The society and its products

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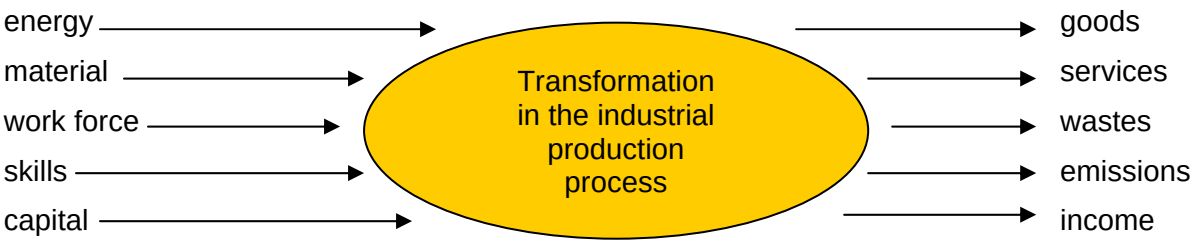
The artefacts of societies

The history of humankind can be read as a history of her products – and vice versa. Our knowledge on earlier societies is based not understanding on their tradition and culture, but on analysing their artefacts, or, more precisely, the waste they left behind. Without arrow tips, bones or potsherds we would know little about their lives. Our way of interpreting human history is to a large degree an anthropology of products and their waste.

Waste is the Ianus face of products and production, its undesired but unavoidable backside. Its sheer volume developed into a key determinant of urban planning already in ancient Rome, was the breeding ground for the plague killing a third of the European population in the 14th to 17th century and accelerated its growth with the emerging industrial revolution. Industrialisation was only possible based on new infrastructure, production facilities, roads and railways, their production and maintenance. The growth of waste heaps would have been the most telling symbol of the new era, even more so than the smoking chimneys (Spangenberg 1994). The pattern of production and consumption pattern which emerged and in its basic traits remained unchanged right into the 21st century (see figure 1) is a wasteful one: more than half of all materials activated never enter the production chain. Vance Packard was right to call our societies "wasteful societies" (Packard 1960): as products become waste after use, as product life is decreasing and as recycling covers less than 2% of all materials activated, the production process is essentially a "wastisation" process of labour and resources.

Figure 1: The industrial transformation system



For instance, while the total volume of resources needed to provide a vacuum cleaner for households is several hundred kilograms, its total time of service delivery (i.e. the use time accumulated over the life time) is about two weeks, and for an electric drill it is less than two days (Striewski 2003). An average German car is produced by turning about 10 tons of resources into 1 ton of an technical artefact used to transport in average 100 kg of humans. This service (enhanced mobility, used mainly in cities where the average car transport velocity is ca. 15 km/h, well below the 17 – 20 km/h of the horse carriage, and for distances of less than 1 km, where it would have been faster to go on foot) is enjoyed for about three to six months (average use in Germany 200 hours per year or 33 minutes per day over 12 years, making the car an "auto*stabile*" rather than an "auto*mobile*"), and then the car is thrown away; recycling of spare parts plays no significant role so far (Spangenberg 1997). The relation of resource consumption to the volume of services generated is rather absurd.

Whereas products as such had been with human development since its first day (for a long time, using instruments has even been considered a key criterion to distinguish between humans and animals), with industrialisation a new mode of production took over. Products

were no longer manufactured by handicraft workers in the neighbourhood and exchanged against farmers' goods. Instead major facilities produced a high volume of more and more specialised products on their assembly belts, based on Taylorism, the disintegration of production processes in small repetitive steps to increase productivity. The products were traded on an increasingly globalised market - at the end of the 19th century, trade volumes (relative to production size) and economic integration were higher than in the early 21st. Traditional goods were now produced industrially, i.e. standardised, in high quantities, and at low prices. New products were invented, and increasingly the satisfaction of all kinds of human needs was commodified.

Mass production, however, faced one serious challenge: who should buy the products? It was Henry Ford who decided to pay a decent wage to his workers so that they could afford the products they were producing. Fordism is the basis of mass consumption, and the traditional cornerstone of our social models: whenever mass income declined, the result was almost inevitably a decline in consumption, production, employment and tax revenue. Insofar the simultaneous occurrence of discourses about European societies being consumer societies and about the end of Fordism and the post-Fordist society are rather remarkable.

Production and consumption today

Every process of production and consumption begins with an intellectual act: recognising the use potential embodied in a part of nature and landscape: be it land for grazing, wood for construction or ores for mining. In the next step, a value is attributed to what is now no longer perceived as a part of nature but a resource (although physically probably nothing has changed so far: the perception counts). This attribution of a value refers to the potential market value of the resource, i.e. the demand other people than the owners have, not to any kind of intrinsic value (Altvater 1985). The resource is exploited if this market value is higher than the cost of exploring and exploiting the resource, which in reality is the cost of waste production: overburden, drainage water, waste heaps are all parts of nature which have been in the way of commercial exploitation of a resource (had the resource been defined otherwise, what is now the waste might have been part of valuable product, and vice versa). So every production process necessarily begins with waste generation, and with negative environmental impacts.

In a Western European economy, 50-60 distinct abiotic materials including energy carriers and water but not air have been defined as such resources, are extracted from nature and crossing the border into the economic sphere at about 20,000 points of entry([1]) (Spangenberg et al. 1999). There they undergo mechanical, thermal and (bio-)chemical treatment to be transformed into products, production waste and liquid and gaseous effluents. A majority of all material is thus transformed into waste, while a minority becomes products which after their use time and maybe a round of recycling become waste as well (Spangenberg 1994, 1996). In physical volumes the goods and services we consume just a mere by-product, albeit a desired one, and the main product of our productive processes is waste. The production process increases the number of substances dramatically: on the output side about 100,000 substances (about 33,000 thereof in significant quantities) and 2 million products leave the human sphere and are returned to the environment (Sturm 2001), at countless points of exit (smokestacks, drainpipes, waste dumps, exhaust pipes,…). 30,000 or 90% of the mass-produced substances are so-called "old substances", which have not undergone a state of the art environmental assessment as they were marketed before appropriate chemicals regulations came into force (on the EU level, in 1981). Although all of theses old substances should have been assessed regarding their health and environment impact, starting with a group of 140 "hot candidates", so far only 20 of them have been fully scrutinised. They delays are caused by the complexity of tests required as much as by the reluctance of the chemical industry to provide the necessary data (Wille 2003). The latest initiative of the European Commission suggests to register all old substances (i.e. to collect

[1] Figures from Germany, with one oil or gas field considered one point of entry.

