

Plastic Planet

A Film by Werner Boote

99 minutes, HD, Color

In English and German with English subtitles

16:9, Stereo/5.1



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SYNOPSIS

Plastic is cheap and practical. We are children of the Plastic Age. Synthetics are able to remain in the ground and in waters for up to 500 years, and can thereby harm our hormonal system due to their often-unknown additives. Did you know you've got plastic in your blood?

In his investigative motion-picture documentary, director Werner Boote shows that plastic has emerged to a global threat. He asks questions that concern all of us: Why don't we change our consumption behavior? Why is the industry not reacting to apparent dangers? Who is held accountable for hills of garbage mounting in Deserts and Seas? Who wins in this game? And who loses?

ABOUT THE FILMMAKER



Born 1965 in Vienna, he studied Dramatics, Media Studies and Sociology as well as being enrolled at the film academy. He fulfilled various roles with many film productions, such as working as Assistant Director for Robert Dornhelm and Ulrich Seidl.

Since 1993 Werner Boote has made his own films with a specific focus on music videos, including the video for Anouk's "Sacrifice" (1999), for which he received the TMF Award; Andrea Bocelli's "Cieli di Toscana" (Universal Music, 2002) and his latest; Kurt Rydl's "Der Gladiator" (ORF/EPO-Film, 2003), which was selected as ORF's submission for the Emmy Awards. He shot the political documentary "Südtirol–Alto Adige" (ORF/ZDF) in 1996.

He began his initial research for Plastic Planet almost 10 years ago. In 2003 he approached Neue Sentimental Film with the topic, with whom he had already worked on various TV documentaries, including *Der Fliegende Holländer – Feuer & Eis*.

He has received numerous awards, among them two "Dolphins" in France and the Silver Screen Award at the New York Film festival.

Werner Boote lived in Amsterdam from 1993 to 2002, and currently resides in Vienna.

ABOUT THE FILM/PRODUCTION INFORMATION

Plastic Planet is an Austrian–German Coproduction by Neue Sentimental Film Entertainment GmbH, in Vienna (leading Producer: Thomas Bogner), and Brandstorm Entertainment AG, in Frankfurt (Producer: Daniel Zuta). Ilann Girard (ARSAM, Paris) acts as Executive Producer. Cine Cartoon Filmproduktion GmbH in Vienna assisted with the animation in the film as a co-producer.

In the summer of 2003, director Werner Boote first introduced the topic to producer Thomas Bogner, after years of research. It took almost four years for further realization of the material and of the relatively high production costs. The film was shot from Spring 2007 to Spring 2008, with one additional shooting day in October 2008. Postproduction lasted almost a year.

Pre-shooting work began summer 2005 in Innsbruck, Austria, in the Moroccan Sahara and in the USA (Grand Junction "House Clearing", interview with Dr. Theo Colborn). They served in the making of a first trailer, and certain parts were used in the documentary that followed. A further, advanced shoot took place in October 2006 in Venice. (Porto Maghera, interview with attorney Phillipe Casson). The first official shooting-phase started Spring 2007 in London (Susan Jobling, Intersex-Fische), then back to Vienna over Finland (ÖMV, Borealis), further through Japan (Tokio, Tsushima, Minamata City, Kumamoto), China (Shanghai) and to India (Kalkutta). After a short break the team traveled through the USA (Los Angeles, Pullman, Cincinnati, and Columbia) and over the Pacific via helicopter, to Charles Moore's boat. A second unit shot additional material in Morocco and Uganda (Kampala). Back in Europe the shoot covered German (Düsseldorf, Guben), Italian (Novara), Belgian (Brussels, Waterloo) and, Austrian (Dachstein, Vienna) territory.

DIRECTOR'S STATEMENT

The idea for the film:

1999 I read in a Dutch daily newspaper, that fish were dying in a certain English river, due to a substance present in plastic. Shortly after, I came across an article in "Time Magazine" declaring that Greenland's seas were intoxicated with synthetics. I read more and more articles in the news reporting of some kind of danger arising through the use of plastics. A small report in an Austrian daily newspaper a few years back disclosed traces of heavy loads of synthetics in the Pacific, and it shook me that no one knew of this! A few days following, the same daily newspaper brought an eight-page report on the topic, financed by the synthetics industry, fit to look like the newspaper itself. My logical summary: That first little report one quickly skims over, but eight pages that assert how innovative, how environmentally friendly and how splendid plastics are, are stuck within the reader. That's why I thought: I'll make a film on this.



Boote's personal connection:

My grandfather worked in the German synthetics industry when I was a child. He came to Vienna every weekend and always brought me pretty presents that were usually made from synthetics. I was very proud of them as they were shiny, colorful, and could do everything.

Advantages of plastic:

The great advantage of plastic is that it is cheap and it is comfortable, as it is lighter than other materials. It is easier to carry home a plastic bottle. Plastic also enables the production of all kinds of shapes and sizes. One can quickly pour plastic into a colorful, gaudy shape that even smells good – of phthalate.

Boote's role in the film:

My films are my personal quest for answers. Thus the persona Werner Boote plays a certain role in the film. When I say I made an investigative film, the question immediately arises, whether it's similar to Michael Moore. My response, "Heaven forbid!" It is nothing more than my personal search or journey. I don't create propaganda films to say "Hi, Let me show you how the world really works..." "Plastic Planet" became a film that tracks and follows me, on my search of finding out what is going on with our plastic planet.

The fear of those in power:

I have been threatened a good deal of times in my career. When one chooses to make documentaries on hot topics, opponents will get in touch with you in acceptable and unacceptable ways. Currently, the synthetics-, oil- and the other industries that depend on plastic, are in confrontation mode – I'll put on my plastic-bullet-proof vest and see what happens.

