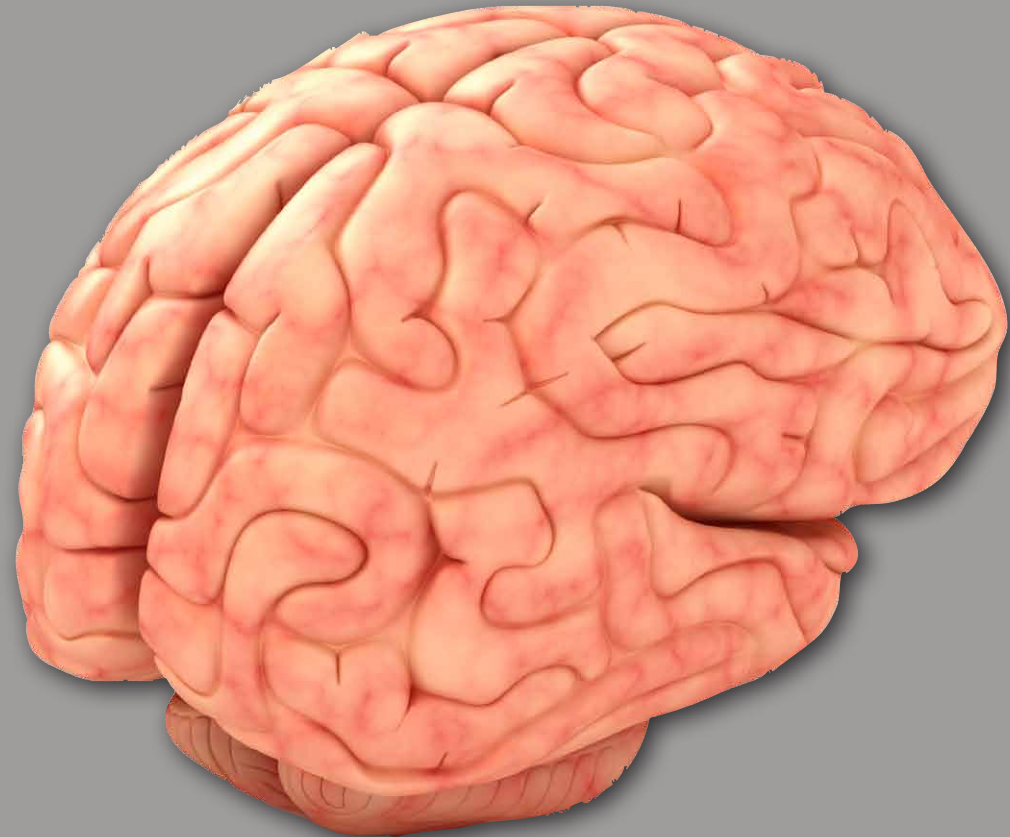


**factor<sup>y</sup>**

Magazine for a sustainable economy



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Topic

# SEPARATING

The Art of Separating More Gold in Waste than in Mines Let's Break Away from  
Determined Breaking Points Analysing Separately – Thinking and Acting  
Together! Exchange Your Mobile Phone for a Wide Range of Options Drinking Water:  
Seawater Minus Salt Separating Waste Feels Good!

# Unifying Separation

Germans are world champions when it comes to separating. Actually, we are talking about separating waste. Blue, yellow, grey and green rubbish bins at home, at train stations, in schools and at the workplace: everyone here is familiar with the system of waste separation. Germany's recycling system is world-famous, a model frequently adopted elsewhere. For the past 18 years, Germany's Closed Substance Cycle and Waste Management Act (KrWG-AbfG) has been contributing to turning waste into an economic asset. With this act, operational and systematic waste management were introduced in companies and organisations.

This year, the act was revised. Now it is only called the Closed Substance Cycle Act (KrWG), leaving 'waste' in its name out. Waste is to be avoided through waste avoidance programmes that have yet to be implemented through regulations. The KrWG is intended to help establish a real recycling economy in an attempt to progress towards the ideal of a cradle-to- ►



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cradle, endless subsistence and resource-conserving economy. Legal experts suggest that the KrWG might be unable to perform the task of protecting natural resources and that Germany needs a proper law with precise provisions for the use of resources. After all, the conservation of resources should not be left to a type of waste management that makes a profit on recycled materials and secondary raw materials.

For this we have to dissociate ourselves from outdated perceptions of how the economy should work, what rules we need and how we should use resources. Let's encourage differentiation and diversity because without them, everything would be the same—boring and less progressive. Proof of our ability to differentiate is provided by the history of mankind and we demonstrate our capacity for separating every day—on a mental as well as on a material level. Hopefully the articles of this magazine will encourage us to refine the model of separation.

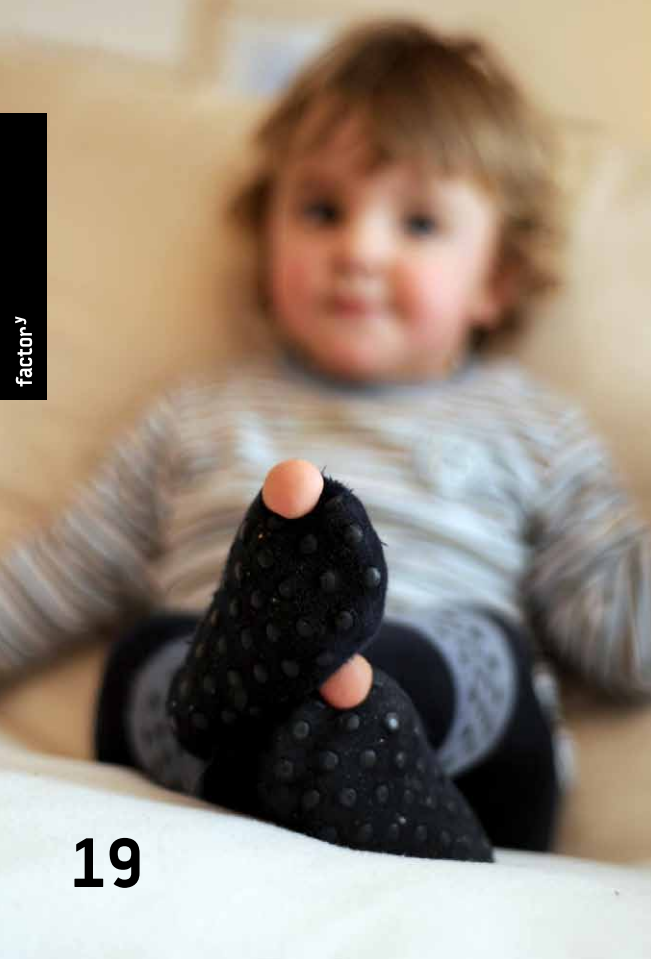
Let's unify for the cause of separation.

Ralf Bindel, Editor



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25



41

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29



36



9

1

41 mobile phones contain as much gold as one ton of gold ore: 1 to 2 grams. In order to obtain one kilogram of gold, about 41,600 mobile phones would have to be recycled. In Germany, there are 83 million disused mobile phones that contain approximately 2,000 kilograms of gold for which two million tons of gold ore would have to be mined.

14,5

After an average of 14.5 years, every third marriage in Germany ends in divorce while about 380,000 weddings take place (2011). Ten years ago, the average marriage lasted just 13 years. In 53 per cent of the cases, it is women who file for divorce, as opposed to 39 per cent filed by men. Half of the divorced couples have at least one child under the age of 18. Federal Statistical Office of Germany, [www.destatis.de](http://www.destatis.de)

66

According to a survey on the frequency of changing jobs conducted on behalf of the European Union, 66 per cent of Germans 15 years of age and older changed jobs one to five times, compared to 60 per cent in the EU27 countries. In Germany, seven per cent changed jobs six to ten times, as opposed to nine per cent in the EU27 countries. In EU27, 13 per cent have never changed employers whereas in Germany 14 per cent never have. TNS Opinion & Social, [de.statista.com](http://de.statista.com)

15

15 percent of employed Germans have a fixed-term contract. Almost every other employed person is hired on a short-term basis at first. The percentage of new hires on fixed-term employment contracts increased from 32 per cent in 2001 to 47 per cent in 2009. Career starters and young employees are especially affected. Approximately every second employee initially hired on a short-term basis is later offered a permanent employment contract by their employer. Institute for Employment Research IAB, IAB information platform on short-term employment

25

According to the relief organisation for homeless people Klimaka, the number of people who cannot afford an apartment in Greece increased by 25 per cent over the past two years. It is currently estimated that there are about 20,000 homeless people in Athens, the number of victims of the financial crisis is increasing by the hundreds on a weekly basis. BISS – Bürger in Sozialen Schwierigkeiten (citizens with social difficulties), [www.biss-magazin.de](http://www.biss-magazin.de)

25

For the first time in six years, more wars (25) and violent conflicts (36) were waged in 2011 than in the previous year. Between 2000 and 2010, wartime violence killed approximately 55,000 people per year. About 100,000 people died in the 1990's per year, during the cold war between 1950 and 1989 there were about 180,000 victims per year. War and violence cost the global economy approximately USD 8bn. Arbeitsgemeinschaft Kriegsursachenforschung (AKUF) (working group on the causes of war of the University of Hamburg), Joshua S. Goldstein – Think Again, War

6912

About half of approximately 7,000 individual languages are threatened with extinction. According to National Geographic, only 2,005 out of 6,912 languages are still being used actively. The languages threatened by extinction are barely spoken anymore and are not being passed down to the next generation. The 50 most common languages are spoken as a native language by approximately 80 per cent of the world's population. Mandarin Chinese, with 1.213 billion speakers, is the most spoken first language in the world and is spoken in 31 countries, whereas English is spoken in 112 countries. [http://en.wikipedia.org/wiki/List\\_of\\_languages\\_by\\_number\\_of\\_native\\_speakers](http://en.wikipedia.org/wiki/List_of_languages_by_number_of_native_speakers)

4

The human body consists of an estimated 100 trillion cells. At the beginning, it consists of only two. By means of mitosis, the human body produces 4 million new cells every second, mainly blood, intestinal, and skin cells. To maintain a constant number of cells in the body, many cells have to die off and be eliminated constantly.