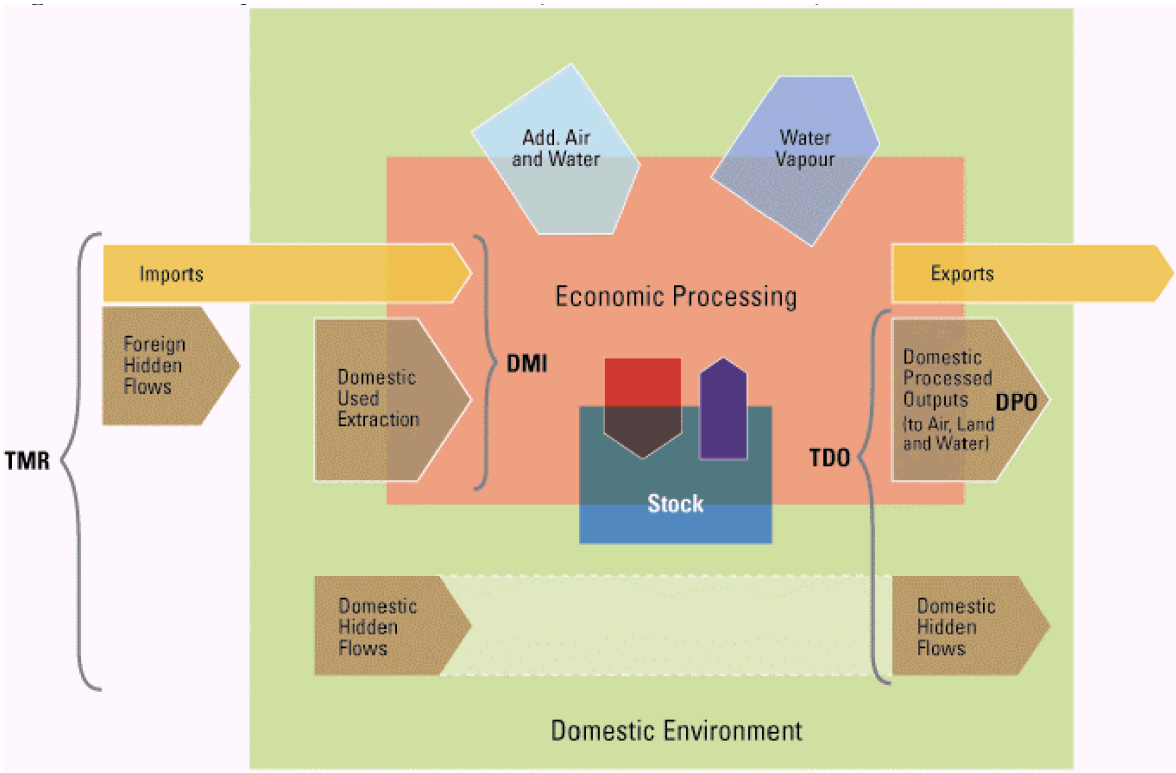
meaningful data for them) by 2012 and to assess their impacts based on these data by 2020 – an undertaking “overly ambitious” by the business lobby. This is a quite scandalous delay in consumer protection, meaning that even the about 1350 cancerogenous and mutagenous (i.e. cancer causing and genome damaging) substances and the about 150 bio-accumulative ones will be on the market at least for another half generation. Obviously, the sheer numbers of substances to be controlled and their emission points are beyond the scope of effective control. As long as we do not manage to design our products so as to minimise the consumption of resources from the very beginning, only limited progress towards environmentally benign production and consumption will be possible. This is why the attitude of designers, architects and producers is so important for sustainable consumption.

Nonetheless substituting at least substances with proven harmless characteristics for these suspicious one in product design would be a significant step forward. However, so far the share of such “eco-products” like solvent-free colours or recyclable packaging material has only a minor share in the total production of the chemical industry. Consumer pressure on retailers and consumption good providers could accelerate the substitution process by downstream pressure on the producers, but a key condition for this is the willingness as well as the knowledge of the consumers, and the readiness of the production sector to offer suitable alternatives.

Quantity counts: the output side

Not only the quality of certain substances causes environmental concerns, the sheer volume of resource consumption is a reason to worry. Most current environmental problems are closely linked to the consumption of energy, material flows and land use intensity. As a matter of fact, except for the impacts of small amounts of highly bio-active substances, and of spatial effects (ecosystem fragmentation by infrastructure construction) the most relevant environmental problems in Europe can be traced back to the overconsumption of these basic resources (Spangenberg, Lorek 2002b). The consumption of primary energy, total material flows and land use intensity can thus be considered a reliable proxy measure for total environmental stresses.

Figure 2: Economy-wide material flows



Source: Bringezu, Schütz 2001

The volume of resources activated for maintaining service flows from stocks as well as from consumer goods, i.e. the total physical throughput of the economy (Daly 1991) can be assessed in different ways. Any meaningful assessment of human-made environmental distortions, diverse as they are in their nature as well as in their causes and origins, must be based on a life-cycle wide approach, from resource mining to final disposal. However, depending on the kind of problem to be dealt with, and on data available different kinds of flows and different system boundaries are selected (see figure 2):

DPO: Domestic Processed Output covers the classical way of describing the interaction of effluents from the production and consumption system and the biosphere. It includes all those substance flows from domestic activities which regularly show up in environmental statistics. The steps to be taken into account include (Schmidt-Bleek F 1994) along the chain of production, consumption and disposal:

- the use of substances which are deliberately dissipated in the environment for a specific purpose, e.g. pesticides or fertilisers in agriculture or salt on icy roads in winter time,

as well as

- emissions and deposition of solid, fluid and gaseous wastes, released into the environment as a result or side-effects of human activities like CO_2 from the energy consumption during manufacturing and use of a product.

In some respect, the resulting pollution pattern from effluents and waste mimics the consumption patterns: the global consumer society leaves its footsteps in every corner of the World, from DDT in penguin eggs to Dioxins for breast-fed babies and – a more subtle, but nonetheless effective kind of pollution – BSE, the mad cow disease, in cattle unnaturally fed as carnivores.

