumers the improvement of the environmentally relevant behaviour is a *conditio sine qua non* for financial saving potentials working as an incentive. And this must be considered for the actual service design. Also the experts proposed to underline that the incentives for energy saving could also be non-financial ones.

Moreover, this type of consumers need further challenges and possibilities to improve their environmentally relevant behaviour: Thus, some of the participants wondered if the "Edumation" DOS would not be obsolete few years after its implementation because of the learning effect for the user. All in all, green consumers can be seen as target group for the early adoption of this DOS.

Besides, the experts recommended the following alterations:

- Special offers or price reductions for energy are counter-productive and should be ruled out.
- The daytime of consumption should be included in the consumption data analysis.
- The energy meter must be standardised and obligatory for all suppliers.
- The appliances should be remote-controllable.

Hence, the workshop participants underlined the relevance of the consumption time for flattening peaks in energy supply and thus to achieve the ecological benefits as assessed above. Furthermore a more customer-friendly design of the DOS – especially with regard to the information of the household members – were discussed.

Regarding policy recommendations for the "Edumation" DOS standardisation and compatibility of data systems were a major topic which administration should co-ordinate and promote, e. g. by standardisation projects in co-operation with NGOs and research. In both Italy and Germany incentive structures were missed; in Germany for instance promotion programmes and depreciation options were seen as tools that could be introduced by policy makers. Furthermore, a consumption tax for internalising external costs, and a political initiative to promote co-operation among stakeholders were recommended by the German stakeholders. In order to reach the independence which was an important feature in the focus group sessions political actors should set labelling rules for more transparency on

consumption data, and implement a fund, a foundation or taxes for independent consultation and coaching. However, it must be pointed out that an – e. g. EU-wide – eco-labelling as it could be strengthened by that DOS might work as protectionist measure against imports from developing countries. Such a limitation of the south's export chances to developed countries would not be in line with the social dimension of sustainability though and would thus require intervention in order to promote a quicker efficiency improvement in the countries in question.

4.4.3 DOS "Come Together"

With regard to sharing, the aspect of voluntariness must be central for enhancing the attractiveness of this DOS for *mainstream consumers*. This group showed a strong need for a protected private sphere which must not be touched by any sharing of facilities. Device pools seem to have a good chance for acceptance while there is more resistance with regard to sharing rooms. All in all, this group is not likely to accept a smaller personal dwelling for sharing rooms. Thus, the DOS "Come Together" should be combined with other energy saving measures.

This *Green consumer group* likes an active way of living together with others. Hence, the communal use of facilities for job and leisure time as shown in the "Come Together" DOS is of high attractiveness. However, private sphere must still be guaranteed. As already mentioned for the "Edumation" DOS, this group of consumers needs further possibilities to improve the environmentally relevant behaviour: For the "Come Together" DOS they wished a broadening (e. g. to regional fruit and vegetable markets) This should be considered for the improvement of the DOSs as well as the suggestion for a combination of both DOSs. All in all, green consumers can be seen as target group for the early adoption of this DOS.

In the Strategy Workshop the experts also recommended

- to loosen the strict link between place of living and working,
- to allow a co-existence of central and decentralised energy supply structures,
- to foster the individual sense of responsibility, and
- to form shopping communities for private devices.

For the DOS "Come Together" the main activities that were recommended were public relations, campaigns, and face-to-face consultation in the homes of the citizens.

5 Conclusion

In this final chapter of the report we first outline our evaluation of the methodology developed and applied in the SusHouse project before we draw our final conclusions on the findings.

5.1 Evaluation of the SusHouse Methodology

5.1.1 Stakeholder Management and Workshop Organisation Task

First of all, it can be said that the SusHouse team succeeded in enrolling representatives of institutions and organisations central for the functions studied in Germany. However, in order to make use of all the potentials a more intensive Stakeholder Management would have been vital, especially after the Strategy Workshop. The task proved to be very time consuming, so more resources would be necessary to fulfil it entirely. It could be an option to concentrate on actor groups in one region in order to enable a more intense Stakeholder Management.

For maintaining the esprit and impetus of the first workshop it could be helpful to have the second round of meetings much earlier. This would also help to meet participants' expectation since in the first workshop strategic planning was missed while in the second workshop creative idea collecting was demanded especially by persons who had not taken part in the first workshop. Thus, the two steps of the backcasting process – now split very clearly – would again move closer to one another and stakeholders would be given a chance to experience the whole process as an entity. In this way the interpretation of the Stakeholder Management is extended. It does not only refer to the processual aspects, like participation in the workshops and general networking but also to the content side. Here continual input and comments on the products of the research team could help quite a lot. It should be mentioned though, that the weak signals from stakeholders into this direction could be interpreted that there is interest, but also the problem of time investment. More time investment will also mean that the relevant stakeholders will try more to benefit from the project (and perhaps also to structure it) company-wise.