Max Planck Society press release 19 July 2004

110

According to the German Council for Sustainable Development, every German citizen consumes an average of 110 kilograms of raw materials per day through the consumption of resources needed to produce goods of all kinds. Only a small percentage of this ends up as domestic waste. Christian Schwägerl, Experten halten 100 Prozent Recycling für möglich (Experts think 100 percent recycling is possible), Spiegel Online 1 June 2011

250

A majority of the approximate 250 million plastic products produced annually eventually ends up in the sea. Up to 100,000 plastic particles have been counted per square kilometre of the European coastlands. Dead Northern Fulmars on the German coast of the North Sea have been found with up to 44 plastic particles in their stomachs. On British beaches, every tenth grain of sand is now actually a crumb of plastic material. Patrick Illinger, Der Plastik-Planet (The plastic planet), SZ 14 May 2011

42,5

At the end of 2011, the UN High Commissioner for Refugees registered 42.5 million people globally who fled from their home countries due to new or ongoing threats. The number of refugees has risen for the fifth consecutive year now; 4.3 million new refugees were recorded in 2011 alone. 895,000 were searching for asylum internationally. The number of people who are not citizens of any country is estimated at around 12 million. The International Organisation for Migration assumes that the number of climate refugees alone will increase to 200 million by 2050. UNHCR Global Trends 2011 - A Year of Crisis, www.unhcr.org

17

In 2011, 1.4 billion mobile phones were sold worldwide. The amount of gold required for their production was 22.4 tons, which involved a mountain of partly toxic overburden of 17 billion tons. Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, Scheub/Kuschel Beschissatlas (encyclopaedia of rip-offs)

7,5

In Germany, there are 7.5 million people who can read individual sentences, but not coherent texts—so-called functional illiterates; this is more than 14 per cent of the working German population. Approximately 3 per cent of the total population is only capable of reading or writing single words.

61

According to the German Institute for Economic Research DIW, the richest 10 per cent of Germans possess about two thirds, that is 61 per cent, of the total national wealth. In comparison, the bottom 70 per cent of the population possesses less than 9 per cent. The 100 largest fortunes in Germany amount to EUR 307 trn, equalling the federal budget. Joachim Frick, Markus Grabka, Gestiegene Vermögensungleichheit in Deutschland, Wochenbericht DIW Berlin Nr. 4/2009 (Increased inequality of wealth in Germany, weekly report 4/2009 by the German Institute for Economic Research DIW)

»In every great parting there lies a seed of insanity; one must beware of brooding over it and nurturing it in one's thinking.«

Johann Wolfgang von Goethe, "Maxims and Reflections" (1833)





# The Art of Separating

Nowadays, people who separate either separate their waste, or break up with someone. Both things are difficult for us, which is why we like to postpone them. To separate waste or other things is referred to by grammar books as transitive, to separate yourself from something is reflexive. This reflexive dimension is what is most important for sustainable ways of living and for the success of all sustainability strategies—it is about shaping ourselves, not about us acting upon things. As the German philosopher Heidegger would say—it is about Dasein, not about stuff.

By Bernd Draser

Translated from the German by Stefan Helwig and Simon Varga



Why is it so difficult to separate yourself from something or someone? Because separation calls habits into question. Habits are comfortable because they, in fact, do not ask questions, but instead take place in an unreflected, effortless way. Habits are needed where we cannot afford to think about each and everything at every moment, that is to say in everyday life. But with our way of life—mass consumption—those unreflected routines congeal into a danger and the familiar, it has always been like this' cannot be the way to go. In the course of the public dialogue, this type of thinking has been seen for many years now, but mostly as a rhetoric figure, not as an actual change in habits. Applying the famous greenwashing method, those habits are prettied up into customs with a bit of green whitewash. As a consequence, we sophists separate our waste rather than separating ourselves from our routines.

However, we would not be where we are now were it not for our ability to separate—even if it is anything but easy for us. Indeed, separating is part of an ancient cultural technique that French ethnologist Arnold van Gennep analysed with astonishing clarity in his 1909 work 'The Rites of Passage'. According to van Gennep, tribal societies without written tradition consider the passage from one state to another dangerous. The old is exhausted, whereas the new is not yet established. This may refer to stages of life, such as the coming of age, marriage or death, but also to transfers of office, annual cycles, travel or the inauguration of buildings. This is where the cultural technique of separating has its place. In a first step, one has to let go of the old, exhausted, and worn out



(rites of separation) and undertake the passage to the new in the subsequent period of transition

(rites of transition), to return changed, renewed and strengthened to society in the third and last step (rites of incorporation).

## Beauty Makes Sense

Rites of separation constitute a major act of substitution, and it is with sadness that they are performed. The rites of transition use the symbolism of death, because the old must die and be buried to give the new strength to live. The rites of incorporation are celebrations of birth and joy that give cause for delight after a dangerous transition has been achieved. Each of the three steps has created complex symbolisms, which used to be closely associated with mythical and religious stories and characters. It is through their highly symbolic nature that these dangerous transitions crystallise into aesthetic procedures that not only produce sense but also beauty for the eye.

This is what makes separation so hard for us. Since the industrial revolution, Western thought has strongly influenced lifestyles around the world. This process began more than 2500 years ago with the criticism of myths and rites. The Ionic philosophy of nature then launched a first wave of secularisation that has become more powerful ever since. This presents several advantages: humanitarianism, the deliverance from the burden of tradition, the allaying of fear through rationality. But there are also disadvantages, as one can see most clearly in our attitude towards death and dying. This most delicate of transitions is transferred to hospitals where it is discreetly managed by experts. Our only experience of death is that of a fictional one in television. By becoming critics of myths and rites and consuming them only in vulgarised forms, such as the cinematic journey of heroes, fan clubs or crude military initiation rites, we have allowed the art of separation to degenerate into something trivial.

Being the secularised critics that we are, we have forgotten about the intrinsic movement of separation, the

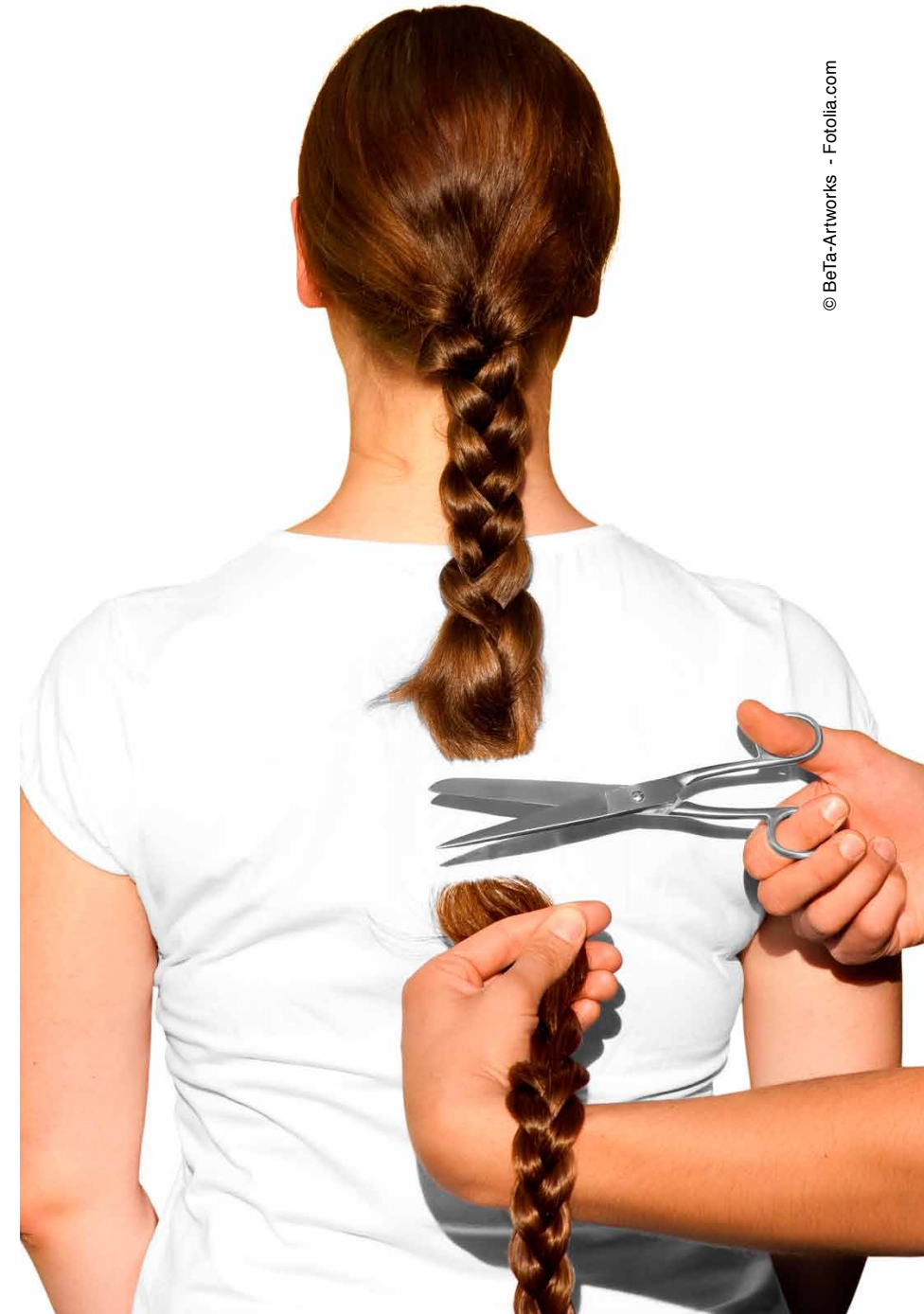
circling. We are hardly capable of circular thinking; we are used to linear thinking (or dialectic thinking—but dialectics is linearity, only with a lot of swagger) that millennia of salvation history have engraved in our minds. Such gloomy thoughts traditionally call for a line from Hölderlin's poem Patmos: "But where there is danger, / A rescuing element grows as well." And indeed, to the extent to which religion was bound by the shackles of pure rationality in the 18th century, its corrective—art—took the place formerly held by religion, especially in regard to the performative aesthetics of its rites. Between 1750 and 1800, aesthetic discourse exploded and art has been attributed a universal power of redemption ever since. According to contemporary discourses on the art of living, the reductionist aesthetic of the 20th century with its heroic avant-garde has then opened our senses to another point: the aesthetically pleasing (in the past, one would have said "the beautiful") is not attractive when nothing more can be added to it, but when there is nothing more that can be taken away to make it even more attractive. ►