TDO: The Total Domestic Output adds the domestic hidden flows to the DPO. They comprise all those physical flows like overburden or strip water from mining which due to their lack of economic value are most frequently not accounted for in the production statistics, and those material which have not at all entered the production process. These materials are usually characterised by a negative economic value, i.e. the cost of waste disposal, and are most frequently not even taken into account in the waste statistics (Striewski 2003). Once they are put to a productive use like residual biomass from food and wood production, they show up in the production statistics. Environmentally they represent open bills, irrespective of their economic valuation, causing environmental impacts like acid rain, groundwater contamination and a variety of not yet known unspecified damages which we will have to deal with in future. Some of these effects are more or less stationary like heavy metal pollution in the ground or in sediments, while others spread ubiquitously. Domestic output accounting is the basis for some more recent policy instruments like waste taxes and levies.

Matter matters: the input side

DMI: Domestic Material Input accounts for those kinds of physical inputs into the economy which have been extracted domestically, plus the volume of imported goods (both without the hidden flows associated with them, and imports without the production waste generated). As has been mentioned, the number of points of entry and the diversity of substances is much lower on the input side, and accounting for inputs covers the immediate outputs as well as those realised later due to a period of staying in the stocks. Therefore input accounting provides a more comprehensive assessment of the environmental damages caused by today's activities, and offers itself to innovative instruments for reducing the total throughput, as the recent Swedish tax on gravel (Palm 2002).

For Denmark as a highly trade dependent country, the DMI in 1997 has been about 185 mln t or 35 t/cap. Allocated to final demand, resources have been used as shown in table 1. However, these figures do not reflect the full picture of the Danish footprint on the global environment: as the DMI does not take the imports into account, the goods and services

purchased by the revenues from the exports do not show up in the statistics. Once included (i.e. when calculating the TMR, see below) Denmark falls quite in line with its neighbours, and the relevance of the contribution from trade is greatly diminished. Nonetheless the table very clearly indicates the importance of the physical dimension of international trade, in addition to the monetary one, the matter-money-dichotomy of all economic activities (Döppe et al. 2003)

Table 1: Danish DMI by final use 1997

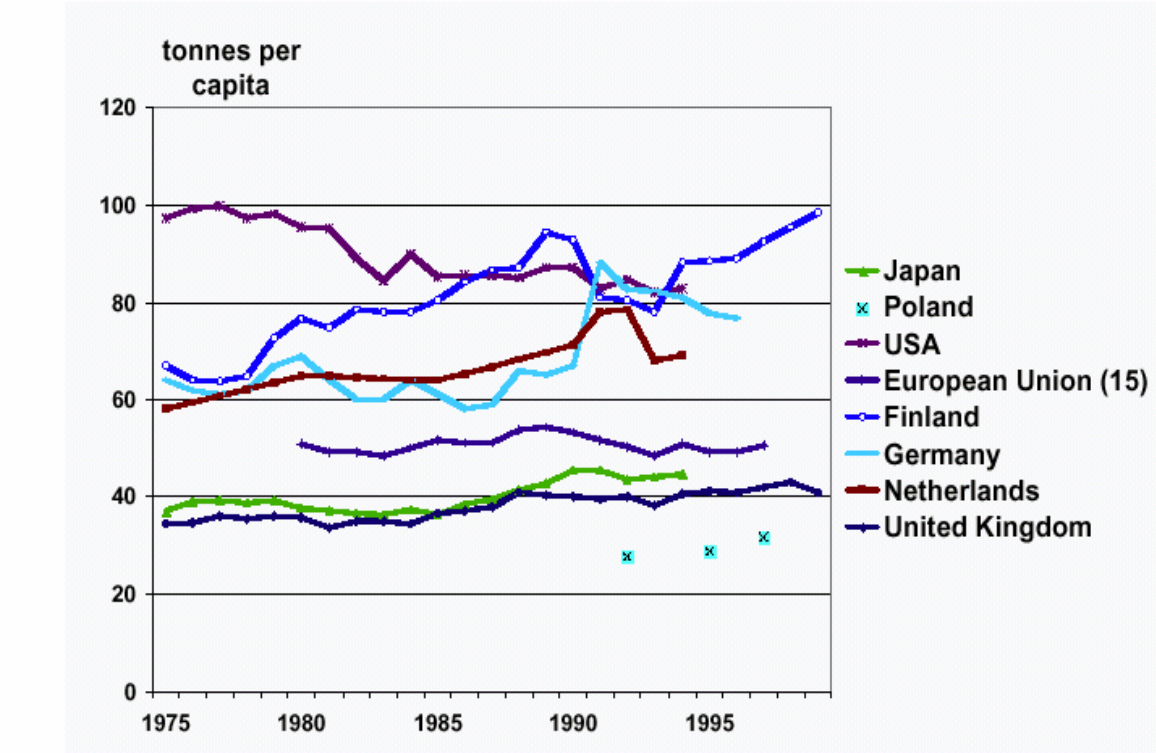
Final use	Volume [mln t]	Share in national DMI [%]
capital formation	40	22
export of goods and services	95	51
government consumption	10	5
private consumption	40	22

Source: Pravgaard 2002

TMR: Total Material Requirement is the all-encompassing measure including the domestic material input plus the hidden flows, both domestically and in the country of origin. As compared to the DMI it covers not only the domestic impacts of economic activities, but their global environmental consequences.

Naturally, the figures for different measurement methodologies vary considerably. So for instance for Sweden domestic used extraction (DMI minus imports) in 2001 was 20 t/cap, with DMI 25 t/cap and TMR 45 t/cap (Palm 2002).

Figure 3: Total Material Flows between 1975 and 2000 in 7 countries and the EU 15



Source: Bringezu, Schütz 2001

The figures vary as well considerably between different countries, due to their level of consumption and to the structure of their domestic industry (for instance, Germany has a high contribution from lignite mining, and the Netherlands a similarly high one from meat

production, Adriaanse 1997). Both countries have a TMR of about 70 tons of material use per capita per year, with the German TMR gradually returning to its pre-unification level. The lowest level is found for Japan and the UK at about 40 t/cap; Finland has outgrown the USA and now exhibits the highest resource consumption level of about 100 t/cap (see figure 3).

Overall the figure illustrates the trend to a relative, but not absolute delinkage of economic growth and resource consumption (except for the USA): despite a growth of at least 50% of the GDP since the mid 1970s, the TMR did not follow suit but remained rather constant (Japan, EU 15, UK) or grew less than the GDP. Only the USA experienced an absolute delinkage, i.e. while the economy grew significantly, the TMR decreased in absolute terms, from about 100 tons per capita to about 80 t/cap, a value rather similar to those in some European countries like the Netherlands or Germany. Another exemption is Finland: despite its focus on IT industries, its TMR grew from around 60 t/cap to nearly 100 t/cap, a rapid increase otherwise typical for newly industrialising economies. The Finnish example illustrates that even a modern high-tech business structure cannot exist without underlying traditional and material intensive production, and provides a warning to all those who hope that the ongoing structural change towards a knowledge based economy would in itself guaranty a significant dematerialisation of the industrialised economies.

