BRÜCKNER GROUP

PLASTIC PACKAGING –

GOOD OR BAD?

IN THE DEBATE ON PLASTICS, FACTS **ARE OF CRUCIAL IMPORTANCE!**

TABLE OF **CONTENTS**

FORE**WORD**

Dear Readers,

The public debate about plastics has become so emotionally charged that arguments are frequently one-dimensional, with the ‘big picture’ often being ignored. Pollution of the oceans by plastic is undisputed, and the issue needs to be tackled vigorously. The question is: where can that be done, and what are the best means?

Climate change, feeding the world‘s growing population and the waste of finite resources must not be forgotten either. Here, plastics are often an important part of the solution.

When discussing our global problems it is wise to keep as many factors in mind as possible. Following our first “YES, **WE CARE**” booklet, we have therefore decided to provide even more facts and background information about the environment, plastic and packaging, in the hope that we can shed some more light on the situation.

In this way, all of us can help to find viable and sustainable solutions to some of the challenges we are facing.

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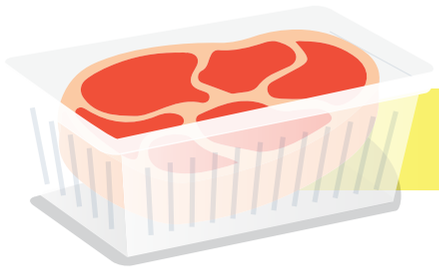
THE **BAD REPUTATION**

Plastic, and plastic packaging in particular, has suffered serious damage to its image in recent years. It has become synonymous with numerous global problems, and a scapegoat for much of our ecological misconduct. This is because it is often simply „disposed of“ in the environment and, ultimately, is all that remains visible. There are things we cannot see, however: water consumption in food production, for instance, and the CO_2 emissions caused by production and transport. None of those end up in our waste bins or in our oceans. They are, however, highly important factors.

The world‘s population is growing, and more and more people live in cities. Food must be produced in large quantities, and it has to reach consumers in as fresh a state as possible. Over the past 20 years, in Germany alone, transport distances have increased by 38% and transport volumes by 45%.[1]

Plastic packaging makes an essential contribution to feeding the urbanized world population. It protects foods from spoilage, conserves resources involved in production (water, fertilizer, energy etc.), and facilitates energy saving during transport due to its low weight. The production of plastic packaging itself causes only a small amount of CO_2 emissions.

IF YOU DECIDE TO STOP USING PLASTIC PACKAGING[2],
THE CO_2 YOU SAVE IS EQUIVALENT TO:

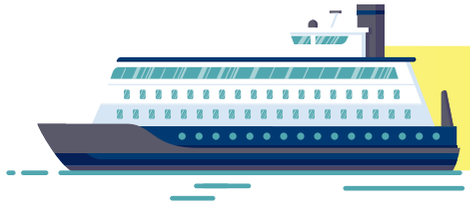


AFTER 1 MONTH,
EATING A STEAK

or

AFTER 3 YEARS,
DRIVING FROM HAMBURG TO DUSSELDORF BY CAR

or



AFTER 44 YEARS,
GOING ON A 7-DAY CRUISE

or

AFTER 57 YEARS,
FLYING FROM FRANKFURT TO NEW YORK AND BACK

CO_2 emissions in particular are a crucial factor if we want to keep global warming at bay.
Climate protection requires plastic packaging!

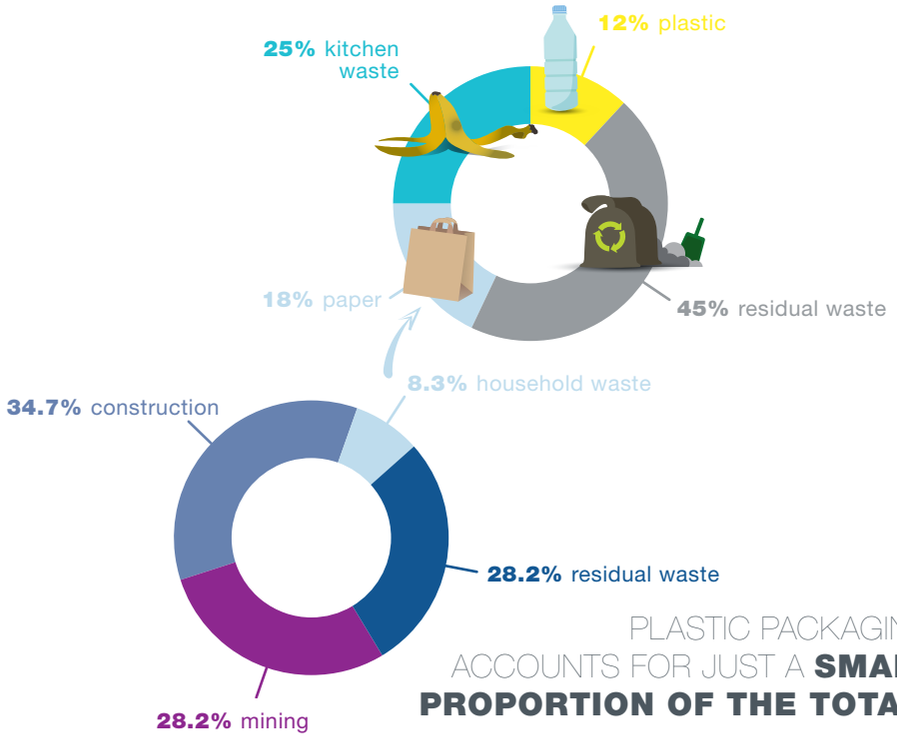
[1] Sources: Statistisches Bundesamt, Traffic at a Glance (Verkehr auf einen Blick), 2013; Analysis: Berndt+Partner Consultants 2017

[2] Sources: atmosfair, cruise, standard cabin, 1 person, > 3000 passengers// myclimate, flight, Economy Class // car, 1 person, petrol 8l/100km // IFEU, 2016, 1 kg beef 13 kg/CO_2, Analysis: Berndt+Partner Consultants

MYTHS AND MISCONCEPTIONS
ABOUT WASTE

In the emotionally charged discussion about plastic packaging, several arguments have persisted despite having no basis in fact. We would like to point out some of these myths and misconceptions here – to make sure that we change our actions in the right areas, and for the right reasons.

Myth: Most of our waste is plastic waste.
Truth: The entire household waste accounts for only 8.3% of all waste generated. And only 12% of household waste is plastic waste.