## Aesthetic transition

Applied to our lifestyles, this aesthetic criterion combines aesthetic quality with what is sustainable and thus necessary in a strikingly simple way. What is charming about this combination is the fact that it renders the unpleasant moral rigorism – which hinders sustainable lifestyles rather than fostering them – obsolete.

The art of separation belongs to the fine arts. It is as old as human culture itself. It is an anthropological universal, and thus a resource that is not just abundant but in fact unlimited. And it produces sense, because this is what rituals do – they produce sense and symbols. Therefore we can tell stories that are both new and very old. And we need these stories of a successful life, of a life that successfully manages separation, transition, incorporation and transformation, because without them, no sustainability strategy can be truly credible. While sustainability is today mainly seen in terms of an economic and technological challenge, sustainability efforts have a better chance to succeed if the aesthetic, symbolic domain – formerly the domain of rites – is included. So, do we have to become traditional? Or even religious? No. We can stay secular, as long as we become more aesthetic. ■

Bernd Draser teaches philosophy at ecosign/Academy for Design, Cologne



A survey of new customers of CarSharing has shown that offers of CarSharing make the drivers want to get along without their own car. This promotes sustainable mobility.

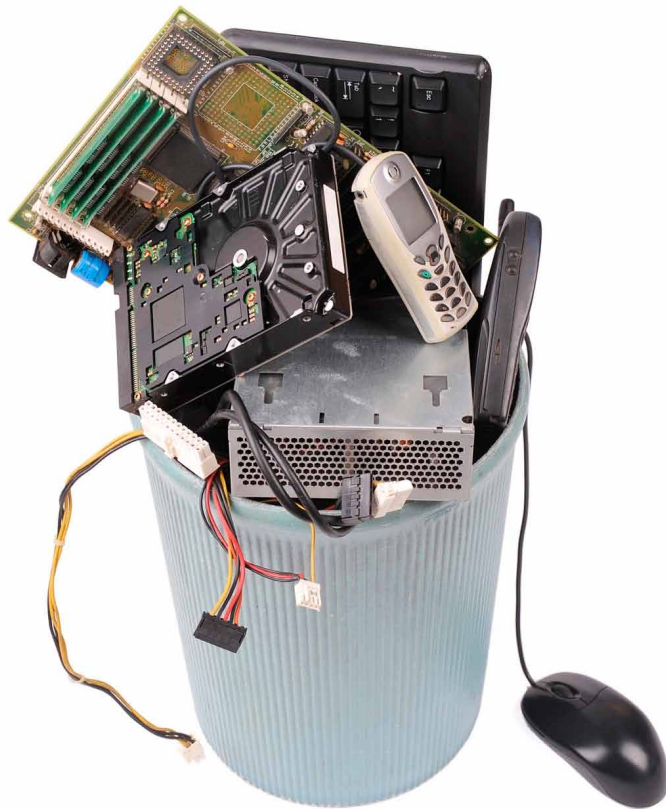
**Almost 50 per cent of new customers decided to part with their car after a seven-month membership with CarSharing.**

# More Gold in Waste than in Mines

Although we are good at separating waste, we could be better at recycling. Dr Christian Hagelüken is Director EU Government Affairs at Umicore AG. The enterprise operates a high-tech facility close to Antwerp where electronic scrap, accumulators and other technical waste are recycled.

An interview by Bert Beyers

Translated from the German by Nadja Gröner, Lea Schiefen, Christin Brauer



*How high is the amount of gold in the printed circuit boards that are delivered to Antwerp?*

Usually, the printed circuit boards, such as motherboards of computers, are of high quality and contain between 200 and 250 grams of gold per ton.

*What is the situation like in conventional mining?*

On average, the amount of gold extracted by mining is below five grams per ton.

*Some computer scrap is recycled in threshold countries, in so-called backyard businesses. How efficient is the processing there?*

Today, when such printed circuit boards are metallurgically recycled by means of modern, high-quality procedures, it is possible to achieve high yields. We recover far more than 95 per cent of the 200 or 250 grams of gold – and not only gold, but also palladium, silver, copper, tin, antimony and many other components. Backyard businesses are more focused on cherry-picking.

Certain valuable metals, especially gold and copper, are recycled. And even for gold, the recovery rate is only in the range of 25 percent. Apart from that, these backyard businesses have a negative impact on the environment.

*What metals can be recovered from electronic scrap?*

I would not only focus on precious metals, such as gold, silver and palladium, but would also include additional technology metals as cobalt, antimony or indium and base metals such as copper, nickel and tin. Rare earths hold a special position. Technology metals, for example precious and special metals, will become more and more important in the future. You just have to think of electric mobility, photovoltaics or wind power stations. We have a booming demand for these metals, and therefore, recycling is an important component in order to ensure and maintain access to these metals on a long-term basis.

*Theoretically, metals can be re-used again and again. But what is the situation really like?*

With many technology metals, the recycling quota is below one per cent. Gold from electronic components is recycled up to 15 per cent, but palladium not even 10 per cent. ▶



*What are the problems?*

Problems occur along the entire recycling chain. Firstly, with insufficient registration, secondly, with inadequate monitoring of material flows after registration, thirdly, with bad and unsuitable recycling procedures and fourthly, the technical limits of recycling pose a problem.

*What are the problems when it comes to electronic scrap?*

Despite legislation, even our collection rates for many electronic devices are still unsatisfactory. Just think of mobile phones or similar high-quality small equipment for example. Even today, there are still a lot of devices that can actually be considered scrap and that, even in countries outside the EU, do not have a real market value anymore. Nevertheless, these devices get lost due to dubious and illegal exports or low-quality recycling. Street traders that organise house clearances are just one example. The metals can get lost either at local collection points or later in the chain. Many players in the market pass themselves off as recyclers. However,

many of them are traders or, at best, pre-processors. The origin of waste management is partially considered as the 'dirty corner.' Some people only have money on their mind and have little interest in high-quality recycling and transparent material flows. Ingrained ways of thinking still prevail. However, we need more ethical thinking in the recycling domain.

*What are possible solutions?*

Within a short period of time, a certification system should be introduced, ensuring that electronic scrap is processed according to high-quality recycling processes along the entire chain to final disposal. This way, transparency of real material flows can be achieved. In my opinion, if we really want to close cycles, we need to provide incentives for consumer goods on a medium-term basis. These should be linked to business models.

*An example?*

For example, leasing models for products and, in individual cases, also deposit systems. It is not so much a question of calling a product one's

property, but rather a question of using its function in an optimal way. The structure of today's system, especially in the field of electronics, is that a product is manufactured and then sold. Initial buyers make use of this product for a certain period of time until they resell it perhaps on eBay. One completely loses track of the device. Unless there is goodwill present, we have little reason to return such a device to the high-quality recycling process.

*Let's think ahead.*

Any production chain – of a car or a computer – is preceded by sophisticated distribution systems with just-in-time delivery. Every supplier's part can be precisely located at any time. The supply chain is highly transparent, and supported by technical processes such as labelling, GPS systems or the tracking of truck routes. However, we still find ourselves in the Stone Age when it comes to a product's end-of-life. In principle, much of the technology used during the production process of an object could be applied to its end-of-life cycle as well. It is also conceivable that certain prod- ►



ucts of higher value are provided with an RFID tag and can thus be tracked throughout the entire production chain. If you are in a clothing store and take a jacket off the hook, and leave without paying, the alarm is set off at the exit. In principle, the same approach could also work for containers with electronic scrap at the harbour.

*How much time did you plan for your vision?*

I hope that 20 or 30 years from now at the latest, we will have thought this resource topic through entirely and will have started to tackle it. Then we will have a combination of fully modern technology, high transparency, different business models, and stronger commitment of manufacturers to view end-of-life as an integral part of their products. Furthermore, they are interested in remaining parts and substances being returned in order to guarantee the supply with new products. This will also have an impact on the products' designs. If, at some point, we have better control of the circulation of used products in Africa ...