Piling up: the relevance of stocks

Although environmentally relevant only when they are disseminated, the materials accumulated in the stocks of society deserve a closer look, too. Stocks are public goods like roads or buildings, private goods like refrigerators, cars and houses, or economic goods like machinery, railway lines and telecommunication infrastructure. Some of the goods and services are only consumed for a short time before they wear off or become unfashionable (fluctuating markets), others are rather replacements in saturated markets (see table 2).

On the one hand, their mere maintenance requires an increasing volume of monetary as well as resource expenditures without providing additional welfare: they need to be cleaned, upgraded, repaired or renovated. This creates a positive feedback cycle: as a rule of thumb, the more materials we have fixed in the stocks, the more flows we need to maintain them. On the other hand, the stocks are bound to become waste as everything else, although after a longer time span, so the substances with rather unknown long-term risks will be with us for quite some time beyond even the 2020 deadline of the EU chemicals policy.

Table 2: Market types and life expectancy

Economic life time	*Short*	*Long*
Expectancy type of market		
Fluctuating	Tamagotchis	Personal computers
	Plateau soles	Transformators
	DDT	PUR foam
	Rubic' cube	Play station
Saturated	Blue jeans	Washing machines
	Newspapers	Water pipes
	Phosphorus	Bricks

Source: van der Voet et al. 2002, modified

For instance, experts warn that around the midst of the century CFC emissions from construction foams are due which are about as much as the total releases during the last century. Similarly, the decreasing trend of emissions of heavy metals is expected to be reverted soon, due to releases not from production, but from the stocks of products. In order to control emissions in the long run, therefore a stock management is required in many cases (van der Voet et al. 2002).

The driving forces: capitalist production

Industrialised, market-based capitalist societies have embarked on a very specific development path in their pursuit of happiness: accumulating material artefacts is considered

as increasing wealth, and wealth has become synonymous to well-being. Like the production of material goods, knowledge, caring for people, entertainment and nature are turned into commodities, making the access to them wealth-dependent. Reflecting this change, human relationships and the environment are increasingly described in economic terms, as being natural and social "capital" and as providing "services", like products are service providing man-made capital – capitalism reduces everything to the "cash nexus" (Giddings et al. 2002). Little wonder then that the richer individuals and societies become, the heavier is their pressure on the environment, and all hopes that the environmental pressure would sooner or later rather automatically decline "once we can afford it" (the so-called Environmental Kuznets Hypothesis EKC) have turned out to be just wishful thinking. To the contrary: in the course of their development the World's richest societies are increasingly degrading the life-sustaining natural systems their very existence depends on.

With economic globalisation, this process has reached a new quality. Mergers and acquisitions have led to an immense capital concentration, and the expected synergies from these friendly or hostile takeovers can only be realised if the standardisation of core components is extended to all products of the respective transnational corporation. So for instance the car frames and the motors are the same in Skoda, Volkswagen, SEAT and AUDI cars, in Fords and Volvos, and only the outer skin, the design is different. The same applies to computers, shoes and banking services: to exploit the economics of scale standardisation is applied, resulting in what looks like a broad variety of products at first glance, but is based on a rather narrow range of basic models and components. Product diversity is created as "pluralism by design", a secondary or virtual diversity of essentially identical products.

This trend obviously limits the impact designers can achieve on the overall eco-efficiency of a product, as in most cases their influence regarding the choice of the basic platform will be limited. Nonetheless, reducing for instance the c_w-Parameter of a car skin can have significant environmental benefits.

On the other hand, eco-labels and standards, environmentally conscious consumers and simple cost concerns have led to a widespread application of life-cycle wide assessments of resource consumption, with the intention to improve the basic design of products and services. Unfortunately, still most such assessments are based on a "cradle to gate" philosophy, i.e. they do not focus their attention on the (not cost relevant) resource consumption throughout the use phase and during product disposal or recycling. LCA could play an important role to improve this situation, providing a marketing argument (reduced running cost) to producers and retailers. However, this requires so much rethinking of established attitudes that it will probably need new political initiatives like take back regulations to make business aware of its responsibility not only in ethical, but also in economic terms. Furthermore, even if designed for take back, reuse and recycling, a short life time of products could still enhance the total resource consumption; long-lived goods reduce resource squandering, but their market penetration is dependant on a series of social innovations: producers have to realise that they can make money from not producing, but maintaining and upgrading products, consumers have to be convinced that upgraded products are at least as good as new ones (investing in high quality makes more sense if the product is durable), and the maintenance services have to be established on a commercial basis. If this trend ever emerged, the challenge to designers would be enormous, as they would not only be involved in fashionable product design, but in the development of products which may be in need of changing their outer appearance according to the trends of time, while maintaining and improving their function.

The driving forces: consumerist consumption

The World Commission on Environment and Development WCED (also known as the Brundtland Commission) has provided the most frequently quoted definition of sustainable development by characterising it as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED 1987, p. 43). Human needs include basic needs like food, clothing and shelter, but also

additional material and non-material demands, which if satisfied are supposed to make life more pleasant and entertaining, and a part of these are consumption demands. Others are the challenge of rising children, gaining reputation from voluntary engagement or the satisfaction from pursuing a personal hobby. Which demands are articulated depends on a variety of factors, including the idea of what makes the quality of life, what is accepted/admired by the social reference groups, or which options are available and affordable. The resulting consumption patterns (including preference formation, purchasing, using and disposing of goods) have significant social and environmental impacts. One task of designers is to provide tailor-made attractiveness characteristics to be applied to essentially similar goods, to make them suitable to different consumer groups.

A car for example, besides being a sink for resources and a source of pollutants has the effect of a "social presence dilution machine". It permits its owner not to stay put in a certain neighbourhood for living, shopping, consuming and leisure, but to reach out over a significantly larger distance, covering more people. This way, the car owner can be more selective in where to shop, whom to meet and where to go – on the one hand, a gift of choices enhancing individual freedom, on the other a mechanism which contributes to the disintegration of society into different and rather unconnected sub-cultures. Individualism and sub-culture development are at the same time driving forces for increasing mobility demands. Add to this the psychological factors like the feeling of independence and the compensation function for unsatisfactory situations in other spheres of life, and the social distinction function of owning a specific car type (the status symbol function is one reason to maintain the virtual diversity), and a permanent need to sustain consumption and to upgrade it results for cars as for other consumer goods. Their symbolic value, the fetish character is frequently more important than their initial function as "service delivery machines" (Schmidt-Bleek, Tischner 1995).