5.1.2 Scenario Building

The methodology proved to be a very productive tool to generate in a shared way worthwhile scenarios. To improve the benefits of the scenario building for the whole project two aspects might be worthwhile to consider:

First there is the issue of comparability of DOSs that were tested in more than one country. On the one hand, it is important to maintain the roots in the outcome of the Creativity Workshop and thus to allow local deviations. On the other hand, for the cross-country comparison it could be very interesting to trace back differences in the assessment results to actual differences in the country-specific situation rather than to have to take into account the differences in the stimulus as intervening variable. A more intensive exchange with the stakeholders during the elaboration phase of the DOSs could help to minimise the disadvantage of this latter way, i. e. a possibly bigger difference to the workshop outcome could become acceptable for the stakeholders.

Second, the question of how concrete the DOSs should be is of high relevance as it has an impact on the subsequent assessments especially on the Environmental Assessment. Here the dilemma – the demand for concreteness for the assessments on the one hand and the problem of a focus in the far future with a lot of insecurity regarding trends and developments on the other hand – had to be handled.

5.1.3 Environmental Assessment

In Germany two approaches were used for the Environmental Assessment. The Shelter approach was qualitative-oriented with taking only a few assumptions and a more quantitative approach in the Clothing Care assessment. The Shelter approach resulted in a rather stable, but merely trend revealing assessment. The Clothing Care assessment was more detailed, though lacked in robustness. Undoubtedly, a more concrete assessment could reveal the ecological potential of the DOSs more entirely. Both research teams shared the conviction that a more qualitative interpretation is appropriate for providing a basis for discussion for the Strategy Workshop as the quantification of the complex interactions of all relevant variables is already not attainable for the current situation, let alone the situation in 50 years.

5.1.4 Economic Analysis

In general the Economic Analysis questionnaire was a helpful tool, especially as structuring input for the Strategy Workshop. To improve this tool one has to handle the issue of interconnectedness of single ideas which are contained in one DOS, while the DOS was assessed proposal-wise. Ambiguous questions and answering options must be clarified in a

modified questionnaire which should also contain clear definitions of the categories in order to improve inter-encoder reliability.

Regarding the stakeholders' expertise from different kinds of backgrounds it would have been interesting to involve business actors in the fulfilment of the Economic Analysis task and to survey their expectations and points of view concerning the different aspects covered by the analysis. As well the results could have been linked with the Stakeholder Management and could have served as tool to detect future business stakeholders which are to invite for the Strategy Workshop. This step should be added to the task formats in question.

5.1.5 Consumer Acceptance

Overall a working methodology was developed for analysing Consumer Acceptance. Especially the discussion groups proved to be rather worthwhile in the sense of a "reality check". Preconceived notions and assumptions about consumer opinions could be tested and the "real life consumers" could give vital input for improving the DOSs. Also the use of the Consumer Acceptance data in the Strategy Workshops as discussion input for the stakeholders worked well. In this sense one can formulate as a result of the Consumer Acceptance research: Projects analysing and initiating future changes should try to integrate consumers. This relates to the process level (integration increases the motivation of the participants and the likelihood of a realisation) and to the content level (integration increases the quality of the solutions by worthwhile input of different perspectives).

With regard to methodology some modifications are recommended. First the sampling was difficult since it made it hard to recruit a sufficient number of participants for the consumer focus groups, especially for the Green consumer group. The most fruitful approach was to contact bigger groups, like organisations, activist groups or school classes.

Second, the quantitative analysis was in parts important (like to evaluate overall assessments, to get individual impressions and to analyse group specific differences), in the whole very time consuming though. This approach might be more important if the different partner research teams adhere more to a shared research design. In this case the quantitative analysis can focus more on the cross-country comparison and a possible pooling of the single data sets. The projective parts of the questionnaire failed to yield meaningful insights into the consumers' perception of the DOSs. One of the reasons could be that open questions here simply overstrained respondents.

Third, the stimulus, i. e. the way in which the DOSs are presented, must be dealt with very carefully. The visualisation part was successful in increasing the involvement of participants. However, the control of visual stimuli is very difficult and the concrete responses on the stimuli were quite varied and difficult to interpret. Here a more controlled procedure should be applied.