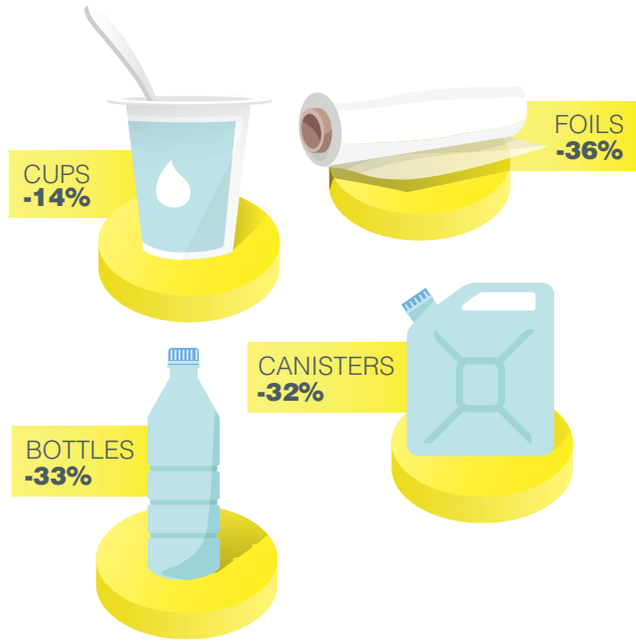
PLASTIC PACKAGING ACCOUNTS FOR JUST A **SMALL PROPORTION OF THE TOTAL.**

Myth: Large amounts of plastic packaging are produced using the finite resource crude oil.
Truth: If we assume that our crude oil resources are enough for around 50 more years and if we immediately stopped producing plastic packaging, this would only give us a few more days: 70 days if we went without producing flexible plastic packaging, and 140 days in the case of rigid plastic packaging.

Myth: The EU's ban on disposable plastic is helping to save the oceans.
Truth: Unfortunately, the alternatives to the banned products – straws, cotton swabs, disposable tableware and cutlery, plastic sticks for balloons – are not always more environmentally-friendly. On the contrary, replacing a disposable item with a product that has been manufactured with complex material usage is paradoxical. Moreover, the ban covering the EU does not solve the problem of many Asian or African countries that lack waste management, sometimes entirely (see chapter 3).

Myth: Industry is doing nothing to reduce plastic consumption.
Truth: Optimization of packaging alone, and the resulting material and weight reduction (an average of 25%), is saving 6.1 million tons of plastic in Western Europe every year.[1]

MATERIAL REDUCTION
IN PLASTIC PACKAGING



[1] Source: GVM Resource Efficiency, 2014; Analysis + Calculation by Berndt+Partner Consultants, 2018

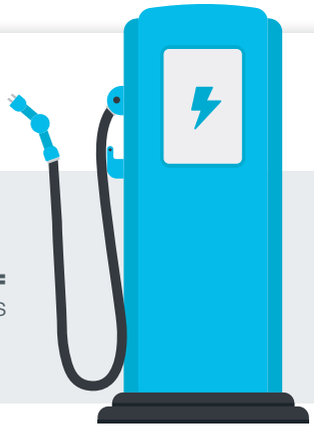
Myth: No packaging is always the best option.
Truth: Many foods can be stored for much longer with the right packaging. An unpacked cucumber, for instance, will start to spoil after only three days, while a packaged one remains fresh for 20 days. And growing 25 cucumbers results in 1kg of CO_2 emissions and requires 3,500 l of water. Packaging protects food from spoilage and thus conserves resources.

LIFECYCLES

If food waste were a country, it would be the third-largest producer of the world's greenhouse gases with 4.4 billion tons of CO_2 – after China (10.7 billion tons) and the USA (5.7 billion tons).[1] In times of global shortage of water it is also important to know that in the USA, for instance, food losses alone account for 25% of the total water consumption. Packaging, therefore, has an important protective function.

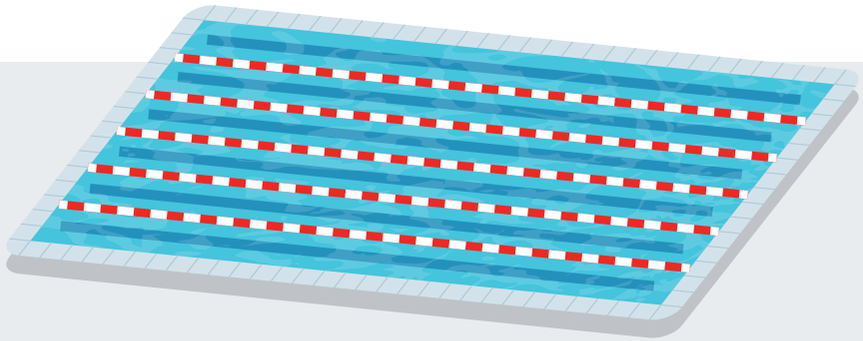
When looking at the bigger picture, we also have to take into account CO_2 emissions as well as the water, energy and material consumption involved in the production of different types of packaging. In a weight comparison, plastic is the clear winner: 1 kg of plastic can preserve an average of 56 kg of product, whereas 1 kg of aluminium can protect only 8.4 kg, and 1 kg of glass only 1.7 kg.[1] Lightweight plastic packaging therefore saves a large amount of CO_2 emissions during transport alone. A US study reveals the total savings we achieve through plastic packaging compared to other materials[2]:

SAVINGS THROUGH PLASTIC PACKAGING



Energy consumption =
enough to charge 8 million e-mobiles

Waste =
same weight as 290,000 jumbo jets



Water =
enough to fill 461,000 Olympic swimming pools

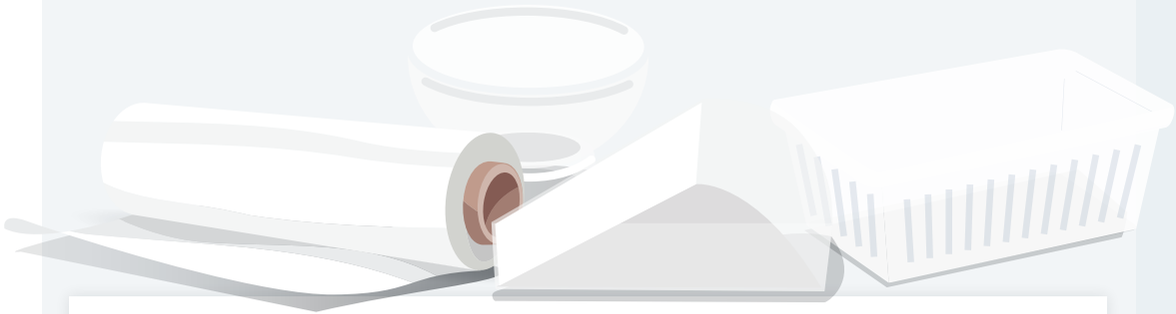
CO_2 emissions =
equals the emissions of 8.5 million cars