The message and the audience:

I'm not saying, "Don't buy another piece of plastic." That would not work. If I manage to get people to think through my film, to consider not buying as much plastic, it would be great. We would have achieved a lot. The film says to its audience, "Hey, become a bit more aware in terms of plastic usage. Inform yourselves. Ask your grocery store-keeper what is behind it all, and why plastic packaging doesn't list all the toxins that wander into your food." The food-store chains will react and change their attitude. Because EU legislation states that the consumer can ask the seller, and that the seller is bound to inform the consumer on what is inside of products. People just don't know this.

INTERVIEWEE BIOS

JOHN TAYLOR

Former president of PlasticsEurope, association of European synthetics producers, lays emphasis on the number of positive contributions, plastic has made to society during his life. PlasticsEurope is one of the leading European business associations. Over 1.6 million people work in over 50.000 businesses within the synthetic-industry (within processing, mostly small and medium-sized businesses), generating a turnover of over 300 billion Euros per year.

FELICE CASSON

Felice Casson, a renowned, Italian investigative judge, attorney and current Senator of the Italian Parliament is known for his fearlessness, and is author of “The Poison Factory“.

BEATRICE BORTOLOZZO

The daughter of Gabriele Bortolozzo, fatality victim in the trial against Montedison, tells of her father’s struggle for justice, gapless clarification, and safe working environments for those working in the chemistry industry.

SUSAN JOBLING-EASTWOOD

Susan Jobling is an environmental scientist; she is a specialist in endocrinal disruption of waters. Jobling was amongst the first scientists to carry out research on the phenomenon of intersex fish (fish with both male and female reproductive organs). Leading a comprehensive study at the British Brunel University that analyzed water samples from 30 British Rivers over a period of three years, Jobling knows: chemical causes of hormonal dysfunctions of animals and humans are far more complex than was hitherto assumed.

HIROSHI SAGAE

A Japanese artist, whose work includes plastic sculptures. He created the “miniature Werner Boote” for the film “Plastic Planet” (which also offered the prototype for the cartoon figures in the film). Veiled slightly by his humor but apparent through his thoughtful tone, he hints towards the fact that he is fully aware of the severe health risks that accompany his preferred working media. He nonetheless processes significant quantities of it.

PATRICIA HUNT

The renowned geneticist Patricia Hunt operates at the Case Western University, Cleveland, Ohio. In 2003 by means of investigation, her research team for the first time managed to prove that administrating BPA to mice, even in minimum quantities, damaged the genetic makeup, being able to cause dysfunctions such as the well-known Down syndrome.

SCOTT BELCHER

The pharmacologist and cell biophysicist Scott Belcher of the University of Cincinnati was initially able to prove on animals, that Bisphenol A influences brain activity, even in small dosages. In Belcher’s animal tests, the substance initiated a devastating effect after several minutes: it blocked the signal path of the female sex-hormone estrogen and thus the natural development of brain cells – impartial of the animals’ sex. Belcher warns that BPA, especially in those small dosages people come in touch with in everyday life, causes extreme impact.

THEO COLBORN

Author of “Our Stolen Future. How We Are Threatening Our Fertility, Intelligence and Survival.” She is Professor of zoology at the university of Florida, Gainesville and president of “The Endocrine Disruption Exchange” (TEDX). She does research on the effects of the environment on

health and is well known for her studies on the impacts of chemicals causing disruptions of the hormonal system.

FRED VOM SAAL

The biologist Frederick vom Saal examines the impacts of natural and synthetic hormones and counts to the most distinguished scientists in the area of endocrinology. Saal is known as the spokesman of critics of Bisphenol A, one of the most used and important chemicals in the world. Since 1995 vom Saal's analyses have suggested that small amounts of BPA can reduce sperm production, influence the development of the brain, increase the weight of the prostate or cause changes in the genetic makeup. The worldwide media attention vom Saal has achieved, is not alone due to his remarkable research findings, but also arises from his heated critique of well-known chemical corporations, which he accuses of manipulating test results. Fred vom Saal currently lectures and researches at the University of Missouri, USA.

FREDERICK CORBIN

Dr Corbin is known as one of the most prominent plastic surgeons in Hollywood.

CHARLES MOORE

The captain and wealthy heir of a US oil company. In 1994 Charles Moore discovered the so-called "North Pacific Gyre", a strip of plastic covering several thousand kilometers in the Northern Pacific, around 1600 kilometers outside California's coast. Moore thereupon founded the Algalita Marine Research Trust to explore the phenomenon. He estimates the "Great Pacific Garbage Patch" as it is called, to consist of 100 million tons of floating garbage today.

PETER FRIGO

Peter Frigo is a specialist for hormones and women's medical science, and has further specialized on "estrogen within the environment", "hormones and cancer", "new ultrasonic technologies" as well as "hormonal problems of women". His analyses of sewage water show the prevalence of xenoestrogens in the environment, which the expert relates to current methods of contraception (the pill) and industrial chemicals such as DDT, Bisphenol A and Phthalate. Frigo sees these as a possible cause of decreasing fertility rates and an increase in hormonally induced tumors. He discusses these topics in scholarly- and mainstream journals, by means of international studies examining the effects hormones and hormonal substances have on human reproduction capability, rate of carcinoma, as well as intelligence. His book "Die Frau der Zukunft" ("Women of the future") explains, how health, beauty and wellbeing can be enhanced through hormonal therapies. The most relevant hormones are portrayed, including how they work and how they can influence quality of life of humans. Dr. Frigo has also developed a functional drink, "Beauty and Power", based on bioactive phytochemicals.

KURT SCHEIDL

The Austrian environmental analyst tests the inflatable plastic globe, which accompanies Werner Boote around the whole world in the film, for containing potentially dangerous substances. The conclusion: the seemingly harmless toy and symbol for our planet, contains poison. This plastic globe, made in China (see film footage of Werner Boote in the factory Qinxu in Shanghai) should be prohibited due to its chemical composition.

