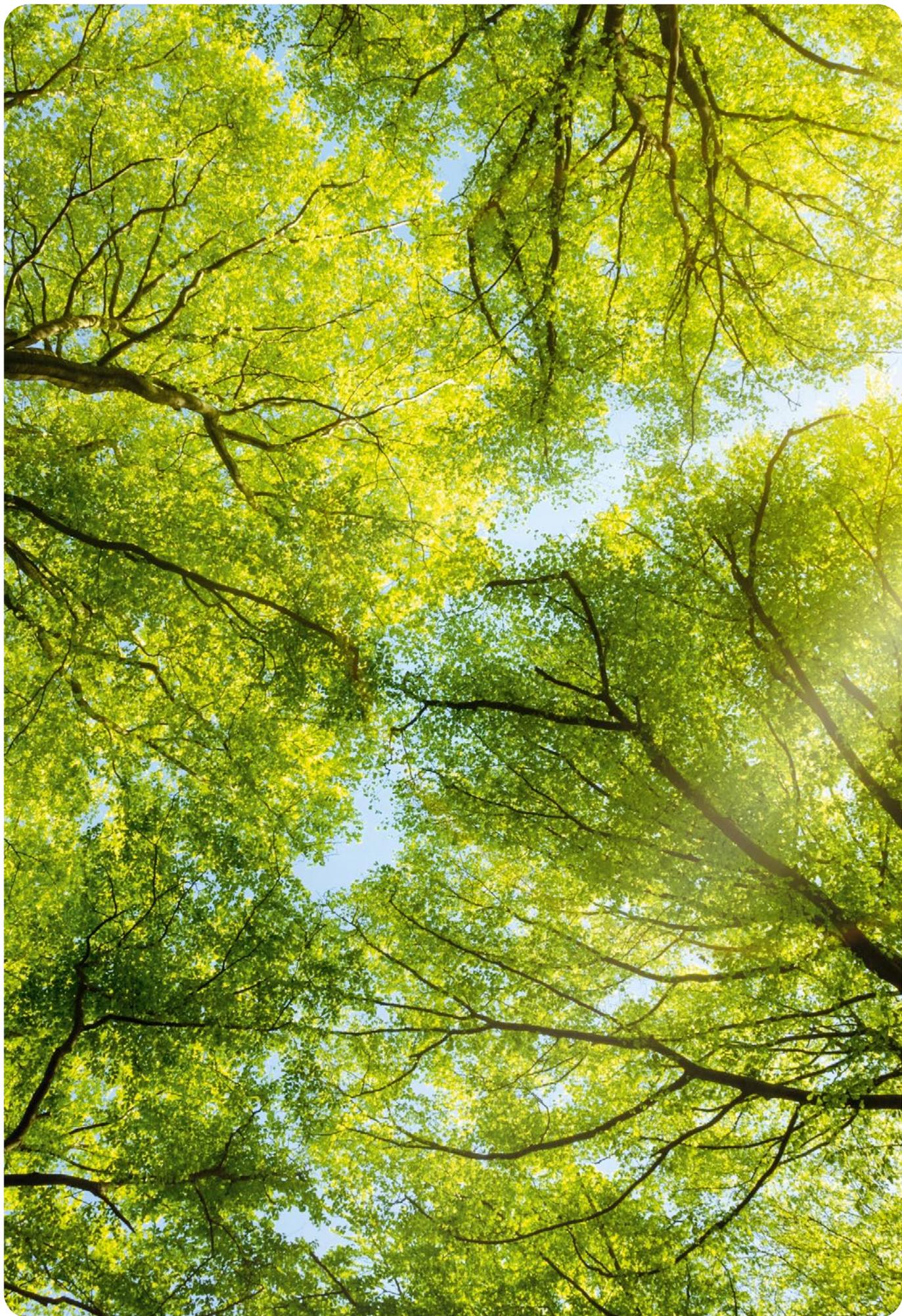




# A STRATEGY FOR THE FUTURE



# A SUSTAINABILITY STRATEGY

The ESE Group's corporate values and strategy are following the concept of sustainability. As one of the leading groups in the waste management industry, we feel it is our responsibility to implement sustainable practices even beyond the requirements of the regulations. This includes environmental protection, but also social concerns and responsible action for a sustainable business model.

The asset we bring is a strategy that involves every department of the company, the will to make investments, decades of experience and creative and innovative potential for the implementation.

In past years, we have successfully launched new projects and target-oriented activities in our company. Of course, market conditions, the economy and politics influence, positively as well as negatively, our ability to achieve

our sustainability goals. Many of our business partners support our approach and represent similar values. Our products, research projects and development are designed to make it easier for our partners to realize their own sustainability strategies.

