INTRODUCTION
Society and its Products

The Artefacts of Societies

The history of humankind can be read as a history of her products – and vice versa. Our knowledge of earlier societies is based not on an understanding of their tradition and culture, but on analysing their artefacts, or, more precisely, the waste they left behind. Without arrowheads, 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 that killed 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, and finally, the disposal of waste produced in this process. 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, which emerged and in its basic traits remained unchanged right into the 21st century (Figure 3), 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.

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 its lifetime) 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 a technical artefact used to transport on 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 walk on foot) is enjoyed for about three months (average use in Germany 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

"The production process is essentially a 'wastisation' process of labour and resources."

Figure 1. Archaeological site. *Our understanding of earlier civilisations is based on the products, or rather waste, they left behind. Photo: Armin Schmidt, University of Bradford.*

so far [Spangenberg, 2004]. 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 had 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 for farmers' goods. Instead major facilities produced a high volume of more and more specialised products on their assembly lines, 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 as high as in the early 21st. Traditional goods were now produced industrially, i.e. standardised, in large 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 would 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 declines, the result is almost inevitably a decline in consumption, production, employment and tax revenue. With this in mind, 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.

Figure 2. Waste dump. *Production-consumption in Europe today is essentially a linear flow from resources to waste; only some 2% of products are recycled. 98% ends in incineration and on ever growing land fills, the most telling symbol of industrial society. Photo: European Communities © 2005.*

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 that people other 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 (if the resource had 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, that 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 (German data, with one oil or gas field considered to be one point of entry) [Spangenberg et al., 1999]. There they undergo mechanical, thermal and (bio-) chemical treatment to be transformed into products, production waste and liquid or gaseous effluents. A majority of all materials is thus transformed into waste, while a minority becomes products which, after their use time and perhaps a round of recycling, become waste as well [Spangenberg et al., 1999]. In physical volume, the goods and services we consume are 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: in Europe, on the output side about 100,000 substances (about 33,000 of them in significant quantities) and

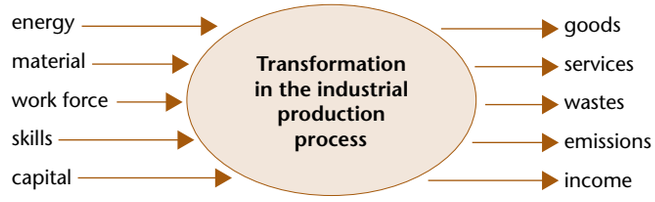

Figure 3. The industrial transformation system. *The pattern of production and consumption, which emerged in early industrialisation has remained unchanged into our times.*

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 these old substances should have been assessed for their health and environment impacts, starting with a group of 140 "hot candidates", 20 years later only 20 of them had been fully scrutinised. The 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 (the REACH Directive) suggests registering all old substances (i.e. to collect meaningful data for them) by 2012 and to assess their impacts based on these data by 2020 – an undertaking seen as "overly ambitious" by the business lobby. This is a quite scandalous delay in consumer protection, meaning that even the some 1350 carcinogenic and mutagenic (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 and limit the damage potentials created in the transformation process 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.

"The consumption of primary energy, total material flows and land use intensity can thus be considered a reliable proxy measure for total environmental stresses."

Nonetheless substituting at least substances with proven harmless characteristics for these suspicious ones in product design would be a significant step forward. However, so far the portion 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 upstream 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 (e.g. ecosystem fragmentation by infrastructure

Figure 4. The input output analysis of the material flow. *Resources flow into the society as some 60 different substances, in a country like Germany at about 20,000 entry points, while they leave society as about 2 million different products, containing about 100,000 substances, in countless points. It is obviously easier to control the input, than the output side. Still today's environmental policy and management focus on the output, as emissions control, product control, chemicals management, and waste management.*
Photo 4a: © 2005-2006 morguefiles.com Photo 4b: Redundant Technology, www.lowtech.org

construction), the most relevant environmental problems in Europe can be traced back to the over consumption of these basic resources [Spangenberg and Lorek, 2002]. The consumption of primary energy, total material flows and land use intensity can thus be considered a reliable proxy measure for total environmental stresses.