MARGOT WALLSTRÖM

Margot Wallström is the current vice-president of the European Commission and an active agent for institutional relations and communication strategies. She is a high-ranking politician and lead figure in the most innovative chemical legislature on European level – REACH, future role model for chemical policies worldwide. She tells of her own experiences as environmental minister, and outlines the resilience of synthetics producers against REACH. She makes visible the strength of

force lobbyists of the chemistry industry have on politicians in Brussels. As environmental minister in the commission Prodi from 1999 to 2004, Wallström managed the greatest legislative scheme in the history of the EU: REACH, the first all-encompassing chemical guideline worldwide.

KLAUS RHOMBERG

Klaus Rhomberg is specialist for medical biology in Innsbruck. He is experienced in human genetics and has been dealing with the impact of harmful substances on the human organism for more than 20 years. In his reports, he warns of the toxin-effects on a child in the mother's womb, and of the falling fertility arising from environmental poisons. Critique on studies contributed by the industry (such as biologist vom Saal - see above). Two years following, a small press conference that held place in Tutzing completely tore the study apart, from the sample-picking procedure over the analysis to the leaving-out of outrageous figure values.

RAY HAMMOND

Futurist and author of various future based novels. Since his book "The World in 2030" which was commissioned by the synthetics industry, he acts as "business speaker"/ lobbyist for PlasticsEurope.

GUNTHER VON HAGENS

German plasticization artist, whose mummifications are made possible by synthetics being injected into human corpses. The idea of "humans increasingly consisting of plastic" takes on a living form in his work. Thanks to plastic, humans are becoming immortal.

PRESS

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Victoria Film
Festival Interview -
"Plastic Planet"
director Werner
Boote
by Jason Whyte

“Plastic Planet is a humorous disaster movie. This investigative documentary shows that plastic has become a threat for human beings and the environment.” Director Werner Boote on the film “Plastic Planet” which screens at the Victoria Film Festival.



Plastic Planet - At Victoria Film Festival

Is this your first film at the Victoria Film Festival? Tell me about your festival experience, and if you plan to attend Victoria for the film's screenings.

I would love to come to Victoria Film Festival and present my film. We always have great discussions going on after screenings. As I spent ten years of work on my film, I cannot afford to pay my flight by myself.

Tell me a little bit about yourself and your background, and what led you to the industry.

I started at the bottom as a best boy for TV and cinema and did almost every possible job in the industry. I love making films, especially documentaries. I think that my job is one of the best jobs on earth because you are meeting great people, seeing fantastic places and learning about important issues.

How did this whole project come together?

In 1999 I read an article in the newspaper, saying that fish are dying out because of a substance, which leaches out plastics. I wanted to know more about this case and started to investigate. As my grandfather was managing director of the German Interplastic Werke, plastic was a very important material in my childhood. I needed to find out the truth about plastics. My Viennese

producer Thomas Bogner had contacts to producers in Canada, UK, Belgium, France, Italy and US but then decided to keep it manageable. The result is an Austrian and German co-production.

Please tell me about the technical side of the film; your relation to the film's cinematographer, what the film was shot on and why it was decided to be photographed this way.

The first take of "Plastic Planet" was shot on 35mm film in Morocco because I was there for another movie and did not have anything else around. Because I enjoy making very very long interviews we then decided to shoot HD-Cam. Photographer Thomas Kirschner and I already worked on several documentaries together. It is very important for me to know that the DOP knows exactly what I want. As I am often protagonist of my docs it is even more important, because I sometimes cannot even give him instructions. We always are shooting with Easy Rig, a portable camera support system. I like it because preparing the camera does not take as long as with steadicam. You are extremely flexible, camera-movements are smooth and the camera-position is not as high as the cameraman's shoulder.

Out of the entire production, what was the most difficult aspect of making this film? Also, what was the most pleasurable moment?

After shooting on the garbage dump in India the whole film-crew got seriously ill and we spent a week in the hospitals getting infusions. The plastics industry considered to bring me to court. I accepted two blood-tests to find out whether I have plastics in my blood or not. Chinese authorities put my production manager to jail for one day because he organized the shooting with a collector of plastic-bottles in Shanghai which they did not want to show to the public.

The most difficult moment of making this film was that I finally knew so much about the dangers of plastics while still everyone bought plastic without challenging it.

The most pleasurable moments came after the opening in Austria. Plastic has become an important issue for the public. Dangerous Baby soothers are banned thanks to our tests. Some baby bottles are now off the market. All local political parties agreed to work out a better way of dealing with poisoning substances in plastics. Even the EU-Commission made plastic to one of its subjects. Families started experiments to buy less plastic. The University of Vienna made scientific studies about my film and my comments. The plastics industry in Europe produced a 14 pages long media kit for all their members about the film Plastic Planet.

Who would you say your biggest inspirations are in the film world (directors, actors, cinematographers, etc)? Did you have any direct inspirations from filmmakers for this film in particular?

Tom Hanks once said that his biggest achievement was endurance. I learned that this is one of the important abilities in the film world.

How has the film been received at other festivals or screenings? Do you have any interesting stories about how this film has screened before? What do you think you will expect at the film's screenings at Victoria?

After the screening of "Plastic Planet" at the MEIFF in Abu Dhabi, two sheiks came to me and wanted to know more about plastics and what I have found out. One was the advisor of the Sheik. The other person was from the Ministry of environment and water. I enjoyed talking to them. In the end, one of them asked me: Please tell us how Abu Dhabi should start to act with this

problem?

I was not prepared. Spontaneously I said, "Ban plastic bags! Many countries decided to ban them. France, Italy, .. Eritrea did it already many years ago." He seemed to be satisfied and promised that he is going to take care about it. I thought I will never hear from him again. Ten days later they sent me what they made officially: "Abu Dhabi bans plastic bags in 2013."

If you weren't making movies, what other line or work do you feel you'd be in?

I would love to be an Astronaut! I would jump in a plastic-spacesuit and let them shoot me into space. I love to explore!

How important do you think the critical/media response is to film these days, be it a large production, independent film or festival title?