In this document, we present some of our plans, projects and successful achievements. While reading it it will become clear that there is still immense potential for further improvement in our market. We press ahead with our development in cooperation with our partners; perhaps you are already among them, or will be in the future. That is what we hope for, because it is only together that we will be able to achieve decisive change.

Björn Hedenström  
CEO ESE World B.V.

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ESE World is a European leader in container systems for the temporary storage of waste and recyclables. ESE develops high-efficiency systems for its customers, combining over 80 years' experience with the latest technical know-how.

Its product portfolio comprises a wide range of 2 and 4-wheel bins, pre-sorting systems, public furnishing bins, hazardous waste containers, collection banks and underground systems. The company also provides logistical services such as the installation of container parks and container data management for its customers. In product development as well as sustainable solutions and use of material, ESE is a pioneer in the market.

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# PRODUCT DESIGN WITH A FUTURE

IT IS NOW GENERALLY ACCEPTED THAT A PRODUCT CAN ONLY BE GENUINELY SUSTAINABLE IF THE DIFFERENT ASPECTS OF SUSTAINABILITY ARE INTEGRATED FROM THE INITIAL CONCEPT TO THE FINISHED PRODUCT - AND ON THROUGH THE ENTIRE PRODUCT LIFE CYCLE. NOT ONLY ENVIRONMENTAL AND ECONOMIC ISSUES, BUT ALSO SOCIAL AND CULTURAL CONCERNS MUST ENTER INTO THE PRODUCT'S DEVELOPMENT.

At ESE, we are convinced that product design is at the root of sustainability. Products that are functional and fulfil the requirements for sustainability and environmental friendliness must permit sustainable production and be recyclable. Optimized use of resources, manufacture from recycled materials and complete reusability are the basic requirements in the development of our 2- and 4-wheel plastic bins.

Stacking and transport optimization significantly reduce emissions of greenhouse gases during transport of the bins. Flexible-use features and replaceability of all parts extend product life and avoid the unnecessary replacement of whole lids or bins.

Continuous ergonomic optimization and the reduction of noise emissions contribute significantly to improving working conditions for workers and making the bins more comfortable to use. Easy access and even barrier-free access become more and more important with respect to demographic development.

For waste and recyclables containers, the optimized use of material, especially of the principal material, plastic, is the key to a sustainable product. Optimized use of material means using as little as possible for ergonomics and environmental protection, but as much as is necessary for quality and safety. Our further technical development and innovations enable us to build containers with optimized wall thickness and weight for every application.

With our decades of experience and the continual development of our resources, we are now in a position to produce our modern bins from nearly 100% recycled plastic. The result is products with a significantly better Life Cycle Assessment.

An experienced team of technicians and engineers in our development department and production centres applies these guidelines in the framework of international standards, ensuring total compatibility with all components of the waste disposal system.

However, for optimum recyclability of our bins, we also have demands upon us in research and the communication of new knowledge and results. We produce our bins in accordance with the wishes and requirements of our customers and for the users. It is therefore crucial that our customers should be informed of what a particularly sustainable bin looks like. Colouring for example, plays an important role, both in the recycling of materials at the end of a product's life and in the use of recycled material in bin production. Where colour is concerned, less is more. Well thought-out marking concepts, such as coloured clips on grey bins, make a positive contribution here and also ensure greater flexibility when bins are reused. In addition, a smaller number of colour changes means a significantly lower scrap rate in production.

## SUSTAINABLE - ECONOMICAL - USER-FRIENDLY

The CL series by ESE is a perfect example of sustainable product design. The bins have been in serial production since 2012. Their construction, combined with a new production technique, has enabled us to achieve light weight with high stability and durability. The result is advantages in ergonomics and handling.

The CL bin is optimized for transport, not only through its reduced weight, but also through its exceptional stacking capabilities. Reduced transport emissions and optimized consumption of material significantly diminish the bin's CO<sub>2</sub> footprint. Coloured clips make the bins flexible in use, so that they remain in operation longer. Completely coloured bins are not necessary anymore, which improves the preconditions for recycling and the use of recycled material.

## USAGE MADE EASY

A special lid-in-lid solution developed by ESE for 2-wheel bins is used particularly often in Scandinavian countries because of its ergonomic properties and excellent user-friendly qualities. The lid can be opened from in front or from behind. Heavy bins no longer need to be turned round in narrow spaces, but can be manoeuvred ergonomically by waste workers using the rear foot step and the handles. Waste is inserted easily through the second lid, which opens from the rear.