As a consequence, today many people buy things they don't need with money they don't have to impress people they don't like, regardless of the costs involved and the environmental impact caused. Having this in mind we can rephrase the request for a new production and consumption pattern by asking which are the most sustainable satisfiers (Max-Neef 1991) for the people's needs and wants. Can we substitute the currently used ones for others with a comparable functional quality, causing less environmental and social stresses? And for the wants – are they all equally justified ?

What is really the role products and their consumption play in our societies is still far from fully understood. Whereas rather obviously in a capitalist economy the profit motive is driving the dynamics of growth and innovation on the production side, is money the overall driver for our societies, or just a lubricant? Are humans a-moral utility maximisers, social integration seekers, or fun addicts? What is the driving force on the consumption side? Needs, prestige, distinction, compensation, fun, in which relation to each other? Does consumption really help to express oneself, does it provide meaning or identity, or is it just a substitute for immaterial needs (Max-Neef 1991)? Are watching the rise and fall of the consumer society (Jackson 2002)? Which kind of consumption contributes to the quality of life, and which one does not (Daly 2001, Spangenberg, Lorek 2003)? How can we enjoy the quality of life gains without detrimental effects on the source of all resources, the environment? What in the end is sustainable consumption, what is overconsumption (Miljöverndepartementet 1995)?

The role of consumption for sustainable development has been an issue of heated debate ever since the UNCED conference in Agenda 21 stated that "*the major cause of the continued degradation of the global environment is the unsustainable pattern of consumption and production, particularly in industrialised countries. […] Changing consumption patterns will require a multi pronged strategy focusing on demand, […] reducing wastage and the use of finite resources in the production process*" (United Nations 1993) – or even before, since Vance Packard published his famous "The Waste Makers" (Packard 1960). The OECD (1999) and the United Nations (UNDESA 1998) developed indicators to assess the sustainability of household consumption as one driving for of unsustainable development, but

with methodological weaknesses on side of the OECD (Spangenberg, Lorek, 2002) and limited impact on side of the UN (although recently UNEP tries to revive the debate).

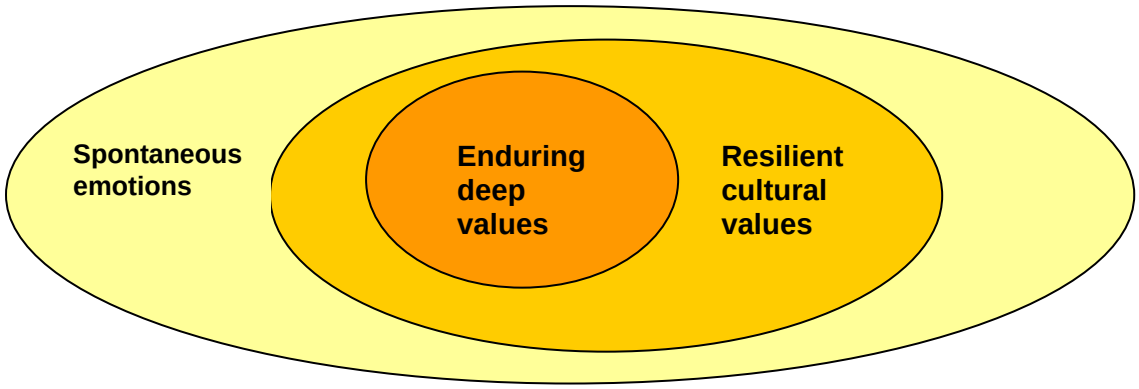
In 2002, ten years after the UNCED conference, these efforts culminated in an UNEP proposal during the preparation process of the World Summit for Sustainable Development WSSD in Johannesburg, to establish a global 10 years *„work programme on promoting sustainable consumption and production patterns“* (UNEP 2002). During the Johannesburg negotiations, however, this was watered down (mainly by US and some G77 pressure) and ended up in the "Johannesburg Plan of Implementation" (PoI, see WSSD 2002) as the intention to "encourage and promote the development" of such a plan, based on the "common but differentiated responsibilities" and "where appropriate delinking economic growth and environmental degradation" (PoI § 14). However, the EU intends to develop such a plan for Europe, setting a precedent for the OECD countries and the global consumer class in general, and the OECD has already published detailed studies on potentials for such a delinkage (OECD 2001). Issues to deal with mentioned include the polluter-pays-principle ("inter alia"), life cycle analysis and national indicators for measuring progress ("where appropriate", PoI § 14a), and labelling ("where appropriate, on a voluntary basis, effective, transparent, verifiable, non-misleading and non-discriminatory, not to be disguised as trade barriers", PoI § 14e).

It remains to be seen if the European Union is really willing to set something into motion – the nomination of the former chairman of the Environment Agency, Domingo Jimenez-Beltran as a special adviser on the issue is hopeful sign, but so far the only one. In the annual synthesis report on the state of the Union and in the corresponding structural indicators sustainable consumption plays no role (Spangenberg 2003b).

The driving forces

For economists it is simple: preferences are exogenously given, and they don't change (one wonders why so much money is spent on advertising). With full information, every consumer is a homo oeconomicus, taking decisions exclusively based on selfish utility maximisation: social or ethical values are not relevant for this "ideal" persons' "rational" behaviour. In other words: consumers are all taken to behave like the kind of guy you would not invite for dinner, and this is called "rational" (a truly Orwellian use of language).

Figure 4: Values, motivation and their resilience



Source: Nielsen 2002, modified

Reality is more complex, however. Whereas basic needs like food, shelter, etc. are relatively easy to define, the means to satisfy these needs vary considerably between cultures, income groups and gender. Furthermore, the preferences expressed at the counter result from a blend of interwoven intrinsic and extrinsic motivations, deep values and spontaneous emotions, influencing each other and co-evolving over time and income, but with different sensitivities, time scales and levels of resilience (see figure 4).

Products are consumed because buying, owning and/or using them has a personal value for which a monetary value is paid. In determining what is consumed, different spheres of influence overlap, developers, producers, retailers, consumers all have a role to play. The relative level of influence of the different actors depends on social and institutional settings determining their power position, on arguments (including the 435 bln US-$ turnover of the global advertising industry) and on the responsiveness of their respective audience to these arguments, which is influenced by a variety of intrinsic and extrinsic factors.