I think the critical/media response is one of the two important things for films and festivals. The second is word-of-mouth advertising.

If your film could play in any movie theatre in the world, which one would you choose?

I prefer to take them all.

If you could offer a nickel's worth of free advice to someone who wanted to make movies, what nuggets of wisdom would you offer?

Tom Hanks once said that his biggest achievement was endurance. I learned that this is one of the important abilities in the film world.

What do you love the most about film and the filmmaking business?

I think that my job is one of the best jobs on earth because you are meeting great people, seeing fantastic places and learning about important issues.

A question that is easy for some but not for others and always gets a different response: what is your favourite film of all time?

I love those movies which I have seen in the past and still make me think about them today.

This is one of the many films playing at this year's Victoria Film Festival. For showtimes and further information visit www.victoriafilmfestival.com.

CREDITS

Director and Writer	Werner Boote
Producers	Thomas Bogner, Daniel Zuta
Executive Producers	Tom Gläser, Ilann Girard
Camera	Thomas Kirschner
Cut	Ilana Goldschmidt, Cordula Werner, Tom Pohanka
Music	The Orb
Research	Werner Boote, Katharina List, Florian Brandt, Doris Lippitsch, Elisabeth Krimbacher, Henning Kröger, Ursina Angel, Julia Irene Peters, Elisabeth Kanettis, Silvia Vollmeier, Marie Therese Zumtobel, Wibke Giese, Lucia Jakubickova, Daniela Ramusch, Maria Senn
Scientific Consultancy	Klaus Rhomberg, Werner Müller , Axel Singhofen , Hans Werner Mackwitz, Andreas Schmidt, Kurt Scheidl
Interview Partners	John Taylor, Felice Casson, Beatrice Bortolozzo, Manfred Zahora, Hermann Bicherl, Susan Jobling, Hiroshi Sagae, Vicky Zhang, Patricia Hunt, Scott Belcher, Fred vom Saal, Theo Colborn, Frederick Corbin, Jeff Harris, Charles Moore, Peter Frigo, Guido Brosius, Alessandra Desauvage, Kurt Scheidl, Margot Wallström
Scientific Support	Umweltbundesamt Wien, WHO, Greenpeace International, Friends of the Earth, Global 2000, Algalita Marine Research Foundation, AMAP, Norwegian Polar Institute, Shanna Swan, Institut für Lebensmitteluntersuchung Linz, Ökotest, Jörg Oehlmann, AK Wien, WKO/Statistik Austria, Verein für Konsumenteninformation, Bundesinstitut für Risikobewertung, Stiftung Warentest, CEFIC , Center for Health, Environment and Justice N.Y., European Chemicals Bureau, REACH
Animation	Cine Cartoon Filmproduktion, Vienna, Animator: Peter Höhsl, Storyboard: Zhivko Zheliazkov, Graphic Design: Sebastian Brauneis
Assistance Filminvest	ORF, Österreichisches Filminstitut, Deutscher Filmförderungsfonds, Hessen

PLASTICS INFORMATION AND STATISTICS

Background Information – Facts - Material

Worldwide, 240 million tons of synthetics are produced from ‘just’ about 4 percent of worldwide crude oil production. *“Around 60 million tons of plastic are produced in Europe nowadays. This amounts to approximately 25 percent of global output.”* (John Taylor, president of PlasticsEurope, quoted in “Plastic Planet“)

The synthetics industry has an **800 billion** Euro turnover per year. Alone in Europe **more than 1 million** people earn their daily bread with plastic. **Every** industrial sector is dependent on plastic today, (quoted from “Plastic Planet”).

What is Plastic?

Plastic is the slang word used for synthetics of all kinds. The word “plastic” finds its origins in Greek and originally means “forming/formed art”. A synthetic refers to a solid body that is produced synthetically or semi-synthetically (from natural products).

In chemical terms, plastics are organic substances. All synthetics contain the element Carbon. Further constituent parts are, amongst others, the elements hydrogen, oxygen, nitrogen and sulfur.

On top of that are various additives (softeners, stabilizers, dye, fillers, boosting agents, fireproofing agents, antistatic agents...), which are mixed in during production process to adjust the properties of the material to the individual purpose it is used for.

How is “Plastic” produced?

Synthetics can be produced through the transformation of certain natural products, or through the synthesis of smaller molecules to molecular chains.

Examples of altered natural products are, amongst others, rubber, which is extracted from the sap of rubber trees (caoutchouk), as well as fiber won from cellulose. The first synthetic, casein, was already produced in the 16th century, from lactic protein. Vessels and pieces of jewelry, partially even colored, were also made from the substance.

Nowadays, most plastics are produced synthetically. The raw materials for this are won from crude oil, coal, and natural gas. Straight-run gasoline (Naphtha) is the most commonly used raw material for the production of synthetics.

In a thermal fission reaction, named ‘cracking’, the resulting gasoline is broken up into ethylene (ethane), propylene (propane), butylenes (butane) and other hydrocarbon bonds, and reconstructed.

Through chemical reactions (polymerization, polycondensation, polyaddition...) smaller molecules rearrange to form large grid or chain-formed structures (Polymers). In further stages of processing these are made into thousands of different plastic-pellets, which eventually, once furnished with diverse kinds of additives, become those colorful, shiny, practical plastic goods we all know.

The Most Useful Synthetics, their Application and Common Problems

90 percent of worldwide produced plastics, annually around 150 million tons, are listed below in order of their occurrence:

Polyethylene (PE) (e.g. in plastic crates, barrels, bowls, wrapping, or plastic bags...)

Useful recycling codes:



Polypropylene (PP) (e.g. in plastic bags, food packaging, medical tools, seat covers...)



Polyvinylchloride (PVC) (e.g. sewage pipes, window framing...) **Soft-PVC** (e.g. flooring, sealing gaskets, tubes and hoses, synthetic leather, tapestries, roofing, truck tarpaulins, clothing, baby products, children's toys...)