The frequently-cited example of the plastic bag clearly shows that all is not always as it seems. The production of alternatives is far more costly and complex in comparison. To achieve the same total lifecycle assessment as a plastic bag, a paper bag would have to be used 43 times and an organic cotton bag 149 times.[3]

[1] Source: Berndt+Partner Consultants, 2018
[2] Source: plastic packaging facts
[3] Source: Süddeutsche Zeitung

PACKAGING
ALTERNATIVES

Given the complexity of the packaging issue sustainable purchasing is by no means easy. And we, as consumers, often know too little about the factors involved. While there are already quite extensive declaration regulations for a product's content, such regulations have not yet been introduced for its packaging. Here are some important questions you should ask yourself:



PROTECTION

Does the packaging protect foods well enough and for long enough to ensure that they will not spoil? Shelf life and food hygiene are important factors that we must not neglect. Unpacked foods are therefore often a short-sighted alternative.

MANUFACTURING

What raw materials were used, and in what way? There also has to be a check for possible pollutants (for example, petroleum hydrocarbons in packaging made of waste paper, formaldehyde in bamboo crockery, bleaches in natural fibres).

TRANSPORT

What transport routes needed to be covered? The farther the route, or the more vehicles required, the greater the environmental impact. The weight of packaging is particularly important here, as well as the route it takes to reach consumers' homes. Unfortunately, a longer drive to an organic farm or to a shop with unpacked food can wreck even the finest environmental balance of a purchase.

DISPOSAL

What happens to the packaging after use? This is where reusable packaging or packaging that can be recycled usually comes off best in view of material usage, energy consumption and waste avoidance.

WHAT IS **BIOPLASTIC?**

For most of us, plastics are synthetically produced and very durable materials – based on mineral oil. When we think of bioplastics, on the other hand, we usually think of it as bio-based and biodegradable. But when it comes to the question of fossil or renewable on the one hand and biodegradable on the other, the attractive prefix „bio“ (“organic”) is still trusted far too much, and rarely called into question.

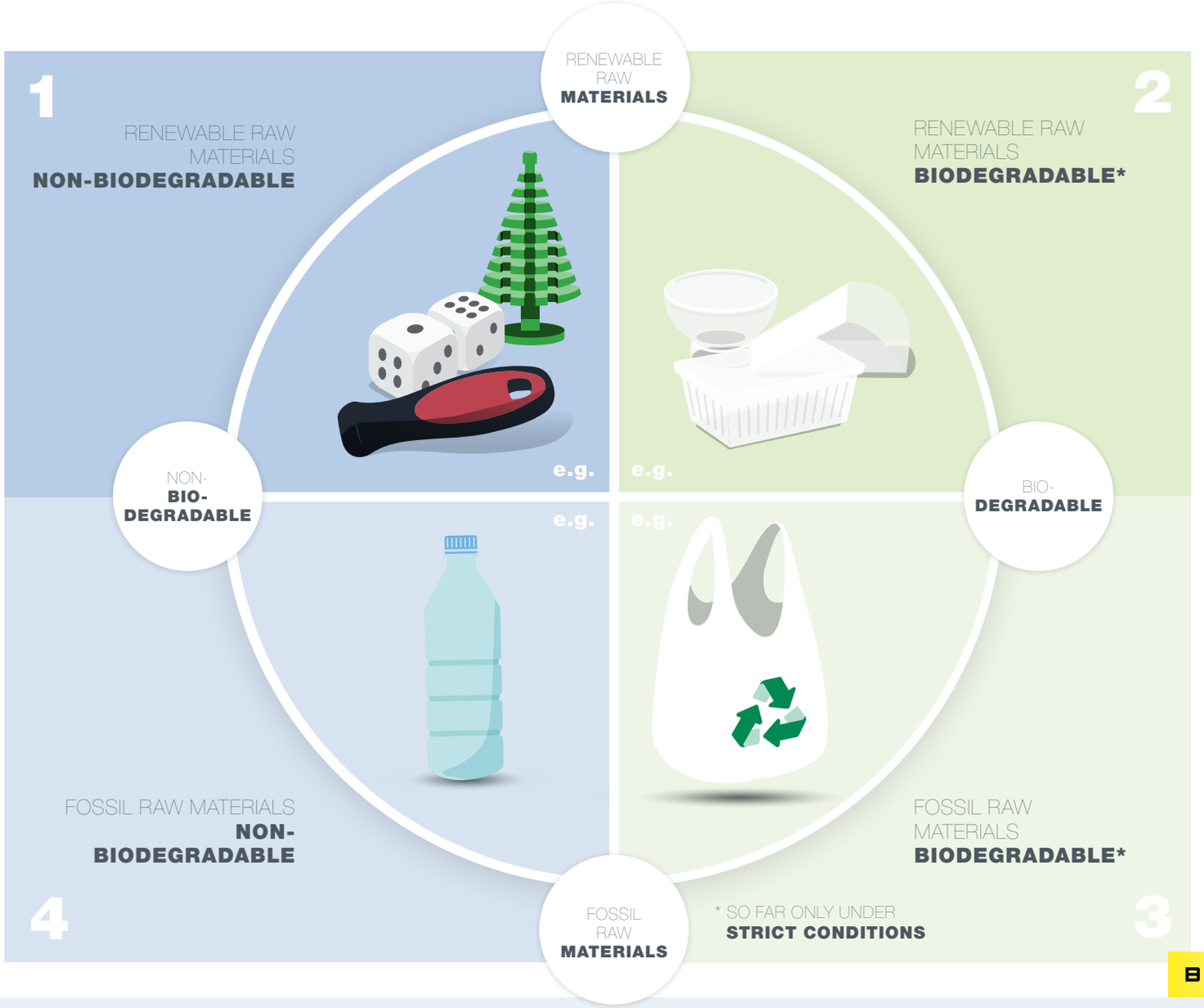
As the chart shows, we distinguish between a total of four categories of plastics (1 to 3 are collectively referred to as „bioplastics“):

1. Plastics from renewable raw materials that are either non-biodegradable
2. or biodegradable;
3. plastics from fossil raw materials that are biodegradable or
4. quite simply, non-biodegradable.