Intrinsic factors comprise cognitive capacities, psychological factors, individual interests and philosophic or ethical norms, whereas extrinsic factors include socio-economic aspects like the disposable income and time availability as well as social relations (self esteem, respect, family bargaining). Intrinsic factors determine the preferences, while extrinsic ones reflect the economic, social and legal possibilities and constraints determining which preferences can be realised. As both overlap (e.g. individual preferences are shaped by social norms and relations and vice versa) no quantitative determination of the relative importance of both for the resulting behaviour is possible; they co-evolve (Hinterberger, Stewen 2001).

Regarding private consumption, while extrinsic factors like disposable income have a significant influence on the availability of consumption options, intrinsic factors shape the choice between the alternatives available. One key factor determining such decisions is the individual assessment if existing alternatives are affordable in terms of purchasing power, time use preferences, resource endowment, social status and acceptability, legal and ethical constraints, and the value attributed to a certain consumer item by the potential customer (Spangenberg, Lorek 2003). From its very root, value (from Latin “valere”) means to have strength and meaning. However, meaning is not inherent to products, but a symbolic function attributed to them by society and her value systems (stimulated e.g. by advertising), or by a specific group. Products can be reflections or symbols of group identity, reflecting the *visions, leitbilder, grand narratives or concrete utopias* a group like a nation, an ethnic group, or a life-style based subgroup has, the idea of quality of life they share and live. Exposing a certain good (owned or borrowed) can thus symbolise the membership of a certain group (or the aspiration to be a member), support for a certain idea, etc.: products do not create identity, but they are indispensable tools to express it. Expressing identity as an active act creates in turn the opportunity to experience one’s identity, an extremely positive effect made possible by exhibiting certain products (and extremely frustrating to those who wish to join this group, but cannot).

Thus products provide solutions to problems and meaning to every day life; both, the problems to be solved and the suitable solutions, and the visions and the meaning derived from them change over time. They have to adapt to changing circumstances to avoid a lock-in, in order not to be fixed to quasi-sacred consumption patterns, as is the case e.g. with the “American way of life”, as president Bush senior made clear when coming to Rio de Janeiro in 1992 to join the UNCED conference, stating that “the American way of life is not up for negotiation”. Such a sclerotic consumption pattern, combined with the insight into the limits to resource availability, i.e. embarking on the “full world paradigm” (Daly 1996) and realising the restrictions this implies, makes an imperial attitude fully plausible as a means to safeguard the supply of those resources needed to maintain the prevalent consumption pattern (Spangenberg JH 2003a).

This attitude has significant social and psychological implications; for instance, every empire perceives the rest of the World as full of enemies and feels the need to protect itself against them by imperial means, whereas a different world view based on fair partnership would consider them to be (more or less pleasant) negotiation partners. The latter view, however, needs the adaptability arising from evolving solutions and meanings, an openness to new knowledge and the willingness to learn (see figure 5). In this sense the sustainable knowledge society offers a different paradigm and an alternative to the expansionist, resource squandering current consumer society, based on a new leitbild or vision of optimality, not maximality (Daly 1991). Adaptability has even more implications: it demands –

like sustainable development – a rather high level of social justice and equity, as social stratification leads to higher consumption pressures (Fischer-Kowalski, Haberl 1997).

The evolution of preferences

Whereas in the pursuit of happiness during the 1950s and 60s the quantity of consumption was taken as a measure of its quality, in the 1970s its social attributes, in the 1980s its price and in the 1990s its fun-factor defined its added value for the quality of life. At the turn of century the consumption drive is slowing down, the risks of life (stock exchange losses, terrorism and war) dominate the public mood, and the quality of life seems likely to re-emerge as a core motive in the first decade of the new century. However, only time will tell whether this will result in another turn in the 300 years old competition of paradigms between sustainability and expansionism (Grober 2002, Spangenberg 2003a). A move from the high-throughput consumption society attitude of "*to buy is to be*" to the wealthy, value-based durability promoting "*to have is to be*" is possible if not plausible, and the rather philosophical attitude of "*to be is to have*" is lurking in the visions of a sustainable knowledge society where social status is more based on knowledge than on the possession of material goods.

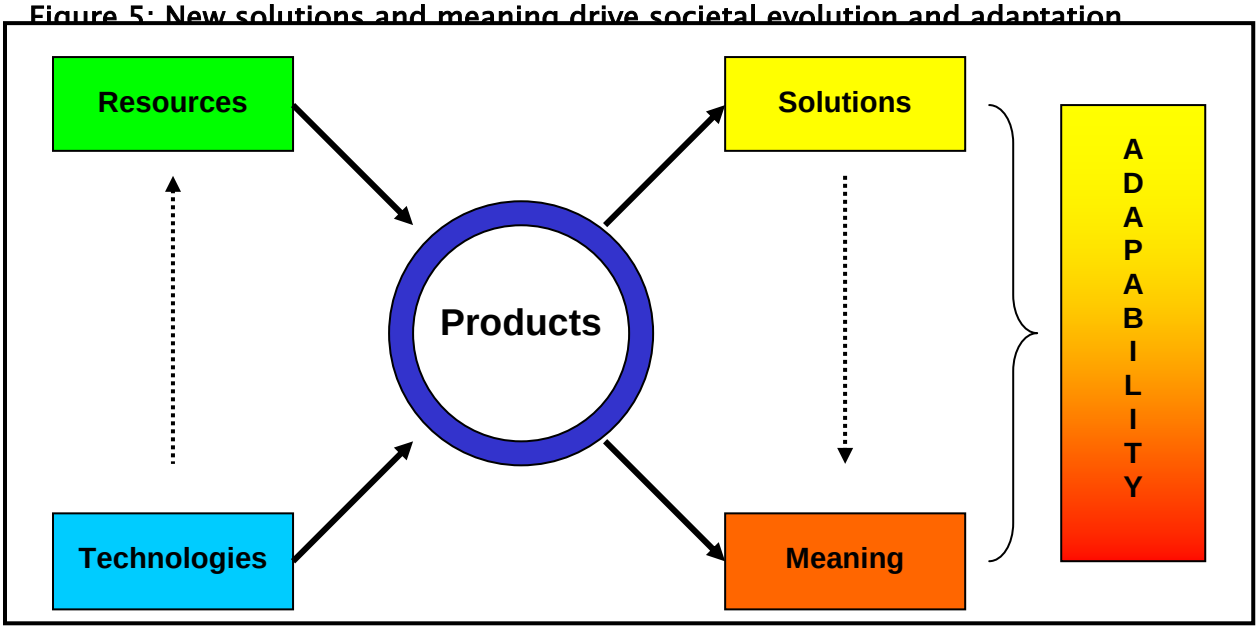
A turn around is neither easy to achieve nor to be expected without deliberately investing significant political, scientific, technological and educational efforts. Less resource consuming products and services are possible, as the examples of resource squandering service provision earlier in this paper have illustrated. So far, however, we are caught in a "catch 22" situation: producers and retailers offer only a few and not too radically dematerialised goods and services, claiming that "there is no market for alternatives", while consumer and environmental NGOs put the blame on the business sector for not offering suitable alternatives. As long as to the consumer "*the enemy of the good*" is rather the cheaper than *the better* (whatever the definition of "better" may be) political interventions to "*get the prices right*" (von Weizsäcker 1994) will be a necessary means of adjusting consumption and production trajectories to environmental needs.