Due to the hazards, PVC recycling is problematic.

PVC causes a number of grave health and environmental problems (chlorine) from its production to its disposal. When burnt, it releases dangerous dioxides.

Soft-PVC can consist of **70 percent health damaging softeners (Phthalate)**. Softeners are not fixedly bonded to the synthetics and can thus evaporate, be washed out or rubbed off. High values of **Nonylphenol** (poisonous, hormonally impacting) were also discovered in Soft-PVC (e.g. baby's dolls and food wrapping).

Polystyrol (PS) (e.g. Styrofoam, electric cable insulation, casing, switches, packaging, packaging foils, yoghurt cups...)



Only one percent of the annually produced 14 million tons of Styrofoam is recycled.

The cancer-enhancing benzene is used in the production of polystyrol; the processing of this leads to the release of carcinogenic styrolooxide.

Polyurethane (PU) (e.g. textile fibers, spandex, polyurethane plastic foam such as for mattresses, car seats, sitting furniture, kitchen sponges, insulating material...)

By now there are methods of production that do not involve chlorine, but burning releases various harmful chemicals such as Isocyanine, hydrocyanic acid and dioxides, furthermore it decomposes into toxic substances when disposed on waste dumps.

Polyethyleneterephthalate

C-PET (e.g. parts of house and kitchen tools, computers, machine parts (cogwheels, brackets, screws, springs...) safety belts, truck tarpaulins, medical implants such as vascular stents...)

PET (e.g. drinking bottles, food and cosmetics packaging...)



PET-bottles can be made with 30 percent recycled PET

PET releases health damaging **acetaldehyde** (Ethanol) into liquid over time, therefore PET bottles were initially only used for sweet drinks which covered the bitter side taste. The manufacturers of PET bottles claim to have overcome this problem in the meantime. PET-bottles can supposedly be produced with a certain blocking agent, which bonds the acetaldehyde in PET.

Recent tests of the consumer journal "Konsument" (consumer) however show, that acetaldehyde is found especially in carbonated mineral water. The fruity-aromatic smelling and tasting substance is already slightly perceivable in non-carbonated, still water, yet unnoticeable in carbonated. Whilst all samples filled in glass bottles showed values below the maximum benchmark, 21 of 25 fizzy waters filled into PET bottles crossed the boundary.

In San Pellegrino (Italy), the most expensive mineral water of this product type (1.13 Euro per liter), 33 micrograms of acetaldehyde were found per liter. Guizza water (also from Italy) one of the cheapest products (0.19 Euro per liter) contained the most

acetaldehyde (58 micrograms per liter). The local Austrian water Gasteiner also showed relatively high values (44 micrograms per liter) as well as Güssinger (48 micrograms per liter).

<http://www.konsument.at/konsument/detail.asp?category=Essen+%2B+Trinken&id=391>

The Federal Institute for Risk Assessment (BfR) claims the dose of acetaldehyde in PET bottles is harmless. According to EU regulations, a maximum of six milligrams (6,000 micrograms) of acetaldehyde from synthetics are allowed per kilogram of food. Up to this value, health damages are excluded.

On the other hand acetaldehyde was placed on the list of carcinogenic substances

Investigations from 2006 trace PET imposed antimony in bottled drinks. The BfR states, that the then-measured values lie 2 decimal powers below the migration value for antimony, which is effective Europe-wide.

Fact: Bottle manufacturers and producers of soft drinks receive material for “plastic bottles” from plastic producers, and are usually not aware of the precise chemical composition as these are company confidences.

A further common and problematic synthetic substance is:

Polycarbonate (PC) (e.g. heat-resistant drinking vessels such as baby bottles, microwaveable crockery...)

Recycling codes for other synthetics as 1 to 6:

Caution: this can contain polycarbonate



Polycarbonate releases the hormonally effective substance **Bisphenol A (BPA)**. BPA is under suspicion of harmfully impacting the hormonal system, acting reproductively damaging, and carcinogenic as well as increasing the heart attack risk.

Background information – Facts - Rubbish

The amount of synthetics we have produced since the age of plastic would be enough to cover the entire globe with plastic foil, six times. (*Quote from “Plastic Planet”*)

The three largest areas of application for synthetics and “rubbish producers” are:

- Packaging (33 percent)
- Construction material (25 percent),
- Electronics, electronic technology (25 percent)

Only minor amounts of rubbish are recycled.

Not more than one percent of the annually 14 million tons produced Styrofoam are recycled.

Plastic Rubbish in the Oceans: Dates, Facts, Little Hope

- 80 percent of synthetic rubbish (the UNO speaks of an annual worldwide total of round 6 million tons) flows into the oceans over rivers. The ocean protection organization Oceana estimates that 675 tons of garbage is thrown directly into the ocean every hour, half of this being plastic.
- According to a report of the UN’s environmental program UNEP, up to 18,000 pieces of plastic float on each square kilometer of the world’s oceans.
- Animals of 267 different species die per year through garbage in the oceans – amongst them turtles, sea lions, fish and crabs. About 100,000 sea mammals die tragic deaths through this rubbish per year, as well as a million seabirds, Albatross for instance, who mistakenly feed themselves and their chicks on pieces of plastic.
- Plastic is found on every beach of this world; different synthetic garbage and pellets. Plastic doesn’t decompose like natural resources. Under the influence of sunlight, wave movement and abrasion, the plastic breaks down into smaller and smaller pieces. Sand already contains a certain percentage of synthetics.
- To the East of Hawaii, a gigantic rubbish whirl has developed within the clockwise flowing current of the Pacific. Three million tons of plastic rubbish rotates in its center. It has been growing for the past 60 years, and researchers presume has reached twice the size of the US-state Texas by now. Sun, time, wind and waves are working the rubbish to tiny particles. Similar rubbish vortexes have accumulated in other world seas, in the South Pacific, the Atlantic and the Indian Ocean, and are riding merry-go-round there similarly to the North Pacific Gyre, just in smaller quantities.
- Scientists presume that this plastic rubbish “sucks up” dangerous environmental toxins such as DDT and PCB like a sponge. Researchers at the University of Tokyo found toxin concentrations at its surface of up to a million times those in the surrounding water.
- Through the food chain, these toxins also accumulate in fish and thus reach our plates again.
- Even if the world stopped plastic production tomorrow, the millions of tons that have reached the oceans thus far, will float around in the currents of this world for thousands of years to come.