Moving large, heavy bins is a heavy physical burden on waste workers and is ergonomically unfavourable, also for users. ESE has developed a version of the 360 to 400 L bin and the 240 L bin with an integral third wheel.



Aside from environmental protection and product safety also social concerns enter into sustainable product development - for better ergonomics, accessibility and noise reduction for example.

These bins can be turned round on the spot easily and moved without tipping. A brake prevents them from rolling unintentionally. With hundreds of bins to be moved every day, this signifies a great advantage as regards musculoskeletal strain on waste workers.



Demographic change creates new challenges and requirements for our containers. Accessibility and intelligent features for easy handling become increasingly more important.

## BARRIER-FREE ACCESS

Comfort and user-friendliness alone often are not enough anymore. Demographic change makes additional demands on our products. Easy access and even barrier-free access and new options to facilitate use will be part of the basic configuration of bins in future.

The large 1100 L flat and round-lid bins are widespread. But in everyday use, handling the tall containers and the big, heavy lid causes difficulties for many people.

With the 1100 L SPLIT LID bin, ESE has put an innovative, system-compatible solution on the market. The front lid extends across the full width of the bin. So the smaller front lid is easier to open, needing about 60 % less effort than a flat lid. This means it can be used without restriction by children or the handicapped, and it is child-safe. The front lid can be completely opened without difficulty, so

that the bin can be filled with one hand. This is especially convenient when there are several waste bags to be disposed of. The lateral handle strip makes the lid easy for wheelchair users to operate.

A good solution is also provided by modern underground systems such as ESE's INGENIO G5. Due to its low-level insertion height, the INGENIO is easily accessible for waste disposal. The insertion columns can be accessed from any direction. The pedestrian platform can be completely integrated into the surroundings at ground level.





Our containers for waste and recyclables are tested and certified according to the worldwide highest quality standard, RAL-GZ 951/1.

## THE RESPONSIBILITY FOR QUALITY

The sustainability of a product requires quality and long life expectancy. Furthermore, a waste and recycling container is a safety-related product, subject to strict test and quality criteria.

The high quality of our bins is guaranteed by compliance with national and European standards. In addition, all plastic bins are tested and certified according to the world's strictest quality standard, RAL-GZ 951/1. This quality label requires permanent monitoring of product and production quality by an independent accredited institute.

The use of environmentally friendly materials and the reduction of material consumption are made possible at ESE through innovative construction and new technologies. This ensures that product optimization is never at the expense of quality or safety - tested and proved through continuous quality surveillance.

On behalf of our customers, we assume responsibility for ensuring that the products conform to all specifications and are certified compliant with the standards in force - no matter which the part of the world they will to be used in.

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The RAL-GZ 951/1 quality label sets the highest standards in the world for mobile plastic waste and recycling containers. Based on the requirements of EN 840, it includes all the tests and requirements of EN 840, but surpasses these in decisive respects, for higher quality and the safety of all users. The manufacturers submit to strict sample tests and surveillance conducted by independent approved test institutes, to ensure the highest quality consistently.

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# SUSTAINABLE PRODUCTION PROCESSES

Standard ISO 14001 is based on the requirements of an environmental management system that is recognized worldwide. The environmental management system in our plastic factory at Neuruppin, Germany, has been certified according to ISO 14001 since 2001, our plastic production site in Crissey, France, since 2005.

An effective environmental management system helps us in our strategy of reducing environmental risks, conserving natural resources and improving our environmental performance as a whole. The essence of ISO 14001 lies in a process of continuous improvement. Regular internal audits and the annual environmental audit by an external accredited auditor ensure systematic implementation of our strategic environmental goals.

An important component of our environmental objectives is the conservation of all resources. For this reason, reducing consumption of other raw materials than plastic is also central to our endeavours.