5.2 Resumé and Outlook

The overall goal of the SusHouse project had been the development and evaluation of strategies for transitions towards the sustainable household. This comprised as final results especially

- *Case examples* of imaginative scenarios, assessed and co-developed with a range of social actors, for the fulfilment of functions of the sustainable household and
- *a tested methodology.*

It includes tools for scenario building, stakeholder management, industry-consumer-government focus groups and methods of assessment of sustainable futures. This methodology enables companies, governmental policy organisations and NGOs to carry out their own analyses of sustainable functions.

The SusHouse project had chosen a promising and as well very demanding way to reach these aims. It differed from traditional social science projects especially in one aspect: The methodology – seen not as prerequisite but as part of the target set – was developed while applying it. This approach required a very open and flexible process and expertise out of various fields, a condition met with the interdisciplinary composition of the SusHouse research team. Overall it can be said, that the SusHouse project succeeded in developing a comprehensive and workable methodology to develop and assess more sustainable ways of organising household functions. The experiences can be summarised by the following conclusions:

- The development of a more sustainable future has to be based on *partnerships* between the so-called "public" and so-called "experts". The SusHouse methodology has demonstrated that this co-designing approach is worthwhile and manageable. Furthermore, networks constituted by experts from different stages of the supply and demand chain allow making use of potentials for product, service, and even system innovation and can hence be an important step towards sustainability.
- The work on a sustainable future requires creativity and expertise from different backgrounds. The SusHouse project demonstrated the usefulness of such an interdisciplinary and flexible process in *the interdisciplinary co-development* of the SusHouse methodology.

- Despite media reports that the interest in environmental issues diminishes this project has shown that there is still a *vital interest in a more sustainable future*. In multiple and diverse interactions we experienced rather involved consumers and stakeholders.
- The environmental consciousness has changed though: For *consumers* environmental issues became a standard demand in some areas and in others they are strongly intertwined with other interests and concerns. Here a simple motivational strategy with a singular focus on the environment will not be sufficient. The SusHouse project tried to integrate this consumer perspective into the development of new sustainable solutions.
- Most of the contacted *companies* have made positive experiences with greening their products and processes. However, the old strategies, focusing on increased efficiency and a premium green consumer target group are not adequate anymore. The SusHouse project tried to show new ways for combining a positive environmental impact with new market solutions. Furthermore we worked on fostering new coalitions, co-operations and networks. A lot of companies showed a considerable interest in this strategy direction.
- Environmental problems are not locally bounded. Scientific endeavours to search for sustainable solutions have to be globalised. The SusHouse project has successfully demonstrated the potentials of a European co-operation. In our experience this internationalisation processes proved to be very productive. The resulting knowledge and experience pool goes far beyond a simple adding up of competencies. We learned that sharing our backgrounds, our cultural and scientific ways of handling problems can lead to new, original solutions. For us, these new structures can stimulate scientific progress and are hopefully part of a way towards a lively *European scientific community*.

These conclusions show the potentials that lie in a future application of the SusHouse methodology. Further modifications are intended in order to come to a more compact co-designing and co-evaluating process of future solutions based on workshop techniques which can be applied both in other countries, and on other consumption areas as those studied in the SusHouse project.

The scenarios and their assessments have shown that by innovative solutions households can undertake important steps towards a more sustainable consumption. There is a considerable potential – and a high demand: Households are – besides traffic – the only sector in Germany that still tends towards an increase of CO₂ emissions in comparison to 1990 (BMU, 2000, p. IV). Thus, strategic steps as elaborated in the SusHouse project could support the federal government's goals on climate protection.

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SusHouse on the net: <http://www.sushouse.tudelft.nl> and <http://www.sushouse.com>

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References

- Altner, G., Dürr, H.-P., & Michelsen, G. (1998): Zukünftige Energiepolitik, Phase II, Handlungsprogramm (Energy Policy of the Future, Phase II, Action Programme). Eine diskursorientierte Studie im Auftrag der Niedersächsischen Energieagentur, Hannover.
- Bell, W. (1997): Foundations of Future Studies, New Brunswick.
- Billig, A., Briefs, D., & Pahl, A. (1987): Das ökologische Problembewußtsein umweltrelevanter Zielgruppen. Wertwandel und Verhaltensänderung (The Ecological Problem Consciousness of Environmentally Relevant Target Groups. Value and Action Change), Berlin.
- BMU (Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit/ German Federal Ministry of the Environment) (1997): Klimaschutz in Deutschland. Zweiter Bericht der Regierung der Bundesrepublik Deutschland nach dem Rahmenübereinkommen der Vereinten Nationen über Klimaänderung (Climate Protection in Germany. Second Report of the Government of the Federal Republic of Germany according to the United Nations' Framework Convention on Climate Change), Bonn.
- BMU (Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit/ German Federal Ministry of the Environment) (2000): Nationales Klimaschutzprogramm (National climate protection program), published as Umwelt-Sonderteil 11/2000.
- BMWi (Bundesministerium für Wirtschaft und Technologie/ German Federal Ministry for Economic Affairs and Technology) (1999): Energie Daten 1999. Nationale und internationale Entwicklung (Energy Data 1999. National and International Trends), Bonn.