A group of environmentalists and scientists is planning an expedition to the remote area in the sea the coming months. The 50-day journey from San Francisco to Hawaii and back, will lead the research team through the garbage-carrousel 500 sea miles off the US’s West coast, twice. A fish trawler will accompany the research ship “Kaisei” (Japanese term for ocean planet). With its help, the scientists aim to develop techniques for the collection of plastic particles, that don’t harm any sea creatures. A further aim is to investigate whether or not the garbage can be recycled, or processed into fuel. The UN’s environmental program and a company for water-treatment systems support the project. The necessary budget, a good 1,4

million Euro, are supposed to be gathered through donations. Because the plastic vortex moves in international waters, no state feels responsible. (orf.on.sience 28.6.2009)

Who is responsible for global plastic garbage?

If the industry would pay more for plastic garbage, we would care more about plastic. We would dispose it more carefully and reluctantly. (Quote from Plastic Planet)

John Taylor, president of PlasticsEurope: *„I believe this is a social theme]... We (the plastics industry) contribute our part. We try to make the advantages of recycling clear to consumers and work together with the people at the end of the supply chain. Nonetheless, the garbage problem is one that society has to deal with.*

Abolition of plastic bags

Bangladesh was the first state in the world to ban plastic bags. The Australian and the Chinese states announced in 2008, that they want to eliminate the production of plastic bags. In the Pacific state of Palau, travelers that are caught with a bag, have to pay a one-dollar fine. The authorities of Zanzibar are even stricter: Whoever brings or distributes plastic bags there risks a 1,560 Euro fine.

Background information – Facts - Health

Health and environmental hazards caused by the synthetics industry, Bisphenol A, softeners (Phthalate), and REACH – a political compromise.

Health and environmental hazards caused by the synthetics industry

Numerous investigations give proof: chemicals are released by synthetics, migrate into the human body and are hormonally effective there. Thereby they can cause grave health damages, from allergies to obesity to infertility, cancer and heart disease.

The chemical Bisphenol A is subject to many critical studies, and a component in the production of polycarbonates as well as epoxides. An especially severe problem with synthetic products is also that they contain additives such as softeners, for example Phthalate in PVC, fireproofing agents (e.g. tributyltin), dyeing agents (Azo-colors, lead-containing colors) etc., which are added during production to give the plastic its desirable properties, however consistently leak into the environment.

Fact sheet Bisphenol A

Bisphenol A is a hormonally effective chemical

Bisphenol A is a chemical substance that impacts the hormonal system of humans and animals as it has estrogen-like effects.

Substances with hormonal effects are denoted as “endocrine effective substances” (endocrine disrupting chemicals, EDC). The endocrine (hormonal) system regulates many body functions, amongst them our metabolism, immune system, behavior, growth as well as organ development during childhood and maternity. The disruption of the hormonal system through EDC resulted in premature puberty with girls, obesity with adults and teen-agers, diabetes type 2 (formerly known as old-age diabetes), a rise in prostate- and breast cancer, as well as reduction of sperms, and malformation of sex organs.

Although Bisphenol A does not occur naturally, there are traces of the chemical in almost all environmental media, even in the human body; in urine, blood, amniotic fluid, follicle fluid, uterus tissue, and in the blood of the umbilical cord.

A representative study (over 2,500 participants) found BPA in the urine of 92.6 percent of Americans. Concentrations of 0.4 to 149 microgram per Liter ($\mu\text{g/l}$) are enough to trace the substance. (Calafat et al 2007).

Where does Bisphenol A originate from?

Since 1953 Bisphenol A is used as the main constituent in the production of the synthetic polycarbonate. 65 percent of worldwide Bisphenol A productions are used for this purpose. Further 30 percent flow into the production of epoxides (varnish, coating, adhesives).

Bisphenol A is the globally most-used industrial chemical; alone European corporations process 1.15 million tons per year. The use of BPA in the EU grows by an annual 8 percent.

How harmful is the Bisphenol A dose consumed daily? The discussion lead by authorities and scientists on whether BPA harms human health, and if yes starting from which dosage, is more controversial than that about any other chemical. The European Food Safety Authority (EFSA) and with it the majority of European states, see no risk. The USA, Canada and other Northern states however don't exclude the possible health risks. Many acclaimed scientists warn of risks, particularly of the special properties of hormonally effective substances, already causing their most severe effects when received in very small dosages.

The Facts

Over 40 investigations of different universities and authoritative research groups showed that BPA induced damaging effects on rodents in terms of brain development and that of other tissue. Impacts on hormonal



receptors were already recorded at far lesser concentrations as were measured as normal values of humans.

Children particularly afflicted

All previously published studies detected the highest BPA values within children, representing the share of the population reacting most sensitively to BPA and its consequential damages. Existent investigations carried out during the critical development stage of fetuses in the mother's womb, show that the chemical is especially damaging in the time before and after birth, and can even effect following generations.

Position of the EFSA

- The EFSA sees no risk for humans, as we apparently break down BPA faster than rodents.
- No study on effects induced by low dosages has hitherto been recognized.
- The EFSA rests on two American studies for its risk evaluation. These studies were financed by the American synthetics industry and did not report any effects in the low-dosage area
- The EFSA claims that previous risk

evaluations (2002, 2006, 2008) showed tolerable daily quantities of BPA: 50 microgram per kilogram of body weight. Their assessment concludes that the absorption over food is far below the tolerable level, and thus there is a safety margin for all consumers, including infants and fetuses.