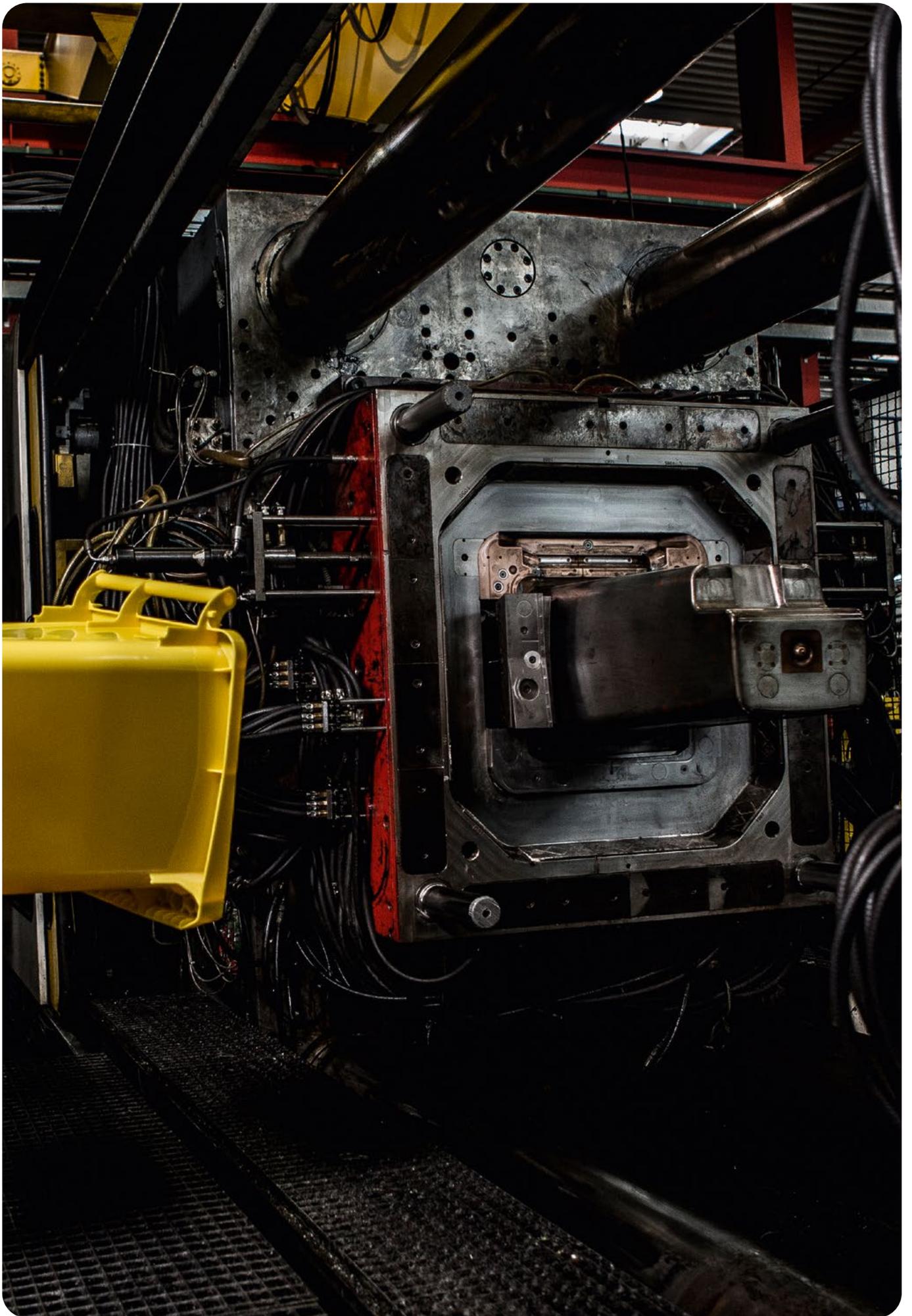
By implementing dry cleaning processes in our Neuruppin factory, we have achieved a significant reduction in drinking-water consumption since 2003. Altogether, the consumption of drinking water and cooling water was greatly reduced in proportion to the volume of plastic to be processed.

The continual increase in the share of recycled material has been very successfully applied in our plastic plants. We unceasingly further optimize material use, while maintaining the highest RAL quality.

We produce our bins from plastic with next to no waste. Our Zero Waste Policy means that scrap goes straight back into the production process. No raw material is wasted. Materials that are not suitable for production are sent for external recycling.

Investment in modern technologies for this purpose is as vital as the integration of sustainability strategy and environmental objectives into all our processes.

Special projects and the LEAN management process in our Neuruppin factory also make their contribution to continuous improvement. The Crissey plant achieved major improvement results between 2014 and 2017 in the cross-departmental Winning Together Project. Sustainability, customer satisfaction and the health and safety of our staff were central to all the activities and goals.





# ENERGY CONCEPT

Continuous optimization of our energy performance is also central to our sustainability activities. For this we rely on the energy management system in our Neuruppin production site, which has been certified to ISO 50001 by independent accredited auditors since 2013. Continuous improvements are a prerequisite for the award of the certificate.

Here too, of course, we are benefitting from our investment in new technology. Energy-efficient machines and shorter production times enable reduced energy consumption.