> "The composting of bioplastic represents the pointless destruction of raw materials that are produced energy-intensively.“
>
> **Thomas Fischer, Deutsche Umwelthilfe**

By the way, the first plastics discovered by people were derived from natural substances. Celluloid, developed in 1869, is made from cellulose nitrate and camphor, and cellophane from regenerated cellulose. Both materials are essentially biodegradable. However, anyone eager for these materials to make a comeback should also remember that a large amount of resources such as wood, water and energy are needed for their production.

AN OVERVIEW OF THE
DIFFERENT KINDS OF PLASTICS



LIFECYCLE AND DISPOSAL

At first glance, bioplastic seems to be an ideal alternative to conventional plastic because it consists of renewable raw materials and, after use, is disposed of ecologically. If only things were that simple.

It‘s a particularly common myth that biodegradable plastic is the better solution in every case – but that statement does not stand up to the facts, because the biodegradability of plastics currently requires very specific conditions. A couple of facts:

- It takes 500 years for petroleum-based plastics to degrade.
- Biodegradable plastic bags are not 100% compostable. It takes several weeks or even months to compost up to 90% – in an industrial composting plant. But even there they are usually removed from the mass because their decay is too slow and incomplete.
- Biodegradable plastics are in no way suited for the compost in your garden. Their decomposition requires high temperatures that can only be achieved in industrial composting.

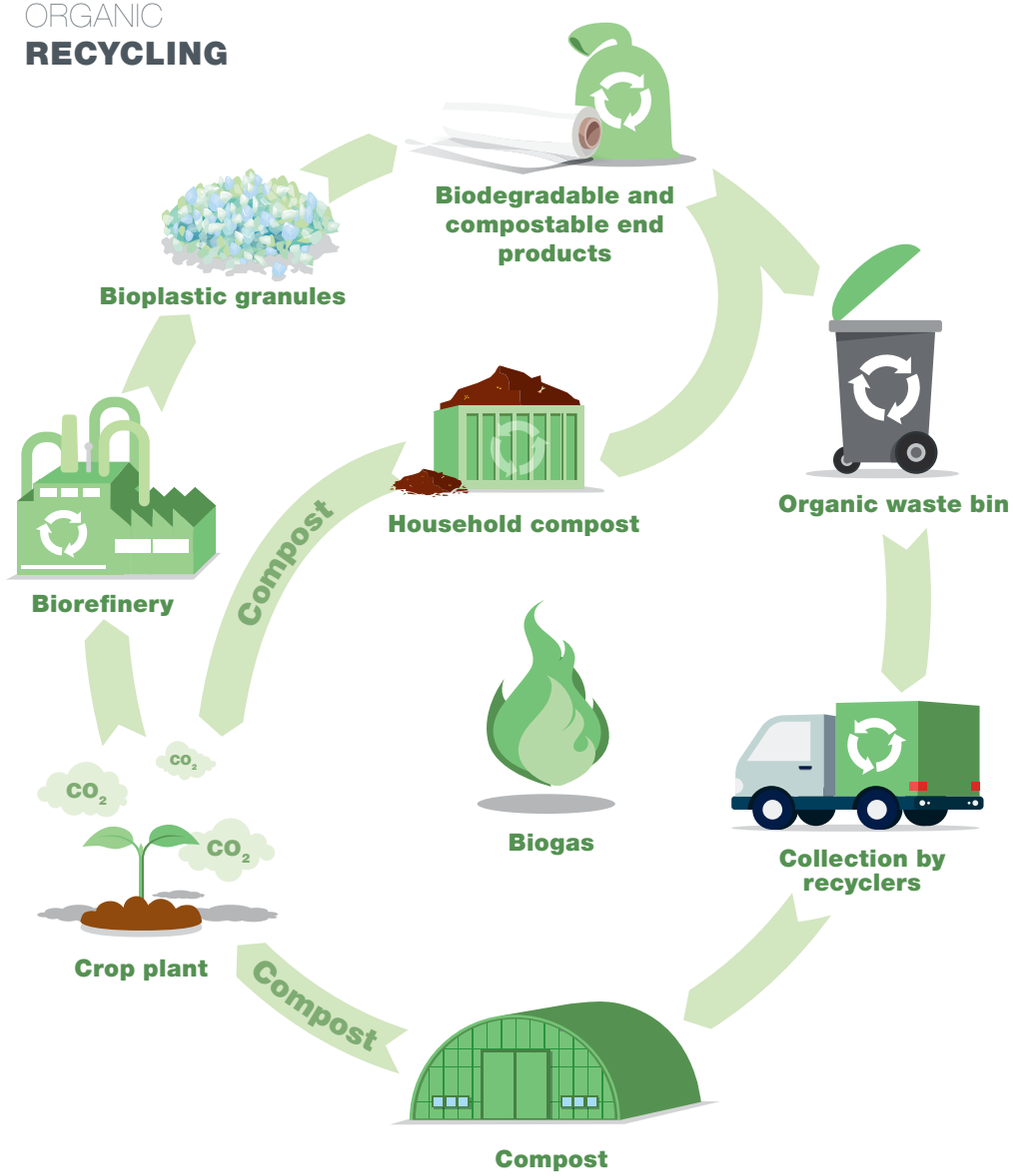
> ”Many people think that bioplastic can simply be thrown away. That‘s misleading.“
>
> **Elke Salzmann, German National Association of Consumer Advice Centres**

Unfortunately, on closer scrutiny, bioplastic is not the ideal solution – as yet, anyway! But the technology is still worth pursuing. Here are some more questions that need to be resolved where bioplastic is concerned:

- Where do enough raw materials come from?
- Does their cultivation interfere with the food chain?
- Under what conditions are they grown and extracted?
- Doesn‘t this increase CO_2 emissions, thereby exacerbating climate change?

If we’ve learned one thing from the current global environmental problems, it‘s that a solution is only sustainable if it is thought through to the very end. Otherwise it is not a solution, but simply the replacement of one problem by another. And that is something we must avoid.