New Results on Bisphenol A:

"A proceeding study (Leranth et al. 2008) now provides proof contesting these claims: BPA dosages that were apparently safe, caused **disorders of monkeys** such as disruptions in brain development that impact memory, learning ability and behaviors. The results are transferable onto humans.

Further consequences are shown by an extensive epidemiologic investigation (Lang et al.2008): BPA-concentrations in the human body (measured with help of urinal values) demonstrated a **significant correlation to heart and cardio-vascular diseases, diabetes and obesity.**

These results also pose the question, whether the increase in **cases of diabetes 2 amongst children** could cohere with the rise in use of BPA. These recent tests confirm toxicologists who see health risks for embryos, infants and small children, and have stressed upon need for action to be taken for years."

(from: BUND, Bund für Umwelt und Naturschutz Deutschland (Union for the protection of Nature and the Environment Germany) and Friends of the Earth, "**Hormone in der Babyflasche. Bisphenol A, Beispiel einer verfehlten Chemikalienpolitik.**" ("Hormones in baby bottles. Bisphenol A, example of a flawed chemical policy." Publication February 2008)

full text:

http://www.bund.net/fileadmin/bundnet/publikationen/chemie/20081022_chemie_studie_bisphenol_a.pdf

On hand of **experiments with human fatty tissue**, a study at the University of Cincinnati (publicized: September 2008) demonstrates that BPA suppresses the hormone Adiponectin in the cells. This hormone is vital as it protects the organism from metabolic syndrome, the four risk factors for heart and cardiovascular disease: diabetes, overweight, high blood pressure and high cholesterol.

(Source: Focus.de online 06.09.2008 and the University of Cincinnati (2008, September 5). Toxic Plastics: Bisphenol A Linked To Metabolic Syndrome In Human Tissue. ScienceDaily. Retrieved June 28, 2009, from <http://www.sciencedaily.com/releases/2008/09/080904151629.htm>)

The study is available in the online-edition of the journal "Environmental Health Perspectives".

*New facts (2009) support former studies: **Everyone consumes much higher daily quantities of Bisphenol A than was thought up until now.** "The chemical is thus believed to migrate into humans from far more sources than we thought, says Frederick vom Saal, co-author of the report. For an investigation at the University of Missouri-Columbia, researchers fed five female monkeys a Bisphenol A dosage of 400 micrograms per kilogram body weight, per day. This quantity represents four times the daily ration of humans as was estimated by the U.S. Food and Drug Administration (FDA), and eight times the value that is supposedly safe. However, 24 hours later, the Bisphenol-A amount in the animals' blood was below the average level of that of industrial state citizens. "The test results prove that the average person is exposed to far higher levels of BPA than the estimated safe daily dose". Frederick vom Saal.*

(quoted from: Focus online, 11.6.2009 http://www.focus.de/gesundheit/news/bisphenol-a-menschen-unerwartet-stark-belastet_aid_407109.html)

Why is Bisphenol A not banned?

The EFSA and other authorities, who don't see any risk tied to Bisphenol A, believe that a ban would inevitably lead to manufacturers of packaging and consumer goods (products for handling foodstuffs) moving to alternate substances, whose toxin levels are still fairly unknown. This would lead to the substitution of a well-assessable risk by an unknown risk.

How does one recognize whether a synthetic contains Bisphenol A?

Polycarbonate is a clear and relatively stable, non-brittle synthetic, which stands temperatures of up to 145 °C and is resistant to many acids and oils. Many (translucent) household tools, bowls for food, heat-resistant bottles such as baby bottles and microwaveable synthetic products, as well as CD cases and food packaging are made from polycarbonate.

The item or packaging can be printed with the acronym "PC" for polycarbonate, however this is not mandatory as Bisphenol A does not necessarily have to be signified.

The recycling code digit 7 (representative for all "other" synthetics, ones that are not 1 to 6) lets the consumer know, that polycarbonate could be contained in the product.

Bisphenol A is furthermore a key component in the production process of **epoxides und epoxy resin**.

Epoxides are used for:

- **Adhesives, surface coating and varnish**, which are distinguished by their strong adhesion and resistance against many chemicals.
- and used for the **inner coating** of:
 - **Drink cans**
 - **Tin cans**
 - **Reusable cartons (Tetra Pak)**
 - **Can lids and bottle caps**

also for

- **Nail polish**



On top of this, a further, quantitatively smaller part of BPA production is used for flame-protection agents, unsaturated polyester resins, polyacrylates, polyetherimides and polysulphon resins, as well as other functions such as brake fluids and as an aid in pesticides (ICIS 2007).

Do PET bottles contain Bisphenol A?

Researchers from the University of Frankfurt have traced hormonally effective substances such as Bisphenol A in mineral water filled into PET bottles, through a new study (March 2009) It is not possible however, to blame PET

bottles as the cause of this. It is assumed that Bisphenol A and other chemicals already make their way into the water prior to being filled into bottles, through other synthetic vessels for example. The German Federal Institute for Risk Assessment concludes that there is no Bisphenol A in PET bottles. Whatever the cause for the permeation of estrogenic substances, is yet apparently subject to further investigation...

http://www.bfr.bund.de/cm/208/hormonell_wirkende_substanzen_in_mineralwasser_aus_pet_flaschen.pdf

CONCLUSION: BPA is omnipresent

It is brought into the environment through production and is constantly released from plastic consumer goods. There are traces of it in the air, in dust, in surface waters, and in seawater. Even fresh greenhouse fruits and drinking water from plastic tanks contain BPA. Humans are globally and continuously exposed to BPA.