- Bode, M. (2000a): Consumers' Acceptance Analysis of Clothing Care Scenarios, Germany, Background Report, SusHouse Project, University of Hannover, Lehrstuhl Markt und Konsum, Hannover.
- Bode, M. (2000b): Consumers' Acceptance Analysis of Scenarios, Final Report, SusHouse Project, University of Hannover, Lehrstuhl Markt und Konsum, Hannover.
- Bode, M. (2000c): Environmental Assessment of Clothing Care Scenarios, Germany, Background Report, SusHouse Project, University of Hannover, Lehrstuhl Markt und Konsum, Hannover.
- Bras-Klapwijk, R. (2000): Environmental Assessment of Scenarios, Final Report, SusHouse Project, Delft University of Technology, Technology Assessment Group, Delft: Delft University of Technology, TBM Faculty.
- Bundesministerium für Raumordnung, Bauwesen und Städtebau (German Federal Ministry for Building) (ed.) (1997): Haus und Wohnung im Spiegel der Statistik 1997/98 (House and Flat as reflected by Statistics 1997/98), 9th revised edition Bonn.
- Cole, R. (1998): Emerging Trends in Building Environmental Assessment Methods. In: Building Research & Information, Vol. 26, No. 1, pp. 3-16.
- Denzin, N.K. (1989): The Research Act: A Theoretical Introduction to Sociological Methods, 3rd ed., New Jersey.
- Derksen, L., & Gartnell, J. (1993): The Social Context of Recycling. In: American Sociological Review, Vol. 58, pp. 434-442.
- DIW (Deutsches Institut für Wirtschaftsforschung/ German Institute for Economic Research) (1998): Indikatoren des Energieverbrauchs in Deutschland (Indicators for the Energy Consumption in Germany), Wochenbericht 50/98, <http://www.diw.de/deutsch/publikationen/wochenberichte/jahrgang98/> (8.3.1999).
- Eicke-Hennig, W. (1998): Der Einfluß des Nutzerverhaltens (The Influence of the User's Behaviour), in: http://www.impulsprogramm.de/neh/e_neh5.html (8.3.1999).
- Enquête-Kommission (1994): Die Industriegesellschaft gestalten - Perspektiven für einen nachhaltigen Umgang mit Stoff- und Materialströmen (Shaping the Industrial Economy – Perspectives for a Sustainable Dealing with Material Flows), Final Report of the Enquête Commission "Schutz des Menschen und der Umwelt" (Protection of Man and Environment) of the 12th German Bundestag, Bonn.
- Enquête-Kommission (1997): Zwischenbericht (Interim Report), Enquête Commission "Schutz des Menschen und der Umwelt" (Protection of Man and Environment) of the 13th German Bundestag, Drucksache 13/7400, 3. April 1997, Bonn.
- ethical consumer (1995): Consumer Report: Washing Machines. In: ethical consumer, November/December 1995, pp. 14-18.
- Flick, U. (1991): Triangulation. In: Flick, U.; Kardoff, E.v.; Keupp, H.; Rosenstiel, L.v. and Wolff, S. (eds.): Handbuch Qualitative Sozialforschung (Handbook of Qualitative Social Research), München, pp. 432-434.