ORGANIC
RECYCLING



PLASTIC WASTE **IN THE OCEANS**

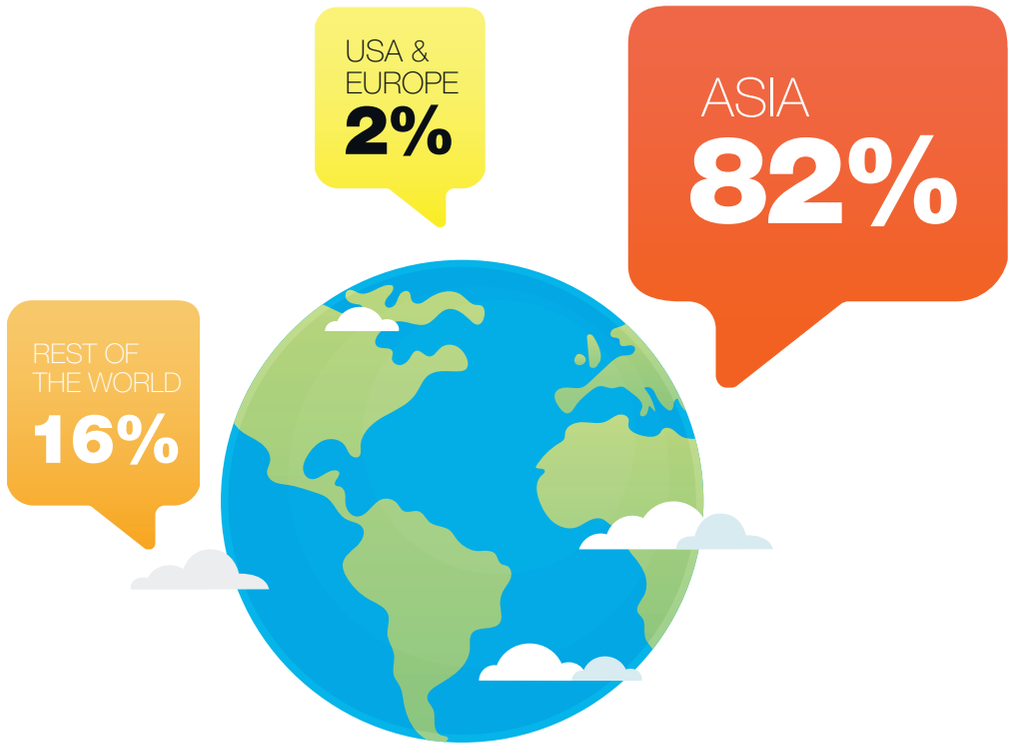
THE **PROBLEM**

Plastic waste in the oceans is definitely one of the big problems that we have to address as a society, as the plastics industry and particularly as a corporate group in the plastics and packaging sector. We also have to act quickly: large areas of debris, such as the "Great Pacific Garbage Patch", can already be seen from space. The fact that other kinds of waste – fishing nets, glass bottles, aluminium and tin cans or other metal parts – are also disposed of in the ocean and don't decay for a long time cannot serve as any kind of alibi for us in this regard.

But where exactly does the waste come from? It is caused by lost cargoes, discarded fishing nets, single items carelessly disposed of in nature, badly secured landfills, and much more. Most of this waste reaches the oceans via rivers. Indeed, about 90% of it is carried into the oceans by just ten rivers. The Yangtze river (China) is the regrettable record holder here, with 10 million kg/day.[1] Most of the other rivers on this ranking list are also located in Asia.[2]

But this doesn't mean that we can just sit back and relax where other countries are concerned. Even rivers like the Rhine or the Danube transport up to 1,000 kg of additional plastic waste into the ocean every day.[1] And can we even be sure that a part of our waste, many tons of which are shipped to Asia, doesn't also end up where we definitely don't want it? In landfills, for example?

OCEAN LITTERING IS THE CONSEQUENCE
OF UNSUPERVISED DISPOSAL.



Around **3 billion people** have no access
to supervised waste disposal.

[1] Source figures: Neue Zürcher Zeitung
[2] Source: Helmholtz-Zentrum für Umweltforschung UFZ

Source: ISWA (The International Solid Waste Association), 2010

IDEAS FOR **SOLUTIONS**

In order to remove plastic waste from the oceans in the long term, we have to act on different levels. Oceans, coasts and rivers must be actively cleaned, because waste does not just disappear by itself. If we want to get a grip on the problem permanently, we must prevent further waste being added.

> "The issue of marine waste can only be tackled on a worldwide basis and locally."
>
> **German Packaging Institute**

> "We aren't helping the oceans by not using plastics here."
>
> **Carbotech environmental consulting, Switzerland**

1. CLEANING UP LAKES, **RIVERS AND COASTS**

An ideal solution has not been found, especially for lakes and rivers; however, there are numerous promising projects. Several organizations have set themselves the goal of removing the plastic waste from the oceans (see chapter 6).

What each individual can do:

> "Avoid unnecessary plastic when on vacation, such as plastic bags in shops and on markets. In a country with poor waste treatment you can ruin all the good you've done all year within just one week."
>
> **Sébastien Humbert, Quantis environmental consulting, Switzerland**

2. OPTIMIZING AND IMPLEMENTING COLLECTING **AND SORTING SYSTEMS WORLDWIDE**

Approximately 3 billion people have no access to waste disposal, sorting and recycling, especially in regions affected by "marine litter". This calls for international cooperation by governments, industry, environmental organizations and the local population. The implementation of systems for collecting, sorting, separation, recycling or thermal utilisation can only be mastered together. Here, the companies in the Brückner Group have started preliminary discussions with partners in the value chain and with local authorities in Asia.

3. ENCOURAGING **RECYCLING**

Plastic is an important and valuable raw material and recycling is therefore a crucial measure (see chapter 4). The Brückner Group companies work to ensure that their machines produce foils and packaging with the highest possible recyclability (see chapter 5).

What each individual can do:

Sort waste in such a way that facilitates recyclability. Buy products with packaging made from recycled plastic.

4. CRITICALLY EXAMINING YOUR OWN **CONSUMPTION BEHAVIOUR**

> "Plastic packaging is not the cause of the problem. It simply mirrors our consumption."
>
> **Süddeutsche Zeitung**

Our consumption habits have changed. Online shopping is convenient, but the dramatic increase in shipping of goods of all kinds ultimately leads to more (and often excessive) packaging. Takeaway coffee is cool, but the number of disposable cups, lids and spoons – of no matter what material – is unimaginably large worldwide.

5. INFORMING YOURSELF AND OTHERS – **BE A ROLE MODEL**

You can only act correctly if you are well-informed. This also applies to the correct handling of plastic (waste). Our tasks as part of the plastics industry also include providing information and education on these topics. Our initiative YES, **WE CARE** is a first step. Especially in the regions most affected by the waste problem, a great deal of information work still needs to be done. We want to support corresponding campaigns in the future.

What each individual can do:

Inform yourself and share your knowledge. And, of course, be a role model: each piece of waste you dispose of properly and each piece of trash you pick up at the roadside has an effect on others.

HOW IS **PLASTIC RECYCLED?**

In many countries, waste is diligently collected, separated and sorted. How this happens, and according to which specifications, varies from country to country and often even from community to community. In Germany there is the „dual system“ with the Green Dot trademark, which was implemented in 1990. Green Dot waste includes packaging made of plastic, metal and composite materials, which are marked accordingly. Glass and paper are collected separately. Systems based on this model have now been launched in 30 other European countries.