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 (Figure 5).

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. Besides the recoverable products, the flows to be taken into account include [Schmidt-Bleek, 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.
- 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 – endocrine disruptors, pseudo-hormones changing the regulatory processes of organisms including humans.

TDO: 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

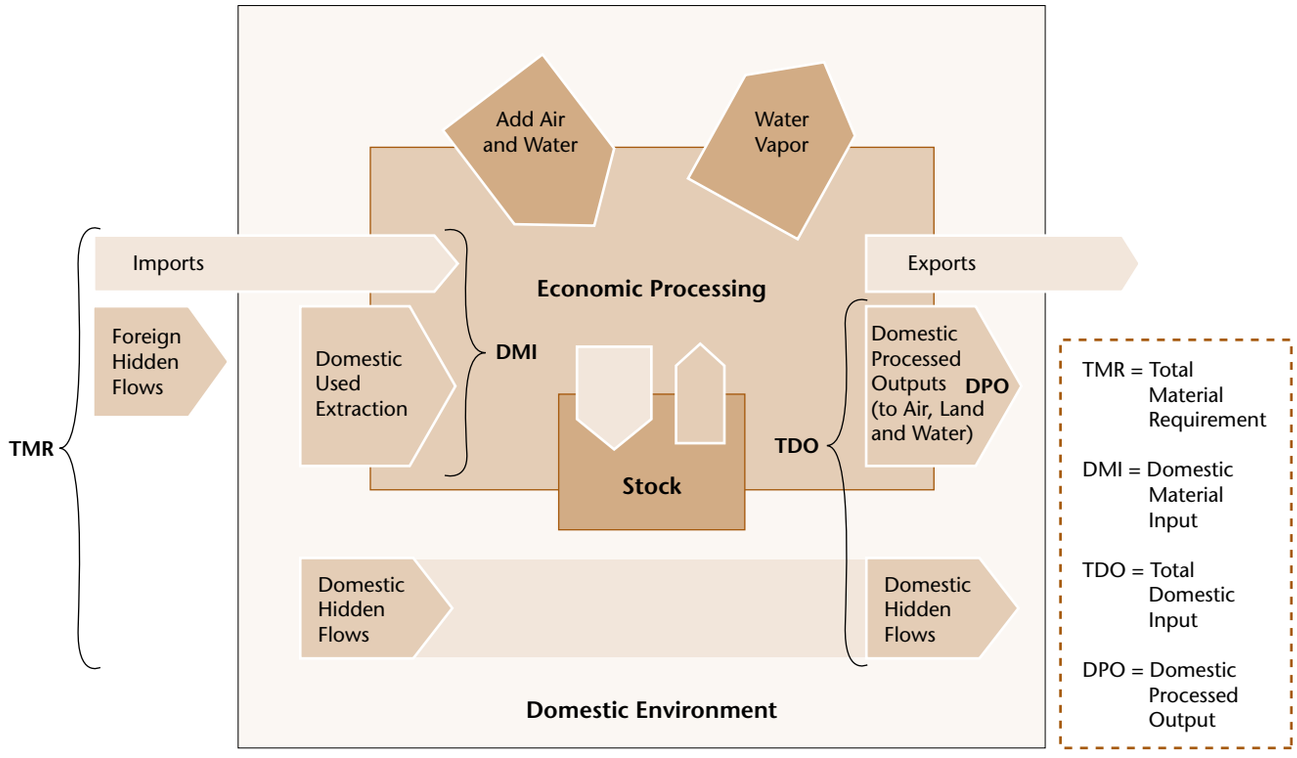

Figure 5. Economy wide material flows. *The material flows in society are accounted for in four different ways. The TMR (Total Material Requirement) consists of the DMI (Domestic Material Input) and the hidden flows, domestic and foreign. The TDO (Total Domestic Output) consists of the DPO (Domestic Processed Output) and the domestic hidden flows. The processing of resources in society (Economic Processing) provides material that stays in society, e.g. as infrastructure, of durable goods, or is used in consumer products, and in the emissions associated with both [Bringezu and Schütz, 2001].*