Such adjustments is not only a matter of political will and determination, as technological, social and economic development cannot change course at will at any time, but are restricted by the fact that they have embarked on path-dependant development processes and developed specific technology trajectories. In this perspective, the strategic challenge of sustainable development is to use, to find or even to create a bifurcation permitting to leave the established socio-economic trajectories and change course towards a new paradigm. This can be based on the values expressed by ordinary people when asked for their most prominent wishes and aspirations: health and fitness, work and social security, education and information, a social environment providing acknowledgement and contact, and last but not least a healthy environment. Unlimited consumption, wealth or just only a high income level are not on the wish list – they are means for security and well being, but no ends in themselves.

Nonetheless consumers have a certain responsibility for environmental degradation through their purchasing and use patterns – however, how much this is, e.g. as compared to public authorities, producers and retailers etc. cannot be quantified. The reason is simple: although it is possible to calculate the resource consumption for each major consumption area (like housing, nutrition, mobility, health, education etc.) the pattern of influence and thus of responsibility varies between individuals, over time and between regions, cultures and gender: no simple percentage figure will ever be able to reflect this dynamics, let alone the overlapping spheres of influence of different actors. However, this is not to say that no assessment can be made at all, but it must take a different form from allocating a specific and quantifiable share of responsibility to household. For this behalf, it is essential to distinguish between those fields of household consumption, which are environmentally dominant (as the five ones listed above are) and others of minor environmental relevance (like clothing, hygiene, leisure without transport, and fashion). In a second step, common sense and educated guesswork help to find out which of the five fields are really shaped household decisions, and which ones are dominated by other actors. As a result,

construction and housing, nutrition and mobility turn out to be the three priority fields for household sustainability (Lorek et al. 1999).

Figure 5: New solutions and meaning drive societal evolution and adaptation



Source: Nielsen 2002

However, each of these fields is constituted by a number of activities which are influenced by different actors in a rather differentiated way. So once the most important activities have been identified, we are down to earth again and can describe the decision making situations including the weight of different actors, e.g. on an ordinal scale from “o” to “++” (Lorek, Spangenberg 2001). These actors include households on the demand side, and planners, architects, producers, advertisers and regulators on the supply side. Designers are usually not mentioned: their potential influence is an internal business affair, dependant on the respective firm, its corporate identity (which role does ethical and environmental responsibility play?).

For all economic actors, however, business and consumers alike, the framework conditions must be set to support sustainable consumption if a change of the status quo is to be expected. Whereas already today “green products” have established themselves in a variety of niche markets, for a broader effect a level playing ground must be provided. This includes setting general environmental minimum standards for all products, be it by means of legal regulation or by voluntary action as a result of consumer pressure – however, in the latter case of “agree and control” instead of “command and control” the control becomes all the more important, not least to shake off free riders. Such frameworks also help ambitious designers, provided they are capable of offering economically promising, environmentally sound solutions (on a life cycle basis). Although it may sound surprising, this includes designing consumer items which *are* environmentally sound but *do not look like that*, in other words: which have not predefined image. As long as consumers use products to project their dreams and identities, a product with a given image will only be attractive for those which agree to these priorities, while it will be rejected by the others (the majority). An “unidentifiable environmental object”, to the contrary, permits projection of whatever lifestyle and value the consumers may have, and the environmental soundness can be marketed as a sub-heading, a feel-good-factor: “take it for other reasons, and don’t worry about the environment”. In the end, consumer preferences are one thing, and the other is the political preferences expressed by the same individuals as citizens, determining which kind of environmental policy will be implemented. At least in one respect they have to make a choice for sustainable development, as business and politics in a democratic society and a market economy will not be a driving force towards sustainability as long as consumers and citizens do not demand it.

Outlook

Sustainability is not an ideological blueprint for a future society: nobody knows how the future will look like, although we are all involved in creating it. For this creation process we need an orientation, a compass indicating the direction of what is probably sustainable in the long run (i.e. also for future generations, and if applied to all the Earth's citizens) and what is definitely not. For implementing this insight, for making it operational and relevant in day-to-day decision making we need a democratic, highly participative political process to translate the general orientation, based on the values of the society, into concrete strategies and policy measures. The result is still open, but probably, as the philosopher A. Andersch put it, "the future will be less different from today than we now expect - the present situation, however, is rather different from how we still perceive it", we are all invited to develop solutions today which will shape a sustainable society tomorrow. "You'll be done with tomorrow if your only concern is today", public wisdom says, but "the great danger in times of turbulence is not turbulence, it is to act with yesterday's logic" (Peter Drucker). But there are alternatives: "When the winds of change start to blow, some people begin to build wind breakers, but other build windmills" (Claude Fussler).

References

Adriaanse AS, Bringezu, S., Hammond, A., Moriguchi, Y., Rodenburg, E., Rogich, D., Schütz, H. 1997. *Resource Flows: The Material Basis of Industrial Economies.* World Resources Institute: Washington, D.C

Altvater E. 1985. Lebensgrundlage (Natur) und Lebensunterhalt (Arbeit). *WZB Papers* **WZB-IIUG,** pp.

Bringezu S, Schütz, H. 2001. *Material use indicators for the European Union, 1980-1997,* Eurostat Working Papers 2/2001/B/2, Luxembourg.

Daly HE. 1991. *Steady State Economics.* Covelo: Washington

Daly HE. 1996. *Beyond Growth. The Economics of Sustainable Developoment.* Beacon Press: Boston

Daly HE. 2001. Unwirtschaftliches Wachstum und Globalisierung in einer vollen Welt. *Natur und Kultur* **2,** 2, pp. 3-22.