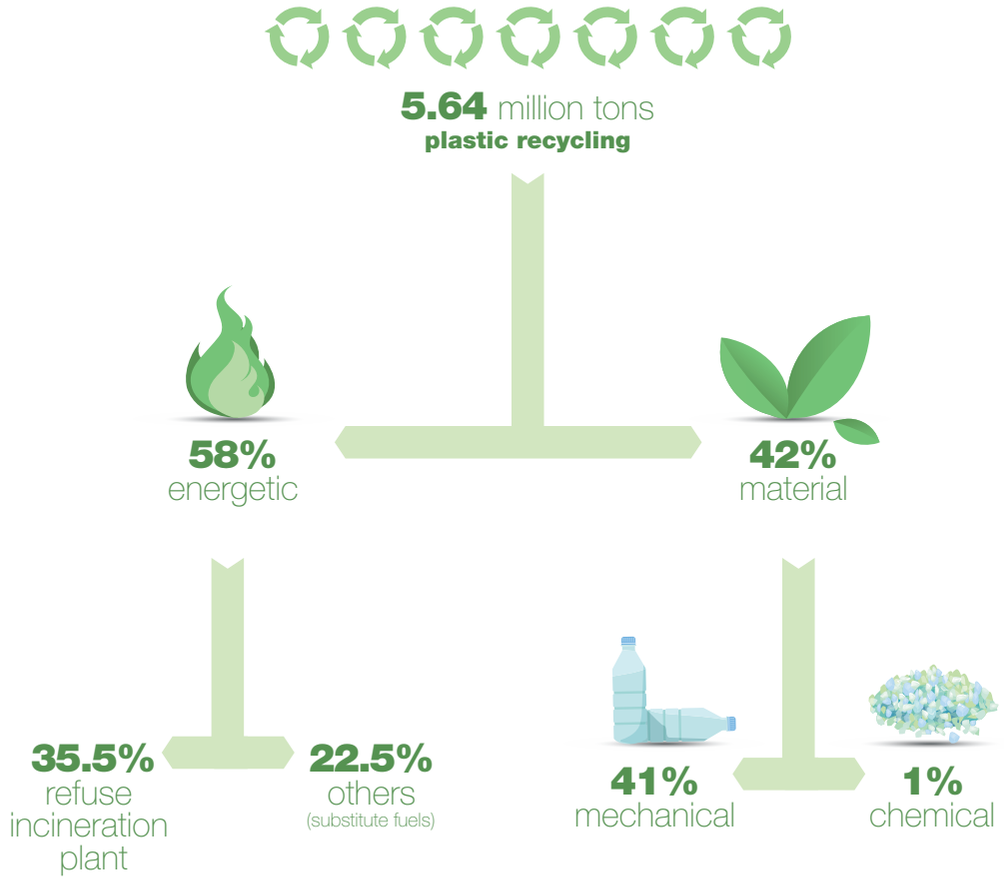
Responsible use of resources naturally also includes the recycling of plastic products at the end of their lifecycle. This can be done by either **mechanical** or **chemical recycling.**

During **mechanical recycling**, the used plastics are crushed, washed, granulated and then processed into foils or moulds. These are then used to produce new plastic products. The basic condition for material recycling is a functioning system for collecting and sorting used plastics.

The second option, which is still largely in the testing phase, is **chemical recycling**. Here, the polymer chains of the plastic are split in such a way that oils or synthesis gases are re-formed. These can be used as raw materials for the production of new plastics. The advantage of chemical recycling in contrast to the mechanical process is that even mixed plastics or contaminated plastics can be recycled. However, performing this procedure still requires high energy input.

Both types of recycling should always be used if it makes economical and ecological sense to do so. If used plastics can no longer be recycled, energetic utilisation is a proven option. In this case, the waste is incinerated at a refuse incineration plant and used for energy production in the form of heat and/or electricity. A further option is to produce substitute fuels from it that can replace valuable fossil fuels such as coal, gas or oil.

PLASTIC RECYCLING
IN GERMANY



Source: Consultic Study 2013; Consultic Marketing & Industrieberatung GmbH ©Kunststoffe.de

PROBLEMS
AND LIMITS

Plastic is a valuable raw material that we shouldn‘t waste. But why isn’t more plastic being recycled at the moment? There are a few clear answers to this question – but the solutions are not always ideal just yet. We’re working on that.

COSTS

Unfortunately, recycled-plastic products are currently often more expensive than products made of the original raw material – because not enough recyclable material is being collected and sorted. If the costs are allocated to the final price, the consumer will rather choose the cheaper rival product without the recycled material. At the moment, making products and packaging made of recycled plastic competitive would mean having to subsidise them.