Sources:

BUND, Bund für Umwelt und Naturschutz Deutschland, (Union for the protection of Nature and the Environment Germany)

Friends of the Earth, "Hormone in der Babyflasche. Bisphenol A, Beispiel einer verfehlten Chemikalienpolitik." ("Hormones in baby bottles. Bisphenol A, example of a flawed chemical policy." (Publication February 2008)

Bundesinstitut für Risikobewertung (BfR), German Federal Institute for Risk Assessment

Bundesumweltamt, Deutschland, German Environmental Agency

Bundesumweltamt Österreich, Austrian Environmental Agency

Fact Sheet Softeners (Phthalates)

Softeners are fore mostly used for PVC (polyvinylchloride), which is hard and rough without. The classic PVC softeners are phthalates (the name phthalate originates from "Naphtha", crude oil)

The five most-used phthalates are:

DIDP (Di-isodecyl-phthalate)

DINP (Di-isonyl-phthalate)

DHEP (Di(2-ethylhexyl)phthalate)

DBP (Dibutylphthalate)

BBP (Benzylbutylphthalate)

Hard-PVC can be phthalate-free, Soft-PVC averagely consists of 30 to 35 percent, some even of 60 percent softeners.



How harmful are phthalates?

In animal tests, phthalates, especially DEHP were found to be carcinogenic, developmentally toxic and reproductively toxic. These effects were especially noted on male descendants and amongst other properties, were made visible on hand of reduced fertility rates and deformities of the genitals.

Reproductively harmful

Phthalates and its degradation products are traceable in the blood and urine of almost every person. At which dosage humans are affected is still unclear. Most recent studies on infertile men show that this could have been caused by increased phthalate charges.

Member states of the EU evaluated the phthalates DEHP, DBP and BBP as reproductively endangering. The EU has already passed a ban against the application of these substances in the production of baby products and children's toys. (80 percent of the toys in the EU are however imported.)

Accumulation in the environment

For the past years the chemical industry has been replacing reproductively endangering phthalates with DIDP and DINP (also prohibited EU-wide in the production of baby items and children's toys for precautionary reasons). DIDP and DINP are also under suspicion of heavily accumulating in organisms and staying in the ground and sediments over long periods of time. The high usage of soft-PVC and the structural similarities to DEHP lead to the conclusion of a severe spreading of these substances into the environment.

How do phthalates enter the environment?

Phthalates are found everywhere, even in house dust, our blood and mother's milk.

Phthalates are not fixedly bonded in synthetics and can thus evaporate, be washed or rubbed off. They mainly come into use within the following areas:

- PVC-products (e.g. flooring, piping, cabling, carpeting, for walls and tapestries, shower curtains, baby products, children's toys, shoe soles, sports and leisure products, vinyl gloves, motor vehicle parts, synthetic leather...) ispersions, varnish/colors
- Dispersions, varnish/colors

- (Products marked with the Austrian Environmental sign, (“Hundertwasserzeichen“) are prohibited to contain any phthalates)
- Emulsifiers,
- (Food & drink-) packaging;
- (Phthalates are prohibited in Austria – with the exception of certain food packaging. The industry has renounced more and more on soft-PVC for food packaging).

Cling-film used to contain phthalates. Nowadays (at least in Europe) they are mainly produced with DEHA (an adipate), which is soft, flexible and adherent.

- Food item conveyer belts
- Sealants
- Cellulose synthetics
- Nail polishes
- Adhesives (esp. polyvinyl-acetate)
- Wetting agents in the textile industry
- Cosmetics: body care products, perfumes, deodorants
- Pharmaceutical products

How do phthalates enter the Human organism?

Essentially through:

- Air, e.g. through evaporative PVC furnishing products or high concentrations in car interiors (“new car smell”)
- Nutrition e.g. through food items that are brought into contact with phthalates (milk, butter, fish, meat and meat products, vegetables and roots who take up phthalates over the soil...)
- Cosmetics (e.g. nail polish contains up to 5 percent DPB, which is easily absorbed by the skin)
- Children can absorb especially high quantities too, when they suck on PVC items for example
- Pharmaceutical products: stomach acid resistant pills or tablets (time-release medication), blood bags, tubes, catheters, bags for nutritional fluids, defoamers, medication packaging

Are there softeners in our drinking bottles?

Drinking bottles made of plastic are usually made of PET (polyethylenterephthalate). The manufacturing of PET does not require any softeners.

Why don't we abandon phthalates?

Economic importance

5 million tons of phthalates are produced annually worldwide. The market volume in the EU amounts to approx. a million tons. Over 90 percent flow into the production of soft-PVC.

Product properties



PVC only receives the product properties expected from PVC through the added softeners. Alternatives are far more expensive, for instance floors made from linoleum or cork.

Sources:

German Environmental Agency

<http://www.umweltbundesamt.de/uba-info-presse/hintergrund/weichmacher.pdf>

Greenpeace File: http://www.arbeitsmedizin.uni-erlangen.de/Phthalate_FAQ.html



REACH – A Political Compromise

The new EU-wide chemical guideline REACH (Registration, Evaluation, Authorization of chemicals) is under effect. Around 30,000 chemicals (out of approx. 100,000 occurring chemical substances) of which a ton gets produced in or imported to Europe each year, need to be tested in terms of their effects on humans and animals.

The chemicals have to be registered at the ECHA, the European chemical agency. The industry is given until 2018 to provide necessary information. REACH also makes sure, that secondary materials and junk, which were brought into the market before 1981, are examined. There are practically no investigations on these substances or their impact on health.

As the guideline doesn't provide harsh regulations in terms of usage of the 2,500 harmful substances, there is great critique against the compromise; especially from sides of Consumer protection. Animal protection and environmental agencies are made aware of the fact that there are huge loopholes in the new legislative guideline. In this way, harmful substances for instance, do not necessarily have to be replaced through alternatives, even if these dangers are known of. A so-called, and in no way further defined, "adequate control" is apparently sufficient.

Further info: [http://de.wikipedia.org/wiki/Verordnung_\(EG\)_Nr._1907/2006_\(REACH-Verordnung\)](http://de.wikipedia.org/wiki/Verordnung_(EG)_Nr._1907/2006_(REACH-Verordnung))