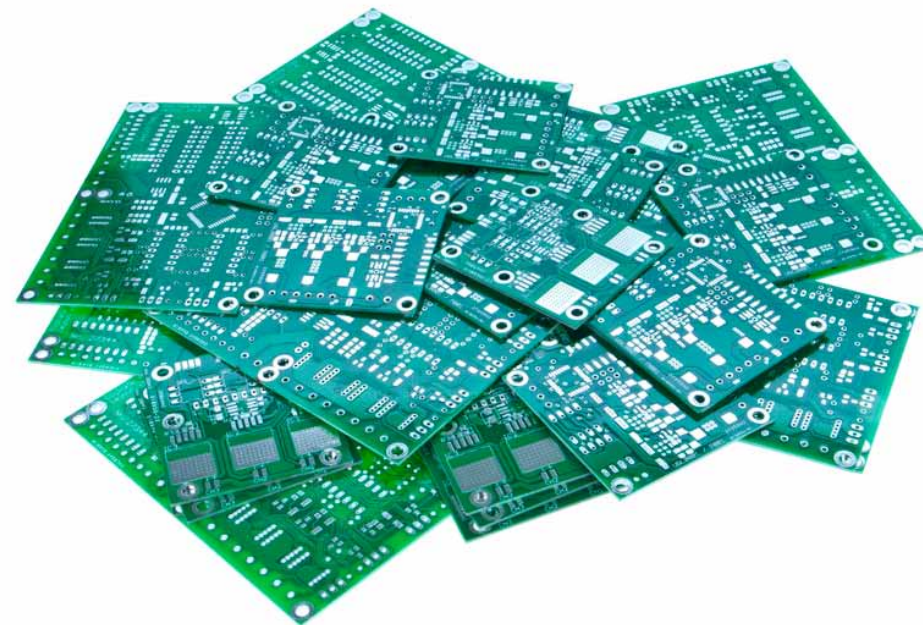
*Like computers, cars and washing machines ...*

... then these devices will probably also be pre-processed in the best possible way in the region at their end-of-life in order to retrieve more complex parts from them, like printed circuit boards, accumulators or magnets. They can then be transported back to suitable high-tech facilities—wherever those may be located; most likely somewhere in Europe. ■



Christian Hagelüken is Director EU Government Affairs at the Belgian materials technology company Umicore S.A/N.V, headquartered in Brussels. Umicore is a world leader in the production and recycling of special material and metals (e.g. cobalt, germanium, nickel, zinc, gold,

silver, and platinum group metals). The listed company employs about 14,300 people who generated a turnover of approximately EUR 9.7m in 2010. Customers are manufacturers in the chemical industry, the automotive, building materials, jewellery, and electronic industries. Bert Beyers is an author and journalist. His last publication in factory was about 'Growth'.



»Until now, wealth has always been coupled linearly to additional resource consumption or CO2 emissions, energy or water consumption – it is always associated with wealth. Or vice versa.

**This we must uncouple: we want wealth to keep growing, whereas resource consumption needs to decrease again.«**



# Let's Break Away from Determined Breaking Points

Many everyday products could have a longer lifecycle if they were designed accordingly. At the Folkwang University of the Arts, designers create new ideas for this purpose: about separating material, separate modules and separable joints.

By Anke Bernotat and Judith Schanz

Translated from the German by Nadja Gröner, Lea Schiefen, Christin Brauer

More and more frequently, the latest mobile phone is cast on the scrapheap after only one year. Not because of its design, but because it becomes less and less effective. The battery weakens quickly and unfortunately cannot be replaced, the keys get stuck, the glass screen is cracked, and to have it repaired would cost almost as much as a new phone.

However, it is not only mobile phones that are temperamental. We also have to part with our shoes, our bike lamps and various electronic devices sooner and sooner, because we can neither repair these products ourselves nor have them repaired. Skilled craft businesses have vanished; consumer electronics stores completely exchange products in the case of warranty claim, and sell new devices.

Users and manufacturers have to ask themselves whether today's products are just too poorly designed or are produced too cheaply. Have we, as users and producers, forgotten how to be careful with our products, how to use them with care and have them repaired, or how to produce them so they can be

fixed? How can the design of products help us to postpone the separation of users from their products as long as possible?

Most consumer goods are designed by industrial designers. Their role is crucial if relevant, durable and therefore sustainable products are to be created. By selecting high or low technology, materials and manufacturing processes, designers can generate concepts that will prolong the lifetime of products considerably. Thus, we do not have to separate ourselves from objects that are still fully operative or from valuable resources at an early stage.

Several creations of the Industrial Design course at the Folkwang University of the Arts show that, in many respects, the topic of separation is very interesting for designers.

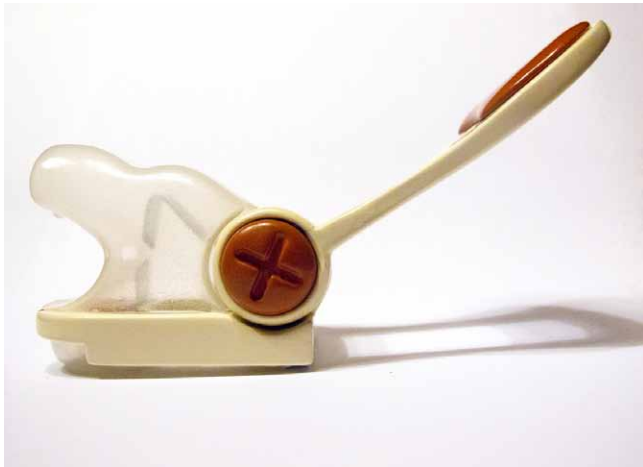
## The Benefits of Cutting Off

If designers focus on beneficial effects and use a methodical approach, even traditional separation tools can be designed to be more user-friendly and durable. Sabet Regnery has designed

a splitting axe based on the model of a traditional Japanese axe for carpenters. Her axe stands out due to its long blade. Thus, it produces a much deeper crack in the wood compared to conventional models – so wood can be split more easily. The user lets the axe drop only from the height of his head to split the wood with its dead weight. Because the axe is made of robust material, it suffers hardly any wear.

Unibble is another innovative separation tool. It helps children to cut their fingernails. The design created by Steffen Kauenhowen takes into account that children's fingernails are still very soft and that conventional nail clippers often cause pain. Unibble provides a safe way for children to learn how to handle their nail care themselves.





*"Unibble", created by Steffen Kauenhoven, is a tool that helps children cut their nails safely.*



*The hand-held vacuum cleaner created by Vanessa Hapke uses standard components that are easily accessible in retail markets and an exchangeable universal accumulator.*

## Separability Extends Product Life

The possibility of repairing something is a big issue when creating sustainable products. When a product can be dismantled into its component parts, it is easier to repair. Unfortunately, manufacturers do not pay enough attention to the separability of component parts when developing and engineering their products. Thus, they impede the possibility of repair for many old products. However, a simple exchange of individual faulty components can considerably extend such products' lifecycles, which often do not last longer than a year. Therefore, the motto for designers has to be Rethink - Research - Repair, as is the case, for example, within the Innovation and Design project that has been carried out in cooperation with the Fraunhofer Umsicht Institute (Fraunhofer Institute for Environmental, Safety and Energy Technology). In a repair workshop, students found out that many electronic gadgets give up the ghost because of smaller defects. Often, contacts are merely dirty, cables are not

robust enough or accumulators are non-durable or not exchangeable.

If designers consider the economic value of modular construction, repairable and sustainable products will be produced. Take, for example, Vanessa Hapke's hand-held vacuum cleaner, which was able to be cleaned only with difficulty. The filter got dirty and a spare filter that costs nearly as much as a new vacuum cleaner was not designed to be easily exchangeable. So the machine became clogged and 'died.' Hence, the student concentrated on developing a hand-held vacuum cleaner that can be completely dismantled and has a universal accumulator. Spare parts are easily available in retail shops and can easily be mounted in the device.

Many products that could still be repaired are thrown away, because users have become too lazy to send defective devices in for repair. Besides, low original prices foster early separation. Ronja Hasselbach, a prospective designer, noticed that a friend of hers bought a new coffee machine nearly every year. She found out that the coffee machine was constructed in a careless and illogi- ▶

cal manner. So she separated several functions of the machine: heating water, pumping water and brewing coffee.

On the basis of this knowledge, the student developed a modularly constructed concept for coffee brewing, which is less susceptible to defects. However, if anything should break, every module is easily accessible and can just as easily be repaired or exchanged.

Izabella Rudic noticed that in rucksacks of all kinds the zippers are the first thing to break. Besides, they are expensive or can only be repaired with specialised knowledge. Her solution is *Keepe*, a rucksack that works completely without a zipper. Users can repair such a product on their own without specialised knowledge. Moreover, the new closing technique turns the rucksack into an individual product that can be adapted to a variety of different situations. Thus, a profane aid in daily life acquires more personality – and the users do not want to ever separate themselves from it.

However, a modular and easily accessible design is not the only possibility for designers to extend the functioning of a product. If they separate the func-

tion from the product, the raw materials in the product can acquire new functions and even worn-out products can begin a new life.

The RELOAD stereo headphones, developed by Phillip Kaeppele and produced out of old vinyl records, are an example for this. Every RELOAD is unique and receives its characteristic look through the colours and labelling of the used records. The headphones can be self-assembled with the help of a blueprint. People who are less talented with crafts also have the possibility to order them via Internet and use the assembly service. Thus, favourite records can be saved from disposal and get a useful function the second time around as well. The RELOAD package is also an upcycled product. Two plastic bags are melted together and thus provide a unique cover that protects RELOAD during transportation.