- Fraunhofer Institut für Systemtechnik und Innovationsforschung et al. (ed.) (1997): Interdisziplinäre Analyse der Umsetzungschancen einer Energiespar- und Klimaschutzpolitik. Hemmende und fördernde Bedingungen der rationellen Energienutzung für private Haushalte und ihr Akteursumfeld aus ökonomischer und sozialpsychologischer Perspektive. Endbericht zur ersten Förderperiode. (Interdisciplinary Analysis of the Possibilities for an Energy Conservation and Climate Protection Policy. Hindering and Promoting Conditions for an Efficient Energy Use in Private Households and their Associated Actors seen from an Economic and Social Psychological Perspective. Final Report at the End of the First Project Phase), Karlsruhe, Kiel, Wuppertal.
- Freeman, R. E. (1984): Strategic Management - A Stakeholder Approach, London.
- GfK Lebensstilforschung (GfK Life-Style Research) (without year): Euro-Socio-Styles: Ein neues Informationssystem, Nürnberg.
- Glaser, B., & Strauss, A. (1967): The Discovery of Grounded Theory: Strategies for Qualitative Research, Chicago.
- Grießhammer, R., Bunke, D., & Gensch, C.-O. (1997): Produktlinienanalyse Waschen und Waschmittel (Product Life Cycle Analysis Washing and Detergents), Umweltbundesamt-Texte 1/97, Berlin.
- Hansen, U., & Bode, M. (1999): Marketing & Konsum: Theorie und Praxis von der Industrialisierung bis ins 21. Jahrhundert (Marketing & Consumption: Theory and Practice from Industrialisation into the 21. Century), München.
- Hansen, U., & Schrader, U. (1997): A Modern Model of Consumption for a Sustainable Society. In: Journal of Consumer Policy, Vol. 20, No.4, pp. 443-468.
- Hines, J.M., Hungerford, H.R., & Tomera, A.N. (1986/1987): Analysis and Synthesis of Research on Responsible Environmental Behaviour: A Meta-Analysis. In: Journal of Environmental Education, Vol. 18, No. 2, pp. 1-8.
- Hirschl, B. (2000): Produkte länger und intensiver nutzen – das Beispiel private Textilwäsche (Using Products longer and more intensive - the Example of private Textile Washing), Schriftenreihe des IÖW, Nr. 149/00, Berlin.
- IKW (Industrieverband Körperpflege- und Waschmittel e.V.) (1998): Tätigkeitsbericht 1997/1998 (Action Report 1997/1998), Frankfurt.
- Institut der deutschen Wirtschaft (Institute of German Industry) (ed.) (1998): Informationsdienst 42/1998, Vol. 24/15.
- Jungk, R., & Müllert, N.R. (1991): Zukunftswerkstätten: Mit Phantasie gegen Routine und Resignation (Future Workshops: With Imagination against Routine and Resignation), München.
- Klima-Bündnis/ Alianza del Clima (ed.) (2000): Klima-Bündnis-Projekt des Monats März 2000 (Climate Alliance Project of the Month March), Press Release from March 9, 2000.

- Knot, M., & Bras-Klapwijk, R. (2000): Environmental Assessment of Clothing Care scenarios, the Netherlands, Background Report, SusHouse Project, Delft University of Technology, Technology Assessment Group, Delft.
- Krueger, R.A. (1994): Focus Groups: A Practical Guide for Applied Research, 2nd ed., Beverly Hills, CA.
- Kuckartz, U. (1995): Umweltwissen, Umweltbewußtsein, Umweltverhalten. Der Stand der Umweltbewußtseinsforschung (Environmental Knowledge, Environmental Consciousness, Environmental Behaviour. The State-of-the-Art of Environmental Consciousness Research). In: de Haan, G. (ed.): Umweltbewußtsein und Massenmedien: Perspektiven ökologischer Kommunikation (Environmental Consciousness and Mass Media. Perspectives in Ecological Communication), Berlin, pp. 71-85.
- Kuckartz, U. (1998): Umweltbewußtsein und Umweltverhalten (Environmental Consciousness, and Environmental Behaviour). In: Enquête-Kommission (ed.): Konzept Nachhaltigkeit: Studienprogramm (The Sustainability Concept: Programme of Study), Berlin et al..
- Lüdtke, H. (1992): Lebensstile: Formen der Wechselwirkung zwischen Konsum und Sozialstruktur (Lifestyles: Interaction Forms between Consumption and Social Structure). In: Eisendle, R., & Miklautz, R. (ed.): Produktkulturen. Dynamik und Bedeutungswandel des Konsums (Productcultures. Dynamics and Meaning Changes of Consumption), Frankfurt a.M., New York, pp. 135-155.
- Morgan, D.L. (1993): Successful Focus Groups. Advancing the State of Art, Newbury Park, London, New Delhi.
- Mowen, J.C. (1990): Consumer Behavior, 2nd ed., New York.
- Niemeyer, F. (1997): Strukturen der Privathaushalte 1995 (Structures of Private Households in 1995). In: Wirtschaft und Statistik 5/1997, pp. 287-292.
- Pacchi, C. (1998): Stakeholder List Format. SusHouse Project, Internal Document, Milano.
- Pacchi, C., & Pfeiffer, C. (1999): Sustainable Energy Consumption in Private Households. Involving Stakeholders as Strategy towards Sustainable Solutions. Paper submitted to the Shaping the Future Conference on the EXPO 2000, Hannover.
- Petkus, E., Jr. (1992): Implications of the Symbolic Interactionist Perspective for the Study of Environmentally-Responsible Consumption. In: Advances in Consumer Research, Vol. 19, pp. 861-869.
- Pfeiffer, C. (2000a): The Shelter Function – Final Report. SusHouse Project, Hannover University, Lehrstuhl Markt und Konsum, Delft University of Technology, TBM Faculty, Delft.
- Pfeiffer, C. (2000b): Shelter Germany – Project Report. SusHouse Project, University of Hannover, Lehrstuhl Markt und Konsum, Delft University of Technology, TBM Faculty, Delft.