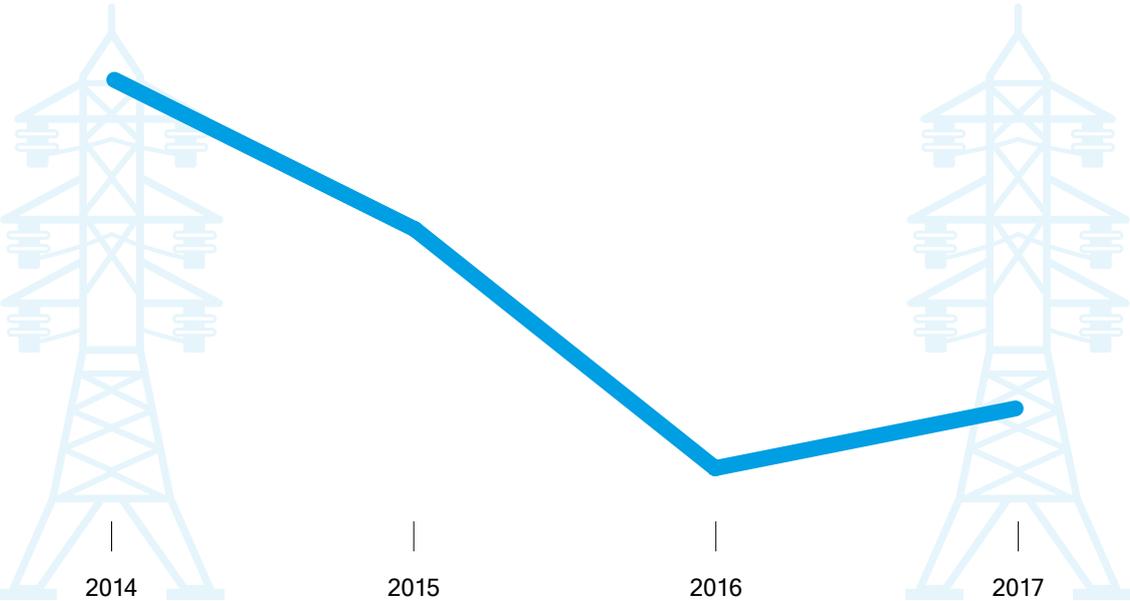
In accordance with French regulations, our plastics factory in Crissey conducts an annual energy audit according to NF EN 16247 to optimize energy consumption with respect to the environment. The associated report identifies and prioritizes potential areas for improvement.

An important indicator is specific energy consumption with respect to the quantity of plastic processed in the injection moulding process. In recent years, we have been able to reduce this significantly, making a consolidated reduction for both factories of 9% between 2010 and 2017. Additional investment in energy-saving technologies is scheduled for the next few years.

Both factories use green energy only. This means that our power consumption has virtually no negative effects in the climate footprint of our plastic bins.

Our plastic production sites use exclusively green energy. This means that energy use has virtually no negative impact on the carbon footprint of our bins.

## DEVELOPMENT OF SPECIFIC ENERGY CONSUMPTION IN OUR PLASTIC FACTORIES



# RECYCLED PLASTIC AT ESE

Today already we save about 60 million litres of crude oil per year for the production of waste containers due to our usage of recycled plastics.

The main material used for our containers, the plastic HDPE, has the greatest influence on the LCA and climate footprint of our products. HDPE virgin material is made from crude oil. Besides reducing the consumption of finite resources, controlling emissions of greenhouse gases and other negative influences on the environment are our top priorities for greater sustainability. The significantly better LCA of recycled HDPE puts the use of recycled material high on the priority list of our sustainability strategy.

ESE uses more than 40 000 tonnes of HDPE every year to make its plastic containers; Europe's annual consumption of HDPE for waste and recyclables containers is estimated at 200 000 tonnes. If all these containers were made from recycled materials alone instead of from new raw materials, the positive impact on the environment would be enormous. 240 000 tonnes of CO<sub>2</sub> equivalent could be saved and some 500 000 000 tonnes of crude oil conserved for the benefit of future generations every year - from the production of waste and recyclables containers in Europe alone.<sup>1</sup>

Our usage of recycled plastics means today already that about 60 million litres crude oil less per year have to be used for waste containers.

ESE looks back on a long history of using recycled plastic. More than 25 years ago, ESE's predecessor company, OTTO, began to work with recycled material. With over 25 years of experience, research and development, setbacks and successes, ESE has now attained its goal: the capability to manufacture waste and recyclables containers from almost 100% recycled plastic without any loss of quality, functionality or safety.

In order to further increase the use of recycled materials in our plastic containers, we invest not only in new product development and new tools and machines, but also in intensive research and development work. Data, facts and information are also important in our communication with our customers. We will only be able to increase the proportion of recycled material in our production even further if those of our customers who seek sustainable public procurement choose their bins accordingly.