Torn does not necessarily mean useless: Selina Strunk is annoyed by the fact that nylon tights wear out increasingly fast and that afterwards a large number of them are just thrown away. This is why she founded the label Eli



*The fastenings of *Keepe*, a rucksack by Izabella Rudic, make size adjustments to different requirements possible and at the same time, they do completely without a zip that is susceptible to faults.*



*The modules for coffee brewing, made by Ronja Hasselbach, are scarcely susceptible to defects. However, if an element is defective, it can be repaired easily and with good access to the respective element.*





*RELOAD are stereo headphones by Phillip Kaeppeler, made of worn out vinyl records and packed in bags that have been made of old shopping bags.*



*The shoe collection Eli Hetti by Selina Strunk is made of an unusual material: torn nylons.*

Hetti that offers shoes made of torn nylons and could even win over Evonik as a partner for the material development. Try them yourself: who might have guessed that these fantastic shoes are made of nylons?

## User and Product – an Inseparable Couple

There is no product without materials. Products require valuable resources. In order to use them in a reasonable and sustainable manner, designers are in demand more than ever. For as long as possible or at best indefinitely, users should be prevented from separating themselves from their products.

This is why products need to be esteemed and appreciated. Whenever there is a tie between the product and the user – whether it is due to a function or to emotion – the user will feel responsible for the product.

The creations presented here exemplify the different possibilities designers have to encourage users like us to establish a sound relationship with their products. Designers can simplify com-

mon tools. With the help of modular design they can make separation of a product into its component parts possible and thus create a possibility for simple exchange and repair of defective component parts. Designers can separate a function from a product in order to reuse the valuable materials for new functions and thus to make a longer life-cycle possible for these materials.

Regarding the dwindling resources of our planet, it is the designers' task to support relevant and useful products and to equip them with materials with as much consideration as possible. The reason for this is that users should unconditionally be convinced by products so that they can strike up an inseparable relationship with them. ■

Anke Bernotat is designer and professor for Industrial Design, including concepts and drafts, at the Folkwang University of the Arts in Essen. Judith Schanz works there as a research assistant.

»Over the contrasts between the rich and the poor, East and West, the educated and the uneducated etc., three figures of social separation can be distinguished: the 'redundant,' the 'deviating' and the 'invisible' people.«

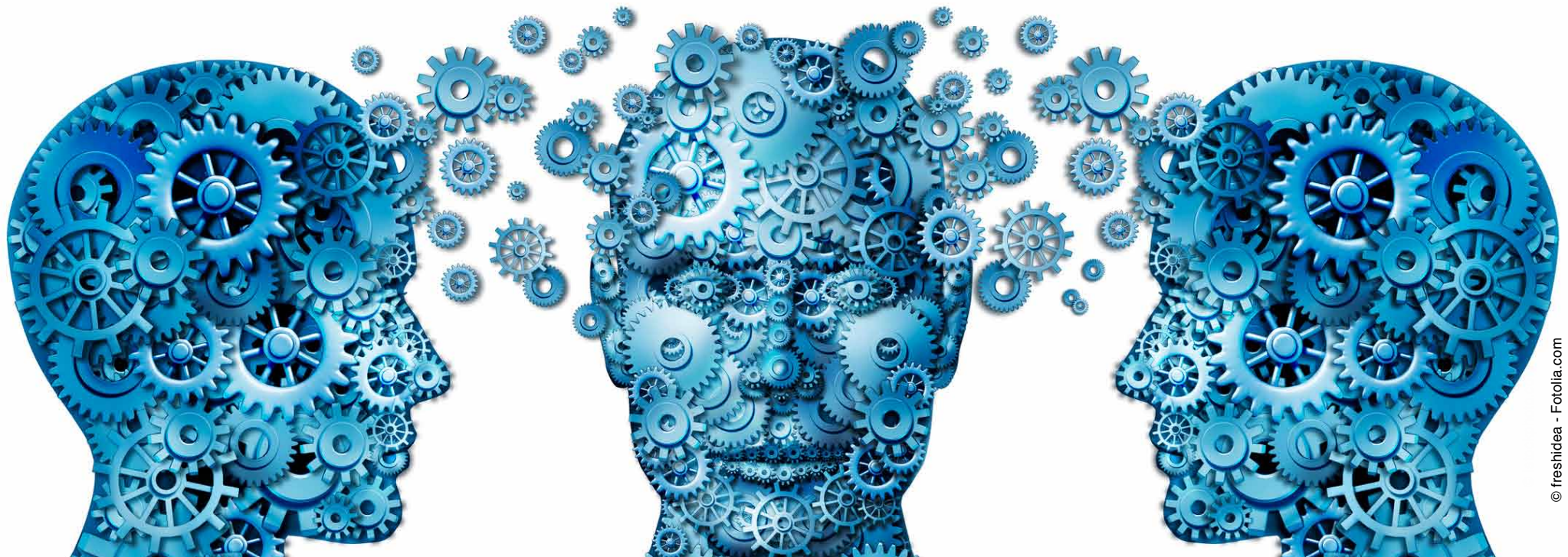


# Analysing Separately – Thinking and Acting Together!

We isolate the three dimensions of sustainability too much. In fact, they are directly and interactively connected with each other in space and time. Instead of separating, there needs to be more integrated thinking and acting.

A standpoint of Prof Angelika Zahrt

Translated from the German by Kerstin Lisewski, Eunike Bawarska, Katarzyna Piasecka



Sustainability is like a precisely designed Greek temple: the roof symbolises sustainability which is underpinned by environmental, economic and social pillars. However, the common image of sustainability is illusory: the three pillars are not equally strong and high and do not equally support the roof of sustainability. In a conflict situation, the broad and high economic pillar would push the others out of the way, leading to a crooked roof. Nevertheless, also the image of the single separated pillars gives a false impression – as if it is important to turn every single pillar into a thing of perfection. Even more, the common image of a temple is inappropriate, because the three dimensions of sustainability are not equivalent in terms of importance and quality. The natural living conditions are the basis for economic and social development, forming an ecological boundary. Sustainable development is a process in which economic, technical, social and cultural factors as well as the development of nature and landscape are associated with each other. These complex connections are very difficult to understand

and explore. Of course, narrowing one's scope of influencing factors may help to analyse particular interdependencies. Economics has made great progress in terms of reducing complexity in order to construct models, optimising them and bringing reality into mathematical quotations.

However, life, economic management and nature are not meticulously separated divisions, but rather connected and interacting with each other. Separating or fading out of consequences in space and time can be admittedly realised in the study design – but not in reality.

The networked nature of our world and the consequences of ignoring it can increasingly be seen:

- when ecological consequences of our economic management with high CO<sub>2</sub> emissions are reflected in climate change,
- when production plant relocations admittedly reduce the environmental impact in Germany, but increase it

at the same time in other parts of the world,

- when green fuel (may) improve the German carbon footprint, but worsen it in the cultivation of oil palms, leading to negative consequences in social life for the population,
- when cheap textiles are produced under inhumane working conditions,
- when in Germany prohibited pesticides are found in imported food,
- when (hazardous) waste is dumped into landfills of Southern countries where it is disassembled and collected in a manner that endangers life.

Complexity of human life is also noticeable and throws sand into the cogs of rational separated perception:

- when the concept of homo economicus, who wants to achieve individual maximisation, defines more and more people in real life who are not strictly orientated towards their career and income, but rather towards thinking that ►

a better work-life balance is the road to happiness,

- when questioning the gender segregation between gainful and unpaid employment in family and household, realising that without new regulations and infrastructure, the reproduction in society – and in consequence the production of the economy – is in doubt,
- when the rebound effect shows us that not only technically efficient products are important but clever handling as well.

Even if it is hard, we must learn to think and act much more effectively in complex ways as well as to separate things in order to gain analytic knowledge which in turn needs to be checked in complex connections. Not only in terms of content is the aim to overcome geographical and professional limits. Even in social change, it is important that stakeholders can operate seamlessly ‘across borders’: when enterprises found local cooperation networks, when municipalities,

energy suppliers, environmental associations, enterprises and citizens sit together to talk about energy transition, when enterprises and consumers jointly develop ideas for new sustainable products instead of leaving each other holding the bag for non-sustainable products, when experts and laymen work together.

Particularly a transformational process of a growth-oriented economy and society to a society that does not depend on growth – characterised by the independency of growth or contraction of economic performance indicators – needs to combine a lot in this complex change process: know-how of different disciplines, experts and laymen, efficiency and sufficiency, social justice in Germany and around the world. It is all about comprehensive thinking and acting and not about keeping up the isolated maintenance of each single pillar. ■

Prof Angelika Zahrnt is the honorary chairwoman of the German association BUND (Friends of the Earth Germany) as well as a member of the Council for Sustainable Development, set up by the German government.



In his book, the neurobiologist Prof Dr Gerald Hüther calls for a new culture of dealing with ourselves and with other people. A resource user who has ultimately fallen victim to mindless routine should now be ready to unfold his potential.

»Instead of walls and graves we could be building bridges. Instead of being shaped by our lives, we ourselves should shape our own life. Instead of carrying on as we always have, we could also try to rise above ourselves.«

Deutschlandfunk (a German radio station) on the 27 October 2011 on the book by Gerald Hüther: Was wir sind und was wir sein könnten – Ein neurobiologischer Mutmacher (What we are and what we could be) [www.dradio.de/dlf/sendungen/buechermarkt/1589928/](http://www.dradio.de/dlf/sendungen/buechermarkt/1589928/)

# Exchange Your Mobile Phone for a Wide Range of Options

Millions of discarded old mobile phones are stored in drawers. If they were recycled, valuable natural resources could be saved. However, the question remains of how the digital generation can be convinced to use their mobile phones longer and to return their old mobile phones. Ralf Bindel talked to the economist Dr Maria Jolanta Welfens about different approaches taken within a project.