QUALITY

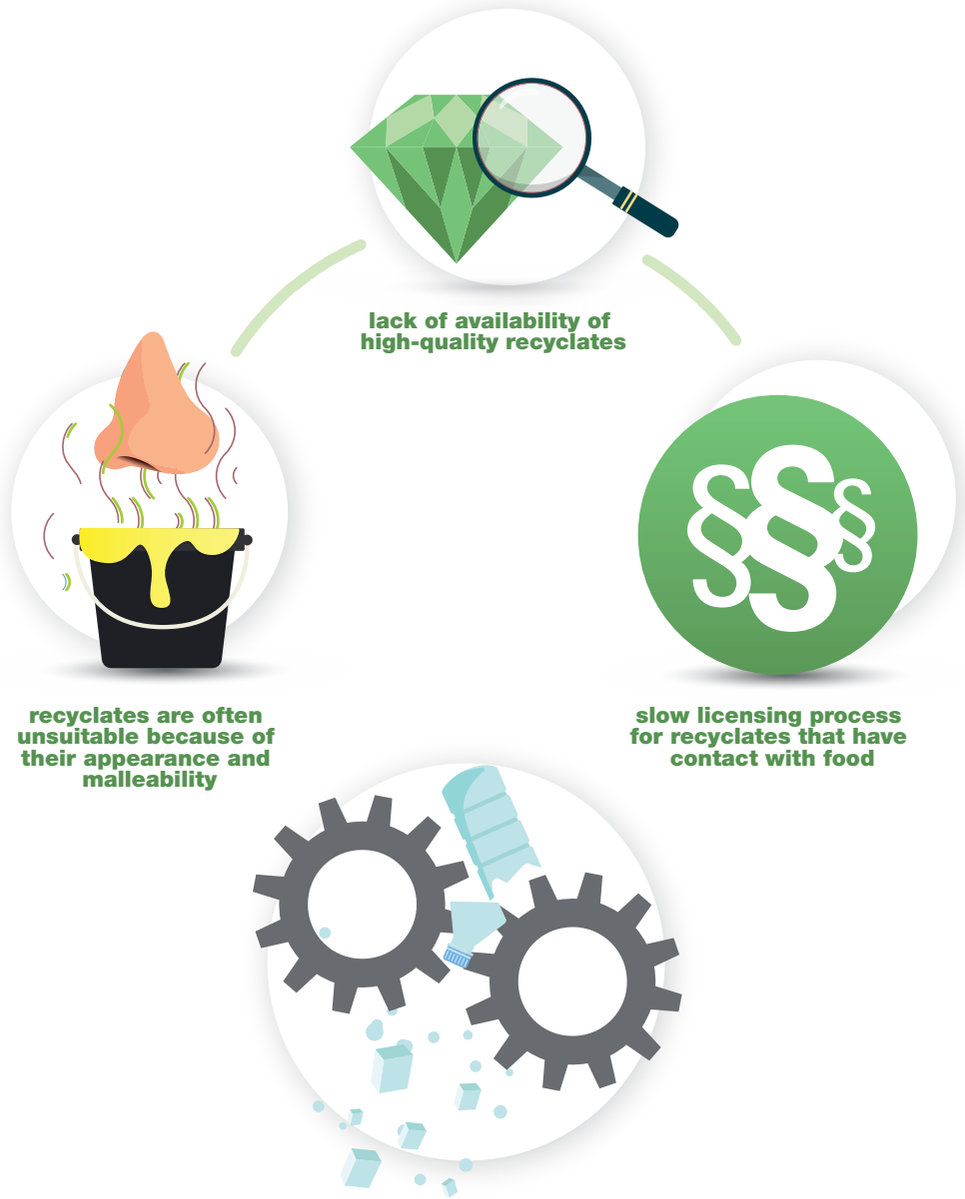
Not every kind of plastic can be recycled with consistent quality. Some materials are damaged during recycling – contamination can deprive them of their thermal stability, for example. Others retain residue such as odours or printing inks, and this reduces their usefulness. Packaging that comes into direct contact with food, in particular, is subject to strict hygienic requirements and statutory regulations.

PURITY / COLOURS

The colour of recyclates naturally depends on the starting material. It is, for example, hardly possible to create pure white recyclates; and darker colours are frequently unattractive for most food packaging. As long as consumers lack knowledge and awareness of specific features of the reusable material cycle, they will be more likely to continue to base their decisions on visual appearance. As well as on their wallets – see above.

The EU aims to achieve a recycling rate of 70% of all packaging by 2030. The question will be how this can be done. It is still unclear whether chemical recycling will be helpful – also because it is currently not categorised as required material recycling under the current definition.

THE THREE LARGEST OBSTACLES TO THE USE
OF RECYCLED MATERIALS IN PLASTIC PACKAGING



REQUIREMENTS FOR **RECYCLABLE PACKAGING**

Recyclable plastic packaging is a crucial factor on the path to a functioning circular economy. This is why the EU has decreed that all packaging on the market should be recyclable by 2030. As a part of the plastic and packaging industry, we are working on the following solutions:

MONO-MATERIAL STRUCTURES **INSTEAD OF MATERIAL MIX**

Packaging with mono-material structures can best be reused. It features good thermal and dynamic stability as well as an excellent oxygen and water vapour barrier. It must, however, be partially thicker than ultra-thin multilayer films (= more material is used) – so using it needs to be carefully considered in different cases.

RIGHT **COLOURING**

The brighter or more transparent the colours of the packaging to be recycled, the easier it is to gain high-quality secondary raw materials in the recovery process – from which visually appealing products, such as packaging, can be produced.

OPTIMISED **LABEL SOLUTIONS**

Labels that are made from the same material as the packaging itself are ideal, also with regard to correct material recognition in the sorting machine.

OPTIMISED **LID SOLUTIONS**

The situation here is similar to that of the labels: if the lid is made from the same material as the packaging, recycling is simple. If this isn‘t possible, good separability when opening the packaging is crucial.

PROPER **EMPTYING**

Product residue inside the packaging makes a resource-consuming cleaning procedure necessary that is often not exactly CO_2 neutral.

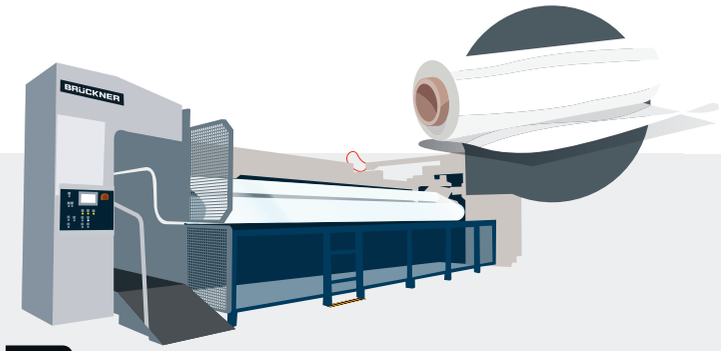
ON THE ROAD TO A CIRCULAR ECONOMY – **AND WE ARE A PART OF IT**

We consider it our duty to contribute to the conservation of valuable resources. The group company Brückner Maschinenbau is therefore a member of CEFLEX. This is a European consortium of well over 100 companies and associations, representing the entire value chain of flexible packaging.

CEFLEX has set itself the goal of better integrating flexible packaging into the circular economy. To do this, system and design solutions across the entire value chain are questioned and reviewed.

TECHNOLOGICAL IMPROVEMENTS TO OUR MACHINES

The Brückner Group and its companies not only talk about sustainability, they take action as well. Alongside support for two initiatives (see chapter 6) there have also been corresponding developments in each of our companies. All of us are working on enabling the machines to produce films and packaging with the highest possible recyclability. The focus here is on mono-material structures.



BRÜCKNER MASCHINENBAU

A Member of Brückner Group

The new concept of BOPE lines (biaxially oriented polyethylene) enables the production of mono-material films with excellent mechanical and optical properties. These enable replacement of the current multilayer films made from several different materials. The films produced on the new lines are easy to sort in waste sorting centres and are also highly recyclable.