- Pfeiffer, C. (2000c): Shelter. In: Young, William, Philip Vergragt (eds) (2000): Strategies towards the Sustainable Household (SuHouse) Project: Design Orienting Scenarios (DOS), CROMTEC, Manchester School of Management, UMIST, Manchester.
- Pfeiffer, C., & Bode, M. (2000): Consumers' Acceptance Analysis of Shelter scenarios, Germany. Background Report, SusHouse Project, University of Hannover, Lehrstuhl Markt und Konsum.
- Poferl, A., Schilling, K., & Brand, K.-W. (1997): Umweltbewußtsein und Alltagshandeln. Eine empirische Untersuchung sozio-kultureller Orientierungen (Environmental Consciousness and Everyday Behaviour. An empirical Analysis of socio-cultural Orientations), Opladen.
- Quist, J.; Pacchi, C. & van der Wel, M. (2000): Workshop Organisation and Stakeholder Management, Final Report, SusHouse Project, Delft University of Technology, Technology Assessment Group (NI) / Avanzi, Milano (I), Delft: Delft University of Technology, TBM Faculty, Delft.
- Reusswig, F. (1994): Lebensstile und Ökologie. Gesellschaftliche Pluralisierung und alltagsökologische Entwicklung unter besonderer Berücksichtigung des Energiebereichs (Lifestyles and Ecology. Social Pluralisation and Everyday Ecological Developments with Special Regard to the Energy Sector), Frankfurt a.M..
- Schmidt-Bleek, F. (1998): Das MIPS-Konzept. Weniger Naturverbrauch - mehr Lebensqualität durch Faktor 10 (The MIPS Concept. Less Nature Consumption – more Quality of Life by Factor 10), München.
- Schmidt, E., & Rosenkranz, B. (1995): Kleidung: Ökologie und Gesundheit. Eine Betrachtung der textilen Kette von der Produktion bis zur Entsorgung (Clothing: Ecology and Health. An Analysis of the Textile Chain from production to Disposal), Berlin.
- Slaughter, R. A. (1996) (ed.): The Knowledge Base of Future Studies, Victoria.
- Statistisches Bundesamt (Federal Statistical Office Germany) (1997) (ed.): Zahlen und Fakten über die Bundesrepublik Deutschland 1995/96 (Figures and Facts about the Federal Republic of Germany in 1995/96), Landsberg am Lech.
- Statistisches Bundesamt (Federal Statistical Office Germany) (ed.) (without year): Im Blickpunkt: Zeitverwendung in Deutschland. Beruf - Familie - Freizeit, Wiesbaden.
- Stewart, D.W., & Shamdasani, P.N. (1990): Focus Groups: Theory and Practice, Beverly Hills, CA.
- Stiftung Warentest (1998): Energiesparlampen (Energy Saving Bulbs). In: test 8/1998, pp.70-74.
- Street, P. (1997): Scenario Workshops: A Participatory Approach to Sustainable Urban Living? In: Futures, Vol. 29, No. 2, pp. 139-158.
- Umweltbundesamt (German Federal Environmental Agency) (ed.) (1997): Daten zur Umwelt - Der Zustand der Umwelt in Deutschland (Data on the Environment - The Condition of the Environment in Germany), Berlin.