Translated from the German by Kerstin Lisewski, Eunike Bawarska, Katarzyna Piasecka

*Mrs Welfens, you are in charge of a project being conducted at the Wuppertal Institute that explores the return and utilisation of used mobile phones. Why is the recycling of mobile phones so important?*

The issue of mobile phone recycling is important because no comprehensive recuperation system has been set up so far. In Germany alone, 83 million old appliances are stored in drawers unless they end up in the household rubbish. The high level of awareness regarding recycling in other areas is virtually non-existent when it comes to mobile phones. The majority of users buy new models and forget about their old ones. As a result, one person can have up to five old mobile phones.

Present collection systems, which were introduced at great expense, function most frequently only for a limited period of time. The suggestion of introducing deposits on mobile phones appears promising. However, this idea has been met with criticism by many industry representatives such as the high-tech Hightech-Verband Bitkom (the Bitkom association). It is argued that deposits

on mobile phones might potentially destroy existing recuperation systems and furthermore, that the introduction of this measure would lead to more red tape.

*However, mobile phones are the smallest electronic appliances in terms of size and weight, are they not?*

Mobile phones are only one example. The same problem applies to all ICT (information and communications technology) devices. Instead of re-using rare and valuable resources, we extract them from nature, costly and at the expense of both people and the environment.

*Does mobile phone recycling pay off at all?*

It definitely pays off not only from the economic point of view, but also ecologically and socially. With regard to urban mining, it is claimed today that old stock is a more valuable source of resources than the extraction of raw materials. An old mobile phone contains approximately 60 various different raw materials, among others precious met-

als such as platinum, gold and silver or metals like tantalum, indium and gallium, the extraction of which is expensive. Therefore, we need to become aware of what is valuable so we can use it later on as recyclable material. In addition, there exists competition for raw materials between ICT and environmental technologies as well as electromobility, since they often use the same strategic raw materials.

*Currently both producers and consumers are still more interested in new than old appliances, right?*

There's a tendency to have several mobile phones. Obviously, it offers the providers and manufacturers higher profits. The monthly rates became cheaper and the declining costs encourage more intensive use which translates to tapping into new target groups.

However, charges to consumers for their mobile life-style and 'calling without limits' increases in the end, including rebound effects.



*Who has an interest in mobile phone recycling? Who benefits from it? Should resources be preserved for the sake of the economy to decrease the production costs or for the sake of environment protection and prevention of resource conflicts?*

All three aspects of sustainability are taken into account: the economic, ecological and the social. For the most part, it is recyclers who profit from the process, although there are hardly any official figures on this. The large network providers such as Telekom, Vodafone, Eplus, O2/Telefonica have initiated different device-return programmes, in most cases in cooperation with campaigns for environmental and social issues. They have already put great efforts into optimising the value chain for several years. However, corporate social responsibility has to be taken into account as well: most mobile phones are manufactured in China under problematic working conditions and insufficient environmental protection. Public campaigns criticise child labour and military conflicts such as the Coltan Conflict in Congo. Systematic recycling of mobile

phones is used as a means to reduce reproaches and to prevent malpractice in the field of mobile phone disposal.

*The number of returned mobile phones is still low. What can we expect in the future?*

There are 6 billion mobile phones contracts concluded worldwide by 7 billion people. According to research conducted by Nokia, only three per cent of the appliances are recycled. Customer's awareness of the regular ways of returning their old mobile phones is very low. Therefore, the return of mobile phones still proceeds particularly as an action of network providers. Worldwide, 1.5 billion new mobile phones are sold annually. This shows what potential there is in the recycling of mobile phones.

*Why doesn't the return system function properly?*

Recycling is a secondary market and new mobile phone purchases are not coupled with an applicable return system. One can only speculate why people prefer to store their mobile phones in their drawers – there can be



a number of reasons: lack of interest or knowledge, but also emotional attachment to their mobile phones. It can also be attributed to the fact that there is hardly any infrastructure and too little communication at the respective point of sale. The sellers are insufficiently trained, they advertise new mobile phones, but not the return systems.

*Your project 'Return and Utilisation of Used Mobile Phones' also focuses on education and communication, right?*

The project was initiated by the Federal Ministry of Education and Research as a contribution to the Science Year 2012: 'Project Earth – Our Future'. We are responsible for the scientific basis of the project and we thereby accompany the communication campaign. Its main target group is made up of young people between 14 and 17 years. However, in terms of its content, the project does not only focus on recycling, but also addresses the whole lifecycle of a mobile phone. We want to raise awareness among young people of the ecological backpack, which in the

case of old mobile phones amounts to 44kg not including the infrastructure. By these means we hope to increase the motivation for both sustainable use and recycling. For this purpose, some initiatives on collecting of mobile phones are undertaken, and educational materials for schools have been prepared. Young people should learn to use their mobile phones for more than two years. They should become more sensitive in terms of energy consumption and learn that smartphones require more energy and that even the battery charge current should be produced ecologically.

*Has the project been successful so far?*

Actually, it seems that the project has really gone down well with the students. Usually, subjects like these are not taught in class at all, and there is no awareness of the possibility of returning mobile phones. However, as soon as one introduces this concept to the students, their ideas of mobile phone recycling become very creative along with their suggestions for spreading the idea of the concept. For example, being

a target group themselves, they came up with the idea to launch a campaign addressed to their peers and to spread it using radio broadcasting stations, YouTube and Facebook. If you want to reach young people, you have to use their communication channels. According to our survey, many would like to return their old mobile phones for a certain amount of money; different values were suggested, ranging from EUR 0.01 to EUR 100. Apparently, the decision to return an old mobile phone depends mostly on economic incentives.

*What about the long-term usage?*

From a technical point of view, the longer usage is of course possible, but the strong incentive to buy new equipment all over again makes it much harder. The users are willing to cooperate, but we do not convince them effectively. On top of this, vendor contracts lure people excessively into buying new appliances. And with the prolonged contracts, a customer can get the newest devices, most of the time almost for free. Moreover, giving old phones away to others who are satisfied with yesterday's





is unthinkable for most people. The emotional attachment and the memories connected to the device make it even more difficult. Many people, for example, want to keep their old messages as documentation of their friendships. Giving it away, separating from it in a reasonable way seems to be very difficult for them. However, if they decide to give it away, then only into good hands.

*How do you want to make consumers use their mobile phones for a long time, while the industry wants to sell new models?*

The industry faces new challenges. It is interested in sales, but due to the current growth, the markets will eventually be saturated. We suggest other business models such as mobile phone leasing. If mobile communication was seen more as a service that is not necessarily related to the possession of a mobile phone, everyone could benefit from it. A further option could be the return of the old device when purchasing a new one. In this way, mobile phones that are stored now in drawers could be brought back into the industrial cycle. We could also try to design modular mobile phones from the beginning, in such a way that the modernisation of an old device would be much easier. It would considerably prolong the service life of mobile phones.

*Let us get back once again to returning the mobile phones: previous campaigns with the slogan “You have blood on your mobile phone” were not very successful or did obviously appear to act rather as a deterrent. What might a successful campaign look like?*

Blood and child labour only have an effect on already socially engaged young people and these make up only a small percent- ▶

age of all users. In addition, the rescue of the rain forest is not attractive anymore, because these issues and projections are almost overused by TV, newspapers and radio. We need a combination of certain education and communication measures, economic motivation and appropriate technological innovations as well as different industry models that promote a more sustainable use of mobile phones. To achieve this, industry, politics and science have to collaborate.

*Does it only work with money?*

We should not forget that economic motivation is a very important factor. The surveys we conducted among pupils clearly confirmed this. In this respect, a suggestion worth considering is, for example, the idea of regarding the old mobile phone as a kind of 'currency'. If you could for example buy a whole meal in a fast-food restaurant with money you received for your old phone, it would perhaps be much easier to part with your device.

*What are the future prospects for sensitising customers to greater awareness of their use of resources?*

Currently, more than 1,500 schools are taking part in the project. Now, we need an appropriate continuation, the further support of all participants. We cannot give up after one campaign. The seed has to keep on growing. ■



Dr Maria Jolanta Welfens is an economist and a project leader in the Research Group 4, Sustainable Production and Consumption at the Wuppertal Institute.