## DEVELOPMENT OF THE SHARE OF RECYCLED HDPE IN OUR PLASTIC FACTORIES



<sup>1</sup> Franklin Associates. Life Cycle Inventory of 100% Postconsumer HDPE and PET Recycled Resin from Postconsumer Containers and Packaging. Prepared for the Plastics Division of the American Chemistry Council, INC. January 19, 2011.

# HOW ECOLOGICAL CAN PLASTIC BE?

THE RECYCLING OF MATERIALS IS A CORE COMPETENCE OF WASTE DISPOSAL CONTRACTORS. WASTE BECOMES VALUABLE - IN CONTINUALLY INCREASING QUANTITIES. RECYCLABLES CONTAINERS MADE FROM RECYCLED MATERIAL HAVE THEIR PLACE IN THIS SCHEME OF THINGS.

## CONSERVATION OF FINITE RESOURCES

HDPE, the principal material of our plastic bins, is made from crude oil. However, it is well known that our fossil fuel resources are not unlimited. Regardless of the difficult prognosis of how long oil reserves will still last, there is no denying that eventually the only way the end of oil reserves can be postponed is by economizing consumption. A significant contribution to this is the option of recycling materials manufactured from petroleum.

The dependency of our European plastics industry on oil as a raw material is also a problem. High demand in emerging countries

exerts a powerful influence on world market prices and on the availability of new HDPE.

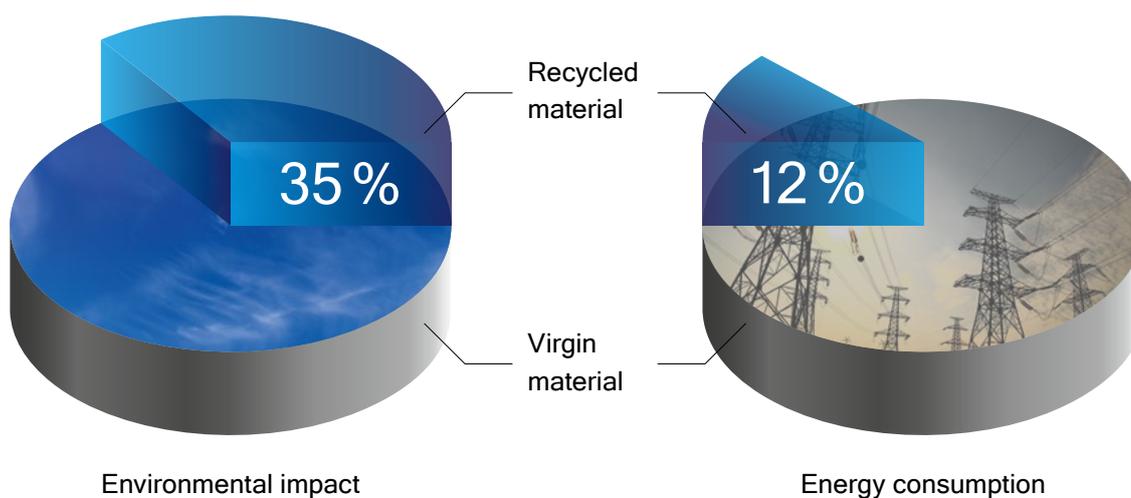
The German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety also fears the effects on security policy, as oil reserves are concentrated in a small number of often geopolitically unstable regions.

## LIFE CYCLE ASSESSMENT

Sustainability manifests itself in the maximum possible reduction of negative influences on the environment. The corresponding evidence should be provided by a Life Cycle

Sustainability of a material is defined by the consumption of finite resources and by a life cycle assessment of the material. The LCA is the only recognized method of proving the environmental friendliness and sustainability of a product or material.

## ENERGY CONSUMPTION AND ENVIRONMENTAL IMPACT IN CO<sub>2</sub> EQUIVALENTS



The energy consumed in the production of recycled HDPE is 87-88% lower than the energy required to produce virgin HDPE and the environmental impact is 65% lower.

Assessment (LCA). The LCA is the only recognized method of proving the environmental friendliness and sustainability of a product or material.

Studies of the environmental effects of goods made from new HDPE as opposed to recycled materials give unequivocal results. The energy consumed in the production of recycled HDPE is 87-88% lower than the energy required to produce virgin HDPE.

The environmental impact of recycled HDPE production in terms of CO<sub>2</sub> equivalent is 65% lower than from the production of new HDPE.