- Van Liere, K.D & Dunlap, R.E. (1980): The Social Basis of Environmental Concern: A Review of Hypotheses, Explanations and Empirical Evidence. In: *Public Opinion Quarterly*, Vol. 44, No. 2, pp. 181-197.
- VDEW (Vereinigung Deutscher Elektrizitätswerke/ Association of German Electric Power Companies) (ed.) (1997): *Datenkatalog zum Haushaltsstromverbrauch 1997 (Data Catalogue on Domestic Electricity Consumption)*, Frankfurt a.M..
- Vergragt, P., & van der Wel, M. (1998): Backcasting: An Example of Sustainable Washing. In: Roome, N. (ed.): *Sustainable Strategies for Industry. The Future of Corporate Practice*, Washington DC, Covelo CA, pp. 171-184.
- Vergragt, P., Meijkamp, R., Tassoul, M., & van der Wel, M. (1995): Involving Industry in Back-casting Scenario Building, Conference Paper, 4th Greening of Industry Conference, Toronto, November 12-14, 1995.
- Vezzoli, C. (2000): *The Clothing Care Function, Final Report, SusHouse Project*, Politecnico di Milano University, Interdepartmental Research Centre, Innovation for the Environmental Sustainability – Department of Industrial Design (CIR.IS-DI-Tec), Delft University of Technology, TBM Faculty, Delft.
- von Weizsäcker, E.U., Lovins, A.B., & Lovins, L.H. (1997): *Factor Four*, London.
- Wolff, B., Knodel, J., & Sittitrai, W. (1993): Focus Groups and Surveys as Complementary Methods. A Case Example. In: Morgan, D.L. (ed.): *Successful Focus Groups. Advancing the State of the Art*, Newbury Park, CA, pp. 118-136.
- Yates, S.M., & Aronson, E. (1983): A Social Psychological Perspective on Energy Conservation in Residential Buildings. In: *American Psychologist*, Vol. 38, April 1983, pp. 435-444.
- Young, C.W., Green, K., Anderson, K., & Simms, J. (1999): *Economic Assessment of Design Orienting Scenarios: Strategies towards the Sustainable Household*, paper for the 8th Greening of Industry Conference – Ways of Knowing Stream, Chapel Hill, NC.

Appendix

A List of Team Members

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László Szûts, M.Sc.	Project Researcher Shopping, Cooking, Eating

B Participating Stakeholder Groups

B.1 Clothing Care

	<i>Interviews</i>	<i>Creativity Workshop</i>	<i>Strategy Workshop</i>
<i>Companies and Trade Associations</i>			
- Association of green clothing producer and retailer food	Arbeitskreis Naturtextil		
- Clothing producer	Gerry Weber Lifestyle-Fashion GmbH	Gerry Weber Lifestyle-Fashion GmbH	
- Clothing research institute of a clothing producer	Klaus Steilmann Institut für Innovation und Umwelt GmbH (KSI)		Klaus Steilmann Institut für Innovation und Umwelt GmbH (KSI)
- Green clothes	BioLogisch	BioLogisch	
- Green clothes	Astrid Jansen Mode	Astrid Jansen Mode	
- Retailer with clothes	Otto		Otto
- Green clothes retailer	Hess Natur	Hess Natur	
- Green products mail order house	Waschbär Versand		
- Green products mail order house	Panda / Media Profil	Panda / Media Profil	
- Washing machine producer	AEG		
- Washing machine producer	Miele & Cie. GmbH & Co		Miele & Cie. GmbH & Co
- Detergent producer	Henkel	Henkel	Henkel
- Detergent producer	Lever Fabergé Deutschland GmbH		Lever Fabergé Deutschland GmbH
- Green detergent producer	AURO Pflanzenchemie AG		
- Green detergent producer	SODASAN		
- Launderette chain	Eco-Express	Eco-Express	Eco-Express
- Laundry chain	Stichweh		
- Association of different non-profit / charitable organisations collecting clothes	Dachverband FairWertung e.V.		
- Washing services	Larosé		
- Green fair organizer and green magazine publisher	Heuer & Wolf Verlag und Umweltmessen	Heuer & Wolf Verlag und Umweltmessen	
<i>Public interest NGOs</i>			
- German association of housewives	Deutscher Hausfrauenbund	Deutscher Hausfrauenbund	
- Consumer association	Verbraucher-Zentrale NRW		
- Environmental association	BUND		BUND
-			

	<i>Interviews</i>	<i>Creativity Workshop</i>	<i>Strategy Workshop</i>
<i>Research institutes & universities</i>			
- Alternative green clothing care project		Universität Bayreuth	
- Consumer research institute	Institut für angewandte Verbraucherforschung (IfAV)	Institut für angewandte Verbraucherforschung (IfAV)	Institut für angewandte Verbraucherforschung (IfAV)
- Ecology research institute	Institut für Ökologische Wirtschaftsforschung	Institut für Ökologische Wirtschaftsforschung	Institut für Ökologische Wirtschaftsforschung (2 participants)
- Department for green textile design	Fachhochschule für Medien und Design Hannover	Fachhochschule für Medien und Design Hannover	