of economic value, are most frequently not accounted for in the production statistics, and those materials that have not entered the production process at all. 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 waste statistics [Striewski, 2003]. Once they are put to 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, ground water 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 in the country of origin). As has been mentioned, the number of gates between ecosphere and troposphere, and the diversity of substances are 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 energy taxation or the Swedish tax on gravel [Palm, 2002].

For Denmark for instance, as a highly trade dependent country, the DMI in 1997 has been about 185 mln tonnes 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 exports is greatly diminished. Nonetheless the table very clearly indicates the importance of the physical dimension of international trade, in addition to the monetary one [Döppe et al., 2003], and the matter-money dichotomy of all economic activities.

Table 1. *Danish Domestic Material Input (DMI) in million tonnes by final demand 1997 [Pedersen, 2002].*

Final use	Volume (mln t)	Share in national DMI (%)
capital formation	38	20
export of goods and services	94	51
government consumption	10	6
private consumption	42	23

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].

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

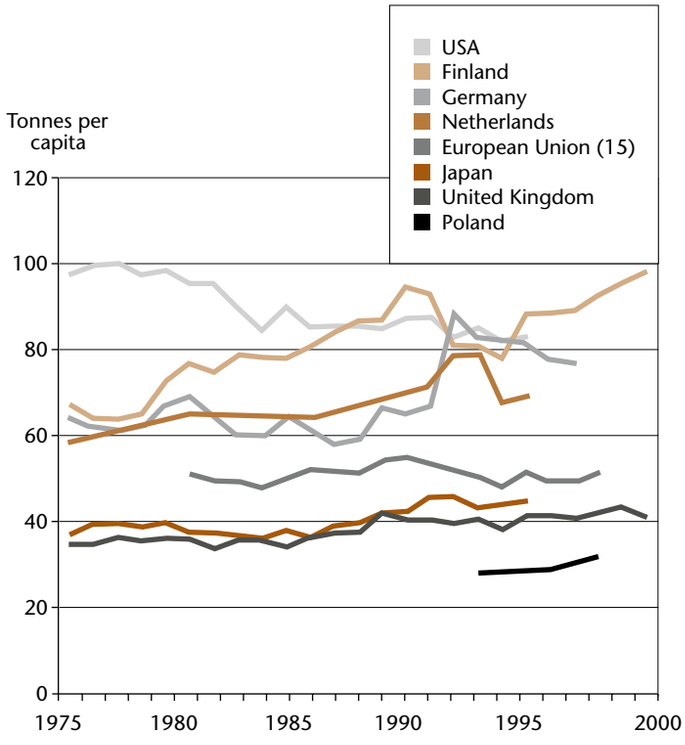

Figure 6. Total Material Flows in Europe. *The TMR is given for EU-15 as well as for 7 individual countries between 1975 and 2000 [Bringezu and Schütz, 2001]. For many countries, as for EU-15, it has been stable or decreasing in spite of a growing economy (reported as GDP). We say that economic growth is relatively or absolutely decoupled from material flows [Azar et al., 2002].*

similarly high one from meat production, [Adriaanse et al., 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 (Figure 6).

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% in GDP since the mid 1970s, the TMR did not follow suit but remained rather constant (Japan, EU 15, UK) or grew less than 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 of 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 guarantee 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 are only consumed for a short time before they wear out or become unfashionable (fluctuating markets); others are rather replacements in saturated markets (Table 2).