The complex investigation by Franklin Associates in 2010 considered energy consumption, energy sources, pollution of air and water and waste generated. Collection and transport, sorting, separation and production - each section of the life cycle was included.

The result of the LCA for HDPE recycled and virgin material leads to the immediate conclusion that the LCA of a plastic waste and recycling container is strongly influenced by what proportion of recycled material can be

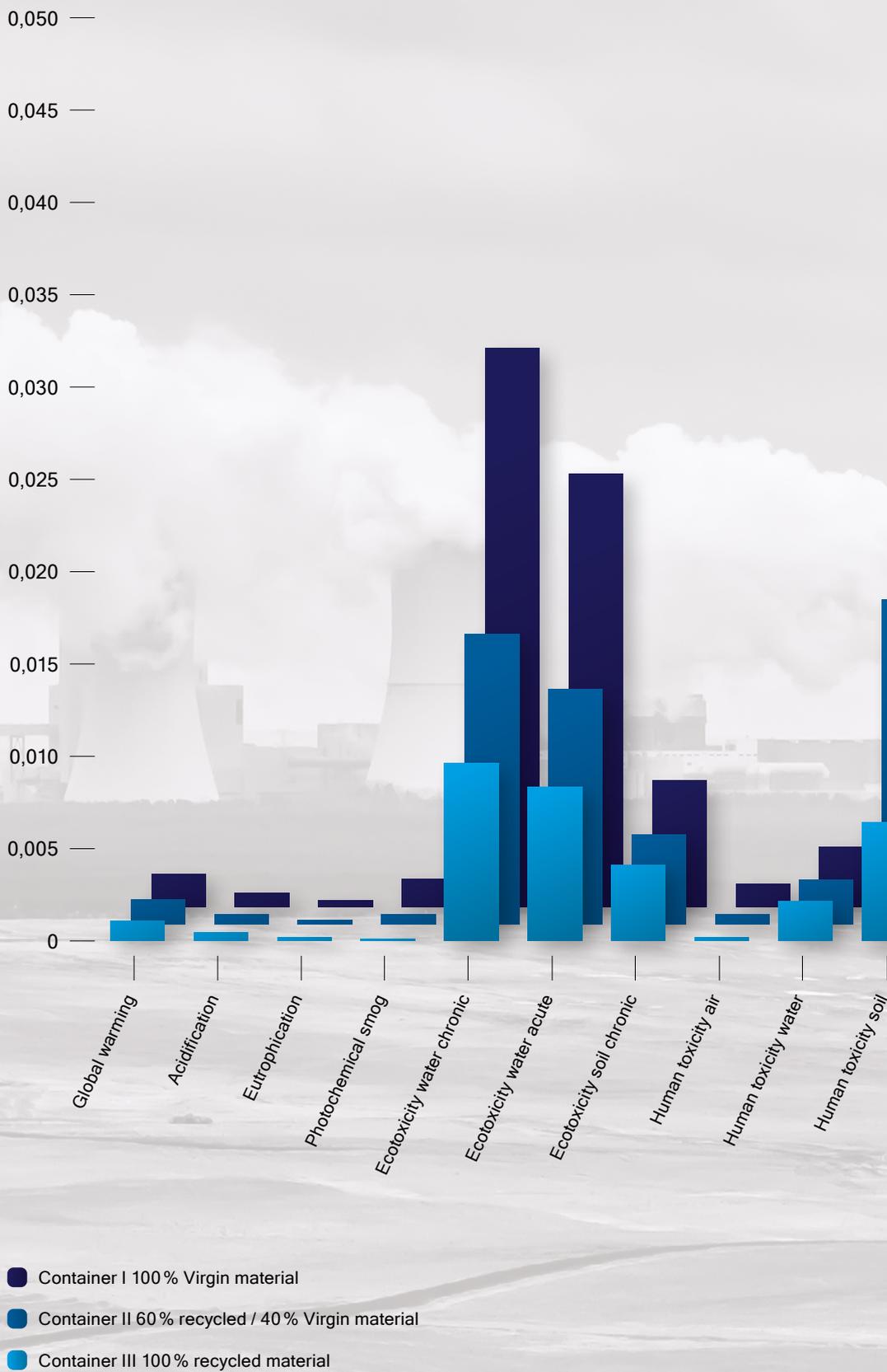
processed. In the context of a dissertation at the Technical University of Denmark, the LCA of ESE bins was examined with special reference to the use of recycled material, and different disposal scenarios were considered.