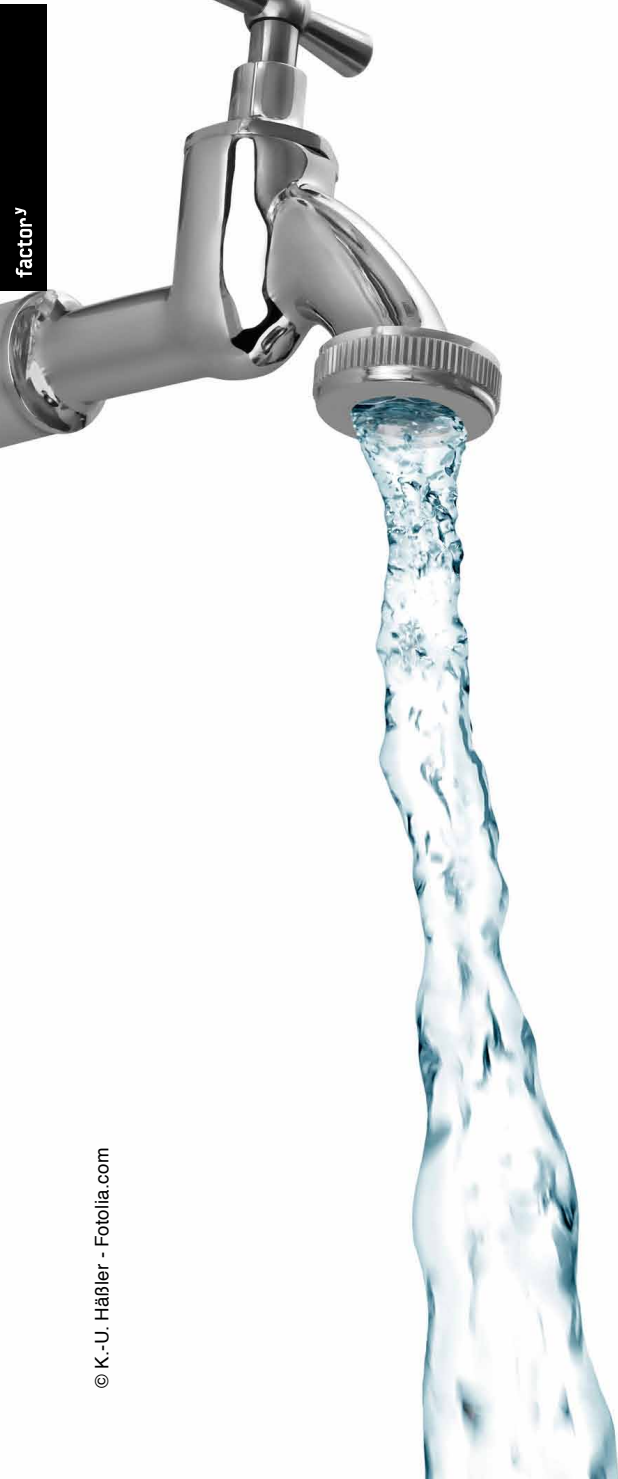
## The Raw Material Expedition

All schools nationwide can register to participate in the 'Raw Material Expedition' campaign (all the information is available at <http://www.die-rohstoff-expedition.de/>) that is accompanied by a project to collect old mobile phones. The classes that collect the most phones can win different prizes. The Wuppertal Institute and IASS (International Institute for Advanced Sustainability Studies in Potsdam) were actively involved in developing the concept of the campaign. Within the project, learning materials and a phone app for ecological and social problems that are connected with the production, usage and recycling of the mobile phones were developed.

»Complex societies like ours depend on cross-border streams of workers. They comprise different ethnic groups, races and religions. They result in different forms of sexuality and family life. Forcing that complexity into one single cultural pattern would be politically repressive and self-deceptive.

**The 'self' is composed of feelings, sense of belonging and behaviours that rarely go together. Every call for the tribal unity reduces this personal complexity.«**

Richard Sennet, Zusammenarbeit. Was unsere Gesellschaft zusammenhält. (Together: The Rituals, Pleasures, and Politics of Cooperation).  
Hanser Berlin 2012



# Seawater Minus Salt: Separation Technique for Drinking Water

Seawater desalination is a market worth billions. Out of currently seven billion people in the world, half a billion and counting depends on drinking water taken from the sea. By mid-century, the world population will have increased to about ten billion people. Most of the additional three billion people will live in coastal regions. The extraction of salt from seawater is an existential technique of the 21st century.

By Bert Beyers

Translated from the German by Caroline Hutter, Christine Kühn, Darinka Potsch and Stefanie Scheu

Those who visit the Mediterranean island of La Gomera have the chance to see a truly impressive rocky landscape: a pattern of shallow water basins along the coastline. Thanks to the sun, the seawater evaporates in these basins. What remains is salt: a precious resource for people in the ancient world. It was they who once cut the basins into the rock.

Two millennia later, on the other side of the globe: near the Australian metropolis of Melbourne, in a town called Wonthaggi, the largest seawater desalination plant using membrane technology has just become operational. It is a giant industrial complex that includes factory buildings, pipes stretching for miles, roads and adjoining car parks. The plant produces 444,000 cubic metres of drinking water per day, enough to fill 200 Olympic swimming pools. The separated salt cannot be used anymore, and is piped back into the sea as a liquid concentrate.

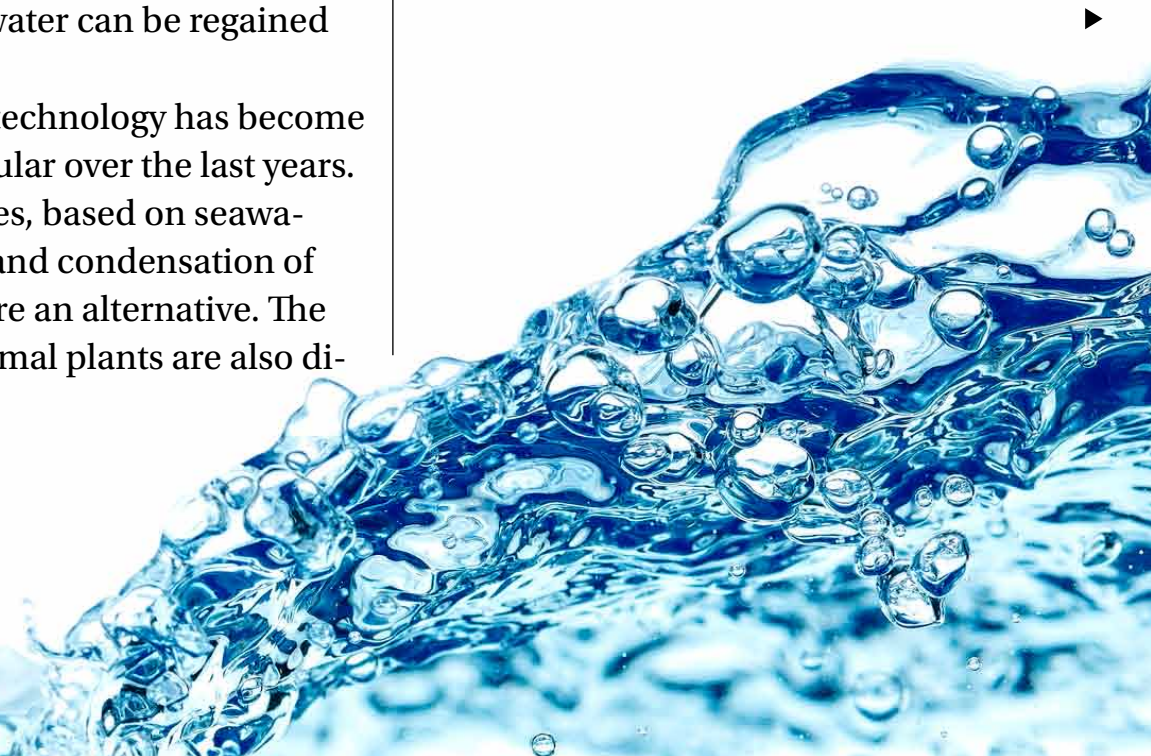
## Filtration vs. Vaporisation

The Wonthaggi plant uses semipermeable membranes that work like filters. The seawater is pressed against the membranes with high pressure. The dissolved salt in the water is filtered out this way. Usually, there are six to eight of these membranes aligned one after another in cylindrical elements. The drinking water yield amounts to up to 45 per cent of the incoming seawater. What remains is concentrated and piped back into the ocean. However, a major part of the hydraulic energy stored within the pressurised water can be regained beforehand.

Membrane technology has become increasingly popular over the last years. Thermal processes, based on seawater vaporisation and condensation of drinking water, are an alternative. The processes in thermal plants are also di-

vided into several steps. Since they also need great amounts of cooling water, the drinking water yield amounts only to 10 to 20 per cent of the seawater used.

Thermal processes are mainly used in the Near and Middle East as well as in the Caribbean. This is partly due to the high amount of thermal energy required – which is not a problem in oil-producing countries. Furthermore, the Persian Gulf's seawater has been found unsuitable for the delicate membranes.



Seawater desalination draws from a virtually infinite resource: the world's oceans. However, its high power requirement, great investments in industrial plants and the significant consumption of resources limit this technology. On average, the membranes need to be changed every five years and are thrown away afterwards. Experts have estimated that the number of used spiral wound modules amounts to one million per year – a problem still to be solved.

## What Remains Is Concentrate

There is another unsolved problem: large quantities of concentrate that are returned to the ocean and are sometimes mixed with chemicals. What about the effects on the local ecosystems?

Marine environmental scientist Sabine Lattemann focuses on this particular problem. She works in Berlin and Saudi Arabia, where drinking water is subsidised even though the water consumption is particularly high and amounts to between 400 and 600 litres

per person per day. In Germany it is only about 130 litres.

According to Sabine Lattemann, the effects of giant desalination plants in oil-producing countries on the marine environment are difficult to assess. Related studies should be viewed with scepticism. In Australia, the situation is different. The desalination plants there are planned and operated with active public participation. A part of the energy is delivered free of CO<sub>2</sub> emissions, thanks to traded certificates. Moreover, the brine is discharged into the ocean some hundred metres from the shore.