Table 2. *Market types and life expectancy [van der Voet et al. 2002, modified].*

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

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 – like 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.

For instance, experts warn that around the middle of the century CFC emissions from construction foams are due that are about as great as the total releases during the last century. Similarly, the decreasing trend of emissions of heavy metals is expected to be reversed 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

Figure 7. Material flows and infrastructure. *The material flows into society are to an extent adding to technical infrastructure, such as buildings, roads, etc, turned into products, or released as emissions to the environment in connection with production or consumption. However also infrastructure and products leaches to the environment; e.g. PCB leaches from building materials and electric equipment. Photo: European Communities © 2005.*

of happiness: accumulating material artefacts is considered as increasing wealth, and wealth has become synonymous with 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", as 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.

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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 economies 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.

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-grave" 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 lifetime of products could still enhance the total resource consumption; long-lived goods reduce resource squandering, but their market penetration is dependent 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 raising 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 constitutes 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 design-

"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."

ers 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 must 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 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 characters are frequently more important than their initial function as "service delivery machines" [Schmidt-Bleek and Tischner, 1995].

Figure 8. The car as a product. *The car has a key role in our economies. Still it is a very odd product: 10 tonnes of resources are turned into 1 tonne of car which transports about 100 kg of humans at an average speed of 15 km/h for an average distance of 1 km per trip (German data). The average German car is used about 200 hours per year for 12 years before it is scrapped as waste. Not much transport service for the resource, or money, input! From another point of view the car allows its owner to consume, and see people or amuse oneself outside his/her neighbourhood – it is a social dilution machine – promoting personal freedom. Or maybe it is a product we do not need, which we buy for money we do not have, to impress people we do not like, a fetish. Photo: European Communities © 2005.*

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 new production and consumption patterns 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 stress? And as for the wants – are they all equally justified?

What role products and their consumption really play in our societies is still far from fully understood. Whereas rather obviously in a capitalist economy the profit motive is driving the dynamic 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 self-expression, does it provide meaning or identity, or is it just a substitute for immaterial needs [Max-Neef, 1991]? Are we 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]? 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]?

Sustainable Production and Consumption

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 force

of unsustainable development, but with methodological weaknesses on side of the OECD [Spangenberg and Lorek, 2002] and limited impact on side of the UN (although since 2002 UNEP is actively working 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, inspired by the EU, 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 pressure from the G7 countries) 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 assessment 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 capable of setting something into motion. In the annual synthesis report on the state of the Union and in the corresponding structural indicators sustainable consumption plays no role so far.

The Driving Forces

For neoclassical 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 œconomicus*, taking decisions exclusively based on selfish utility maximisation: social or ethical values are not relevant for this "ideal" person's "rational" behaviour. In other words: consumers are all taken to behave like the kind of person you would not invite to dinner, and this is called "rational" (a truly Orwellian use of language).

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 (Figure 9).

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 US-$435 bln 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 philosophical 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 and 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 at-

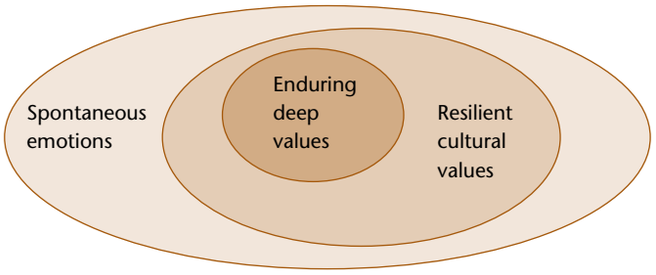

Figure 9. Values, motivation and their resilience. *To understand why people consume we need to look at deeper values. Basic values are shelter, food, health, mobility and education; we buy products, which help us to fulfil these values. However the products may be very different, and are so in different cultures. Long term, resilient, cultural values are expressed in various products, while short term values, or rather emotions, are expressed in different products, although overlaps are possible. [Nielsen 2002, modified].*

tributed to a certain consumer item by the potential customer. From its very root, value (from Latin "valere") means to have strength and meaning. However, meaning is not inherent in products, but a symbolic function attributed to them by society and its 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 lifestyle based subgroup has, the idea of quality of life they share and live. Exposing a certain good (owned or borrowed) can thus symbolise 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". President Bush senior made this clear when he came 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.