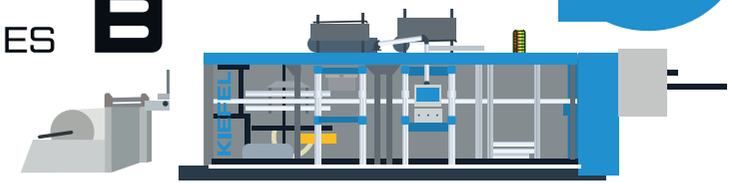
BRÜCKNER SERVTEC

A Member of Brückner Group

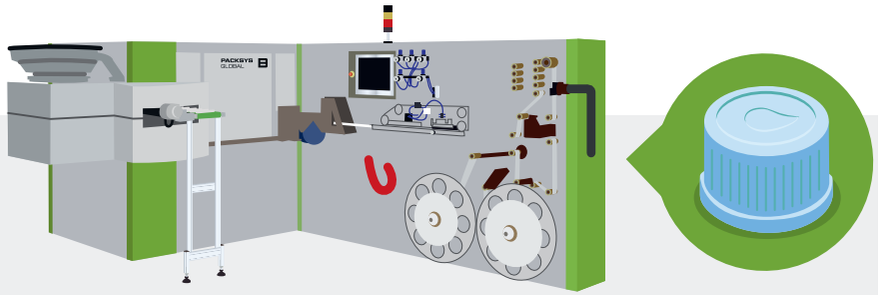
By offering special audits we help film manufacturers to modify their old production lines and to upgrade to the latest environmental standards.

KIEFEL TECHNOLOGIES

A Member of Brückner Group



Our newly developed technologies for production lines and tools are geared towards processing different mono-material structures and also recycling material itself for all important plastics such as PP, PET and PE. The result: 100% recyclable bowls and cups.



PACKSYS GLOBAL

A Member of Brückner Group

We have developed a mono-material tube (including the lid) that ensures optimal recyclability. Tube and lid do not have to be separated from each other. For bottle caps, we have developed a solution that connects the lid with the bottle until both are specially separated for disposal. This ensures that loose bottle caps are not lost in the environment.

These are just a few of the developments we are currently researching, developing and working on in different ways, to improve the current situation. Brückner Maschinenbau has, for instance, launched a corresponding project in collaboration with a foil manufacturer, a foil processor, a printing ink manufacturer and a provider of recycling technology. The goal is to analyse the influence of foil printing on recyclability, and to create corresponding baseline values for reuse.

WE SUPPORT:
THE ASASE FOUNDATION

ASASE
RESILIENT AND SUSTAINABLE COMMUNITIES

In March 2017, the ASASE Foundation was launched in the Greater Accra Region of Ghana. The founders, Dana Mosora and Hilda Addah, set themselves the goal of establishing a circular economy in this coastal region, to combat littering of the lakes and rivers and the landscape in general.

So far, only 20% of household waste is being collected in this region, and just 2% recycled – so a lot of it ends up on the streets. The ASASE Foundation is now training women from the region to become entrepreneurs, who go on to operate their own recycling plant. With the help of the equipment, the plastic waste is collected, sorted and processed into granulate – which in turn is used to manufacture new products. This gives the women their own source of income, so that they can support themselves and their families.

The name of the foundation derives from that of the traditional religion of the African Akan tribe: Asase Yaa is the name for Mother Earth, and stands for her resilience and nourishing power.

Our cooperation with the ASASE Foundation came about via personal contact with its founder Dana Mosora. We can therefore be certain that the money is in good hands.

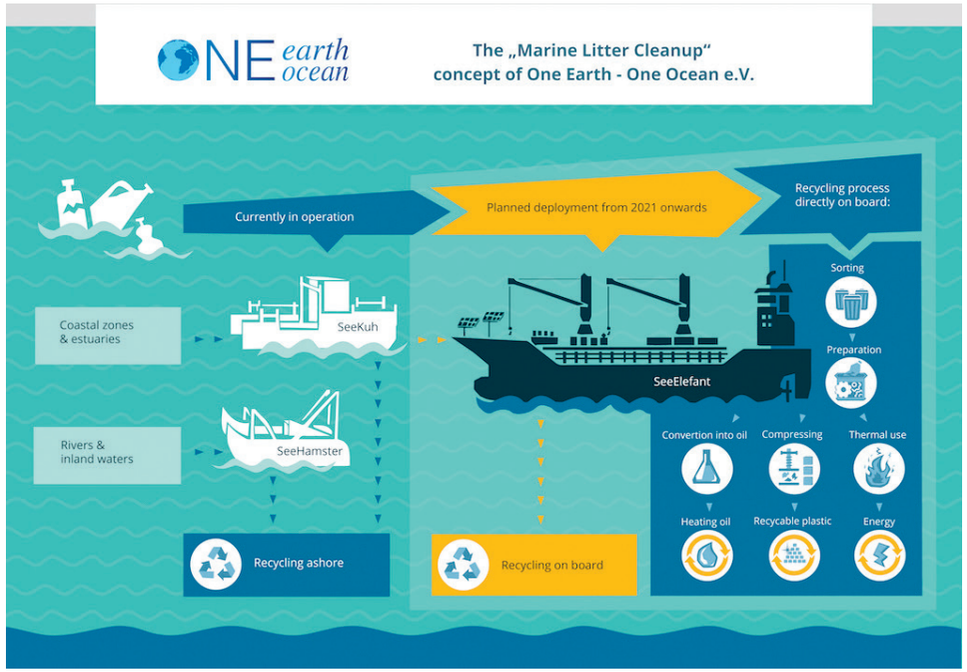
WE SUPPORT:
ONE EARTH – ONE OCEAN

www.oneearth-oneocean.com

The environmental organization One Earth – One Ocean e.V. has set itself the goal of developing a concept that makes it possible for lakes and rivers worldwide to be freed from plastic waste, oil and pollutants. Plastic waste is collected with special ships and then recycled or reconverted into oil. In this way, approximately 800 litres of oil can be recovered from one ton of pre-sorted waste.

The association is also involved nationally and internationally in the areas of oil purification and microplastics, as well as in research, education and documentation on the subject of „marine littering“ with the aim of effecting a change in people‘s behaviour towards (plastic) waste over the medium to long term.

One Earth – One Ocean was founded in Munich in 2011 by Günther Bonin, a former IT entrepreneur. Together with a team of experts – including marine biologists, ship designer Thomas Hahn, metalworker Michael Lingenfelder and other volunteers – he developed his concept of „Marine Litter Cleanup“.



Since 2018, One Earth – One Ocean has also been the official partner of the UN environmental campaign #CleanSeas. The campaign was launched by the UN in February 2017 with the aim of winning over governments, the public, civil society and the private sector to help in the fight against plastic waste in the oceans.

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