B.2 Shelter

	<i>Interviews</i>	<i>Creativity Workshop</i>	<i>Strategy Workshop</i>
<i>Companies and Trade Associations</i>			
- Energy Producers and Suppliers	Arbeitsgemeinschaft kommunaler Versorgungsunternehmen zur sparsamen Energie- und Wasserverwendung (ASEW), Köln	Arbeitsgemeinschaft kommunaler Versorgungsunternehmen zur sparsamen Energie- und Wasserverwendung (ASEW), Köln	
	PreussenElektra, Hannover	PreussenElektra, Hannover	
	Stadtwerke Hannover	Stadtwerke Hannover (2 participants)	
	WEMAG Westmecklenburgische Energieversorgung AG, Schwerin	WEMAG Westmecklenburgische Energieversorgung AG, Schwerin	
- Architects and Construction Industry	Rasch & Partner Bauen und Wohnen GmbH, Darmstadt	Rasch & Partner Bauen und Wohnen GmbH, Hannover branch	
	Gundlach GmbH & Co., Hannover		Gundlach GmbH & Co., Hannover
	Philips Holzmann AG, Frankfurt am Main		
- Equipment and Material Producers	Osram GmbH, München	Osram GmbH, München	
	Philips Licht GmbH, Hamburg		
	ERCO, Lüdenscheid		
	STIEBEL ELTRON GmbH & Co. KG, Holzminden		STIEBEL ELTRON GmbH & Co. KG, Holzminden
	Bomin Solar GmbH, Lörrach		Bomin Solar GmbH, Lörrach
	Okalux, Marktheidenfeld		

	<i>Interviews</i>	<i>Creativity Workshop</i>	<i>Strategy Workshop</i>
- Others	VDI/VDE-IT GmbH, Teltow	VDI/VDE-IT GmbH, Teltow	
	ZVEI, Fördergemeinschaft Gutes Licht, Frankfurt am Main		
Public interest NGOs			
- Consumer associations	Stiftung Verbraucherinstitut, Berlin	Stiftung Verbraucherinstitut, Berlin	Stiftung Verbraucherinstitut, Berlin
	Die Verbraucher Initiative e. V., Bonn		
- Environmental organizations and sustainability initiatives	Bund für Umwelt und Naturschutz (BUND), Bonn/ Berlin		
	Naturschutzbund Deutschland (NABU), Bonn		
	Greenpeace, Hamburg		
		Local Agenda 21, Group "Building and Living"	
Research institutes & universities			
- Energy research	Wissenschaftliches Zentrum für Umweltsystemforsch ung, Universität - Gesamthochschule Kassel	Wissenschaftliches Zentrum für Umweltsystemforsch ung, Universität - Gesamthochschule Kassel	
			Wuppertal Institut fuer Klima, Umwelt, Energie
- Departments for Architecture and Construction	Universität - Gesamthochschule Kassel, Department of Architecture (Fachgebiet Technische Gebäudeausrüstung)		Universität - Gesamthochschule Kassel, Department of Architecture (Fachgebiet Technische Gebäudeausrüstung)
Political and administrative actors			
- Federal Level	Bundesministerium für Wirtschaft und Technologie, Bonn/ Berlin		Bundesministerium für Wirtschaft und Technologie, Bonn/ Berlin
-	Bundesministerium für Verkehr, Bau- und Wohnungswesen, Bonn		
- Municipal Level	Umweltbehörde Hamburg	Umweltbehörde Hamburg	Umweltbehörde Hamburg
			Amt für Umweltschutz der Landeshauptstadt Hannover/

	<i>Interviews</i>	<i>Creativity Workshop</i>	<i>Strategy Workshop</i>
			Coordination of Network "Haus-Partner-Hannover"
Media			
- Environmental Consumer Magazine	ÖKO-TEST-Magazin, Frankfurt am Main	ÖKO-TEST-Magazin, Frankfurt am Main	ÖKO-TEST-Magazin, Frankfurt am Main
- Special Interest Magazine on Construction and Living	Das Haus, München		
Others			
	Kronsberg-Umwelt-Kommunikations-Agentur GmbH, Hannover	Kronsberg-Umwelt-Kommunikations-Agentur GmbH, Hannover (2 participants)	
	Niedersächsische Energieagentur, Hannover		
		Consumers (2 participants of the project "100 Haushalte auf neuen Wegen", Hamburg)	