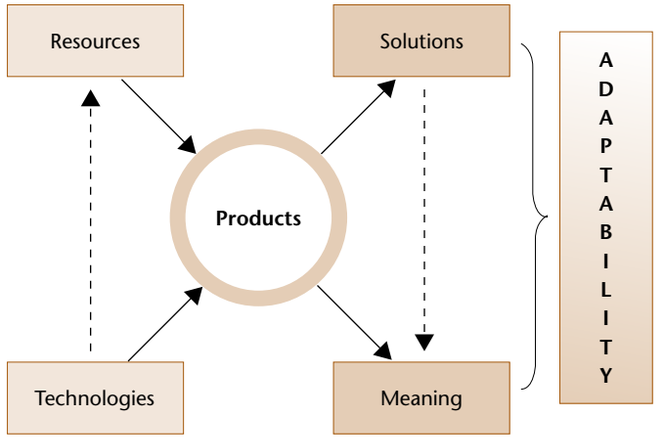

Figure 10. Societal evolution and adaptation. *New solutions, through technological development and new use of resources, and development of meaning, drive the evolution of a society to adapt to changing conditions, e.g. environmental requirements [Nielsen, 2002].*

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 worldview 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 (Figure 10). In this sense the sustainable knowledge-based 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 and 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 has been slowing down, the risks of life (stock exchange losses, terrorism and war) dominated the public mood, while the quality of life seems to be re-emerging 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-year-old competition of paradigms between sustainability and expansionism [Grober, 2002]. 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-based 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 options. As long as to the consumer *"the enemy of the good is the cheaper"* rather 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 are 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-dependent 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 bifurcations permitting us 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 only a high income level are not on the wish list – they are means for security and well being, but no ends in themselves.

Towards Sustainable Consumption

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), 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 households. To achieve this, it is essential to distinguish between those fields of household consumption that are environmentally dominant (as are the five listed above) and others of minor environmental relevance (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 by 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 [Spangenberg and Lorek, 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 "0" to "++" [Lorek and Spangenberg, 2001]. These actors include households on the demand side, and planners, architects, producers, advertisers and regulators on the supply side.

"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 only a high income level are not on the wish list – they are means for security and well being, but no ends in themselves."

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 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 of product characteristics or producer liability, 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. Although it may sound surprising, this includes developing and marketing consumer items which are environmentally sound but *do not*

Household Consumption

It is essential to distinguish between those fields of household consumption that are **environmentally dominant** (housing, nutrition, mobility, health, education) and others of **minor environmental relevance** (clothing, hygiene, leisure without transport, and fashion).

look like it, in other words: which have no predefined image. As long as consumers use products to project their dreams and identities, a product with a given image will only be attractive to those who agree with these priorities, while it will be rejected by the others (the majority). An "unidentifiable environmental object", on the other hand, permits projection of whatever lifestyle and value the consumers may have, and the environmental soundness can be marketed as an added value, 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 political preferences expressed by the same individuals as citizens are another, 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.

Figure 11. To meet the sustainability challenge with creativity.
"When the winds of change start to blow, some people begin to build wind breakers, but others build windmills." The environmental challenge can be met by ingenuity. A wind power station is producing high value electricity with a footprint that is some 100 times lower than e.g. biofuel, but with a significant TMR.
Photo: Vattenfall/Hans Blomberg.

Outlook

Sustainability is not an ideological blueprint for a future society: nobody knows what 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 there are alternatives: "When the winds of change start to blow, some people begin to build wind breakers, but other build windmills".

"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."

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