Döppe T, Giljum, S, Hammer, M, Hinterberger, F, Luks, F, Schnepf, D, Spangenberg, JH. 2003. *Freier Handel, nachhaltiger Handel - ein Widerspruch ? Hintergrundpapier für die Debatte um Handel und nachhaltige Entwicklung nach Johannesburg.* Heinrich-Böll-Stiftung: Berlin

Fischer-Kowalski M, Haberl, H. 1997. Tons, Joules, and Money: Modes of Production and Their Sustainability Problems. *Society & Natural Resources* **10,** 1, pp. 61-85.

Giddings B, Hopwood, B., 0'Brien, G. 2002. Environment, economy and society: fitting them together into sustainable development. *Sustainable Development* **10,** 4, pp. 187-196.

Grober U. 2002. Tiefe Wurzeln: Eine kleine Begriffsgeschichte von "sustainable development"-Nachhaltigkeit. *Natur und Kultur* **3,** 1, pp. 116-128.

Hinterberger F, Stewen, M. 2001. Zur Notwendigkeit und Umsetzungsproblematik langfristiger Umweltziele - eine evolutorisch-institutionalistische Sicht. Schloß Wartensee/St. Gallen.

Jackson T. 2002. Paradies-Verbraucher? Aufstieg und Fall der Konsumgesellschaft. *Natur und Kultur* **3,** 2, pp. 55-74.

Lorek S, Spangenberg, JH. 2001. Indicators for environmentally sustainable household consumption. *Int. J. Sustainable Development* **4,** 1, pp. 101-120.

Lorek S, Spangenberg, JH., Felten, C. 1999. *Prioritäten, Tendenzen und Indikatoren umweltrelevanten Konsumverhaltens. Endbericht des UBA-Forschungsvorhabens 209 01 216/03,* Endbericht des UBA-Forschungsvorhabens 209 01 216/03, Wuppertal Institute: Wuppertal.

Max-Neef M. 1991. *Human Scale Development.* Routledge: New York, London

Miljöverndepartementet Norwegian Ministry of the Environment, 1995. Report, Oslo Ministerial Roundtable. Miljoverndepartementet, Oslo. 56

Nielsen AS, 2002. Mastering true value creation. ICIS, Copenhagen.

OECD. 1999. *Towards more sustainable household consumption patterns - Indicators to measure progress.* OECD: Paris

OECD 2001. *Environmental indicators to measure decoupling of environmental pressure from economic growth ENV/EPOC(2001)26,* OECD: Paris.

Packard V. 1960. *The Waste Makers.* Penguin Books: Harmondsworth

Palm VK, 2002. Material Flow Accounting in Sweden. Technical University of Denmark, Copenhagen.

Pravgaard O, 2002. Material Flows in Denmark. Technical University of Denmark, Copenhagen.

Schmidt-Bleek F. 1994. *Wieviel Umwelt braucht der Mensch? MIPS, das Maß für ökologisches Wirtschaften.* Birkhäuser: Berlin, Basel, Boston

Schmidt-Bleek F, Tischner, U. 1995. *Produktentwicklung: Nutzen gestalten - Natur schonen.* WIFI: Vienna

Spangenberg JH. 1994. Mensch und Müll. *Widerspruch. Münchener Zeitschrift für Philosophie* **14,** 25, pp. 51-57.

Spangenberg JH. 1996. Klimawirksamkeit abfallwirtschaftlicher Maßnahmen. Ein Diskurs über Umwelt, Klima, Stoffströme und Abfallwirtschaft. In *Abfallwirtschaft - Neues aus Forschung und Praxis. Biologische Abfallbehandlung III*, Wiemer K, Kern, M. (eds). Baeza-Verlag: Witzenhausen; pp. 63-78

Spangenberg JH. 1997. Design on Demand. In *Ingenieurinnen und Ingenieure für die Zukunft*, Neef W, Pelz, Thomas (eds). TU Berlin: Berlin; pp.

Spangenberg JH. 2003a. Sustainability strategies - roots, state and challenges. ERP Environment, Nottingham, UK. 432-441

Spangenberg JH. 2003b. *Integrating economic, social and environmental policies: who calls the tune? A background paper for the EU spring summit,* SERI Paper Series, SERI Sustainable Europe Research Institute: Cologne, Vienna.

Spangenberg JH, Femia, A, Hinterberger, F, Schütz, H. 1999. *Material Flow-based Indicators in Environmental Reporting.* Office for Official Publications of the European Communities: Luxembourg

Spangenberg JH, Lorek, S. 2002. Environmentally sustainable household consumption: From aggregate environmental pressures to priority fields of action. *Ecological Economics* **43,** 2-3, pp. 127-140.

Spangenberg JH, Lorek, S. 2003c. *Lebensqualität, Konsum und Umwelt: intelligente Lösungen statt unnötiger Gegensätze.* Friedrich Ebert Stiftung: Bonn

Striewski S. 2003. Optimieren des "Hin-Wegs" - Etablieren des "Rück-Wegs". In *Vision 2020. Arbeit, Umwelt, Gerechtigkeit - Strategien für ein zukunftsfähiges Deutschland*, Spangenberg JH (eds). oekom: München; pp. 145-164

Sturm K-D. 2001. Persistente Ignoranz. *punkt.um* **2001,** 9, pp. 21-22.

UNDESA UN Department of Economic and Social Affairs. 1998. *Measuring Changes in Consumption and Production Patterns. A Set of Indicators.* United Nations: New York

UNEP United Nations Environment Programme 2002. *Proposal for a work programme on promoting sustainable consumption and production patterns,* UNEP Documents, Nairobi.

United Nations, 1993. Earth Summit: Agenda 21, the United Nations programme of action from Rio. United Nations, New York. 294

van der Voet E, Kleijn, R, Heule, R, Ishikawa, M, Verkijlen, E. 2002. Predicting future emissions based on characterists of stocks. *Ecological Economics* **41,** 2, pp. 223-234.

von Weizsäcker EU. 1994. *Earth Politics.* Zed Books: London

WCED World Commission on Environment and Development. 1987. *Our Common Future.* Oxford University Press: Oxford

Wille J. 2003. Ein "Saustall" soll ausgemistet werden. *Frankfurter Rundschau* **2003,** 87, pp. 17.

WSSD, 2002. World Summit on Sustainable Development Plan of Implemetation. United Nations, Johannesburg, South Africa. 54