Sabine Lattemann concludes that desalination plants can be operated in an environmentally friendly way, but only if there is a willingness to do so. Also, alternatives such as pumping water over long distances need to be considered since there are ecological problems associated with these options as well. ▶



## Separation Technologies for Life

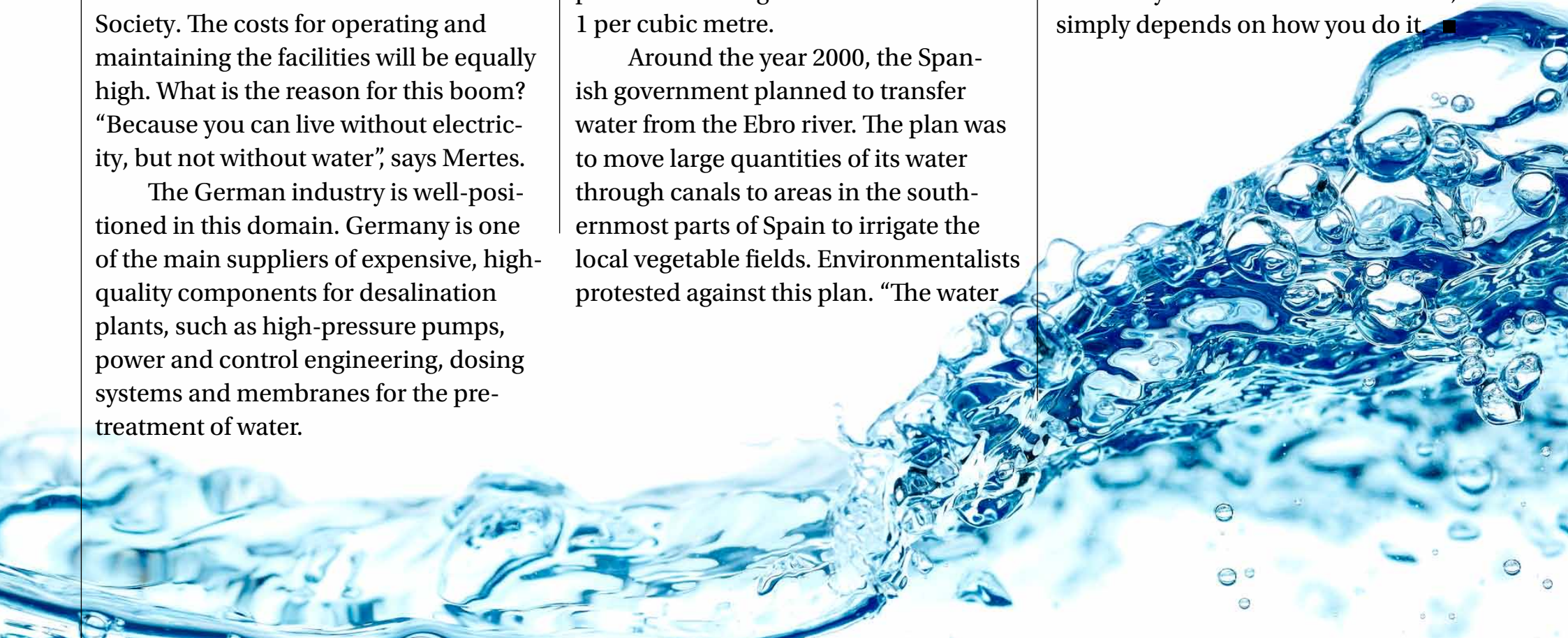
It would be an understatement to call the development of desalination plants a rapid one. Over the last five years, the global installed capacity has increased by almost 60 per cent. For the next decade, the turnover for the construction of new desalination plants is estimated at approximately EUR 50bn, says Claus Mertes of the German Desalination Society. The costs for operating and maintaining the facilities will be equally high. What is the reason for this boom? “Because you can live without electricity, but not without water”, says Mertes.

The German industry is well-positioned in this domain. Germany is one of the main suppliers of expensive, high-quality components for desalination plants, such as high-pressure pumps, power and control engineering, dosing systems and membranes for the pre-treatment of water.

Increased energy efficiency is the new mega trend. While 30 years ago, membrane plants still required 11 kilowatt-hours of electricity to produce one cubic metre of drinking water, they require only 2.5 kilowatt-hours today, according to Mr Mertes. In the Arab countries, it costs about EUR 1 to EUR 1.50 to prepare one cubic metre of drinking water. In Spain, the market leader in membrane technology in Europe, the price for drinking water is less than EUR 1 per cubic metre.

Around the year 2000, the Spanish government planned to transfer water from the Ebro river. The plan was to move large quantities of its water through canals to areas in the southernmost parts of Spain to irrigate the local vegetable fields. Environmentalists protested against this plan. “The water

of the Ebro is the lifeblood of Aragon,” the protesters shouted. In the end, the Ebro stayed in its natural riverbed. As an alternative, membrane desalination plants were built. However, these plants provided water with a high residual salt content, not so much for technical reasons, but rather to save money. The consequences are agricultural land with a high level of salinity for which, in turn, large quantities of purified water are necessary to remove the salt. Hence, it simply depends on how you do it. ■



»Where is the limit,  
how far do you want to go?  
Keep the truth secret,  
you cannot see it.  
Only use what you like.  
Only things you tell are right.«

Gott sei Dank nicht in England (Thankfully not in England) by the German band Fehlfarben, Monarchie und Alltag 1980,  
in Peter Hein, Die Songtexte, 1979 – 2009, Düsseldorf: Lilienfeld Verlag, 2009





# Separating Feels Good!

We are living in a time of dematerialisation caused by digitalisation. However, parting with your record is a sacrilege. An ironic commentary on separating.

By Klaus Dosch

Translated from the German by Caroline Hutter, Christine Kühn, Darinka Potsch and Stefanie Scheu

The tyres of my car crunching on gravel as I enter the material recycling facility. It has come this far: I am really going there. The entranceway is a one-way street; there is no turning back—at least not without suffering a personal defeat. We are talking about something I used to be very proud of when I was a teenager: the records I used to listen to during my years as a pupil and a student. Not one second-hand shop was interested in buying the records that I had cherished ever since. More than 200 records, which were once anxiously examined after being used and being carefully put back into their protective sleeves, are now in the boot of my car. Next to them, there is the device to play them, the ‘Mercedes’ among the turntables that used to be just barely affordable. Back then, it was my faithful and reliable supplier of music. Until yesterday, it was standing rather forlorn on a stack of records in the corridor. This farewell will take a bit longer. When passing my record collection, I can hear it whispering to me: do you remember, back in the days, Meat Loaf, your first girlfriend? Do you want to—throw me away!?!? Yes!

When I was still at school, I dreamt of getting this status symbol. Then I devotedly listened to the music. Best remembered were the moments when I had to turn the record over, always at the wrong moment. The result: thump, thump, thump- every two seconds.

I take every single record in my hands and sort them once again. Two hundred black records and almost as many memories. I catch myself thinking about changing plans. Well, they will move to the new place again. Just like when we last moved ten years ago. I had sacrificed almost a meter of the shelf for the records. And only one single time in the last decade had they landed on the turntable. We had a lot of fun together with our children. It was a trip into the past when there were no such things as iPods, portable CD players and cassette player. Yes, this is how we used to listen to music back then. It is almost like visiting a Neanderthal museum. The following day, the record player disappeared in the cupboard again. I quickly make a rough calculation: listening to the music once for two hours, a space of one square metre in the living room cup-



board that had to be heated for ten years, 120 kilowatt-hours of heat energy. Per year! And this over a period of ten years.

This adds up to around 100 Euros, plus one metre of shelf made by a carpenter for another 200 Euros. For two hours of listening to the music. This means 120 minutes for 300 Euros.

No, the decision has been taken. Ballast needs to be tossed overboard. And it feels great to do so. I have to get rid of all the junk no one will ever use again. Perhaps the CDs will be next. When we moved into our new-smaller-house, they had all disappeared in four big drawers. Later on, we put doors in front of the drawers of the cupboard. And now, we cannot even open the drawers anymore. Pretty stupid, but nobody ever seemed to bother, because the music is on an iPod. Of course, the music was not just taken from the Internet, but was manually digitised during leisure hours—and without any loss in quality of course. This had happened before the doors appeared. Or what about the countless items of clothing that we do not wear anymore. And the many unnecessary shoes. And the hand-blown fine wine glasses that have never been put on the table because they are too good to be put into the dishwasher. Then there is the electronic waste that could tell long stories of planned obsolescence; and the books that have already been read and will certainly not be read again. And, and, and. All these things probably need at least another ten square metres of shelf surface!

Separating makes you feel good!

At least when it comes to material things. ■

Klaus Dosch is a geologist, an industrial engineer as well as the scientific director of the Aachen-based Kathy Beys Foundation.



# factor<sup>y</sup> – the Magazine for Sustainable Economy

Although the word 'factory' is mostly associated with the manufacturing industry and industrial production, it can also refer to 'factor Y', the factor by which energy consumption needs to change so that future generations will find themselves living in similar conditions. Such an understanding of sustainability implies that all aspects of economic activity need to be addressed with sustainability in mind, including consumer practices as well as the manufacturing and services sectors.

factor<sup>y</sup> highlights the role of businesses in sustainable development and aims to draw the drivers of the economy into the public debate. Such development entails resource efficient economic practices for both producers and consumers as well as educating and informing them about sustainability issues.

factor<sup>y</sup> is a free magazine that is published four times a year in PDF format as well as on the magazine's website [www.factory-magazin.de](http://www.factory-magazin.de).

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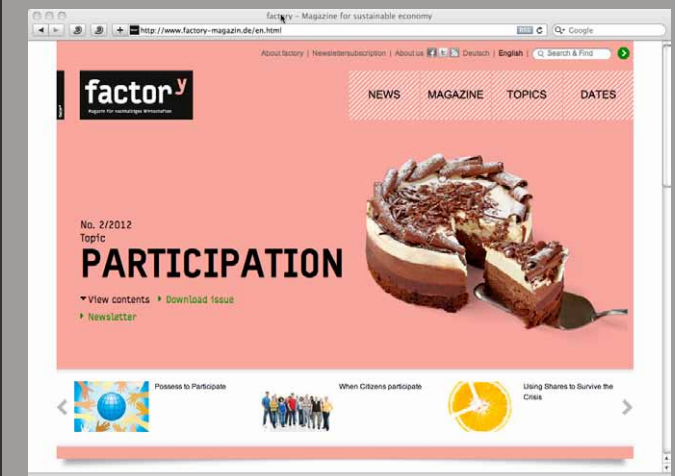
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