The results of the comparison leave no room for doubt. Briefly, the marked advantages of recycled material are clearly demonstrated. The higher the proportion of recycled material used in production, the better for the environment: bins made from recycled material achieved considerably better results in all applicable categories of environmental impact.<sup>1</sup>

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<sup>1</sup> Kai-Sørensen Brogaard, Line. Life cycle assessment of a 240L HDPE bin produced by Environmental Solutions Europe (ESE) Group. DTU Environment. Department of Environmental Engineering. Technical University of Denmark. The investigation was carried out in the context of a doctoral thesis, „Life cycle assessment of waste management systems: Assessing technical externalities“ by Line Kai-Sørensen Brogaard, submitted in August 2013.

LIFE CYCLE ASSESSMENT OF A 240 L BIN INCL. TRANSPORT IN PE



So far we are lacking scientific proof of any environmental advantage of bioplastic compared with conventional plastic. Results from Life Cycle Assessments indicate that recycled plastic may give best results for the environment.<sup>2</sup>

## BIOPLASTICS

The circular economy is the royal road to more efficient use of resources. As an alternative, there is talk of renewable materials. What is obvious in many fields is controversial in the case of bioplastics. A distinction is made between plastics made from renewable raw materials and compostable plastics, which can be made from fossil raw materials.

We are keeping track of the discussion on bioplastics and continuously evaluating their use. At present, many points are the subject of argument or are as yet unresolved. In addition to environmental concerns, the social aspects must also be kept in view. For example, renewable resources are not available without limit, and are in competition in several ways. First of all, they are largely foodstuffs, they are used for heat and power generation, as biofuels and also as raw materials for the chemical industry. The need for space is growing: fertile land is becoming a sought-after resource. Land grabbing by investors from industrial and emerging countries displaces native smallholders and nomads from land that was previously open to public access. The term renewable raw materials suggests unlimited available resources. Yet even raw materials of vegetable origin require space, fertilizers and very often pesticides for their production.

Even the German Federal Environmental Agency expresses reservations about bioplastics. It sees no scientific proof of any environmental advantage in comparison with conventional plastics.

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In the view of the Federal Environmental Agency, the establishment of a Life Cycle Assessment in accordance with ISO 14040 and ISO 14044 is the only appropriate method of determining the environmental impact of production processes and products, comprehensively and objectively.<sup>1</sup>

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It is largely unclear to date whether bioplastics might also pose problems in the sorting and recycling process.

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<sup>1</sup> Umweltbundesamt (Hrsg.) Biologisch abbaubare Kunststoffe. August 2009. S. 7f.

<sup>2</sup> Umweltbundesamt (Hrsg.) Untersuchung der Umweltwirkungen von Verpackungen aus biologisch abbaubaren Kunststoffen. Oktober 2012.

# ENVIRONMENTAL PROTECTION FLYING HIGH

## THE BLUE ANGEL FOR ESE BINS



[www.blauer-engel.de/uz30a](http://www.blauer-engel.de/uz30a)

As the first manufacturer of plastic waste and recyclables containers, ESE was in 2016 already awarded the well-known Blue Angel environmental label for its bins - because they are made from recycled plastic.

ESE created the preconditions for the award by adapting its internal processes. Procurement of the specially certified materials needed, and the consequent demand, increasingly motivate more and more of our suppliers to develop sustainable products.

This recognized environmental label The Blue Angel is verified by RAL gGmbH in accordance with the criteria of the German Federal Environmental Agency and awarded by the independent "Umweltzeichen" panel. The sources and composition of the recycled plastic used must be proven and certified according to EuCertPlast. The owner of the Blue Angel environmental label is the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety. The technical criteria on which the award is based are developed by the Federal Environmental Agency. In addition, EuCertPlast certification gives the assurance by an independent third party that the recycled materials used are harmless to people, animals and the environment.

Today only by this system of independent certification can be proved that a bin is really made of at least 80 % recycled plastic.

The Blue Angel is the guarantee of an environmentally friendly product. It is at present the only environmental label that can be awarded for waste and recyclables containers made from plastic. As a recognized environmental label, it also significantly facilitates sustainable procurement. The new EU procurement guidelines place greatly enhanced value on the environmental aspect in the award of public procurement contracts. European municipalities seek, and will be obliged, to give greater weight to environmental aspects. The environmental friendliness of materials and products must be easy to understand, comparable and certified by an independent third party in order to offer legal certitude for tendering authorities. The requirement for environmentally friendly materials or production processes is made easier by requesting recognized environmental labels in the tender, such as the Blue Angel.

Independent certification makes the Blue Angel the proof of an eco-friendly container with minimum 80 % recycled plastic. This facilitates sustainable procurement considerably.



# CARBON FOOTPRINT OF BINS

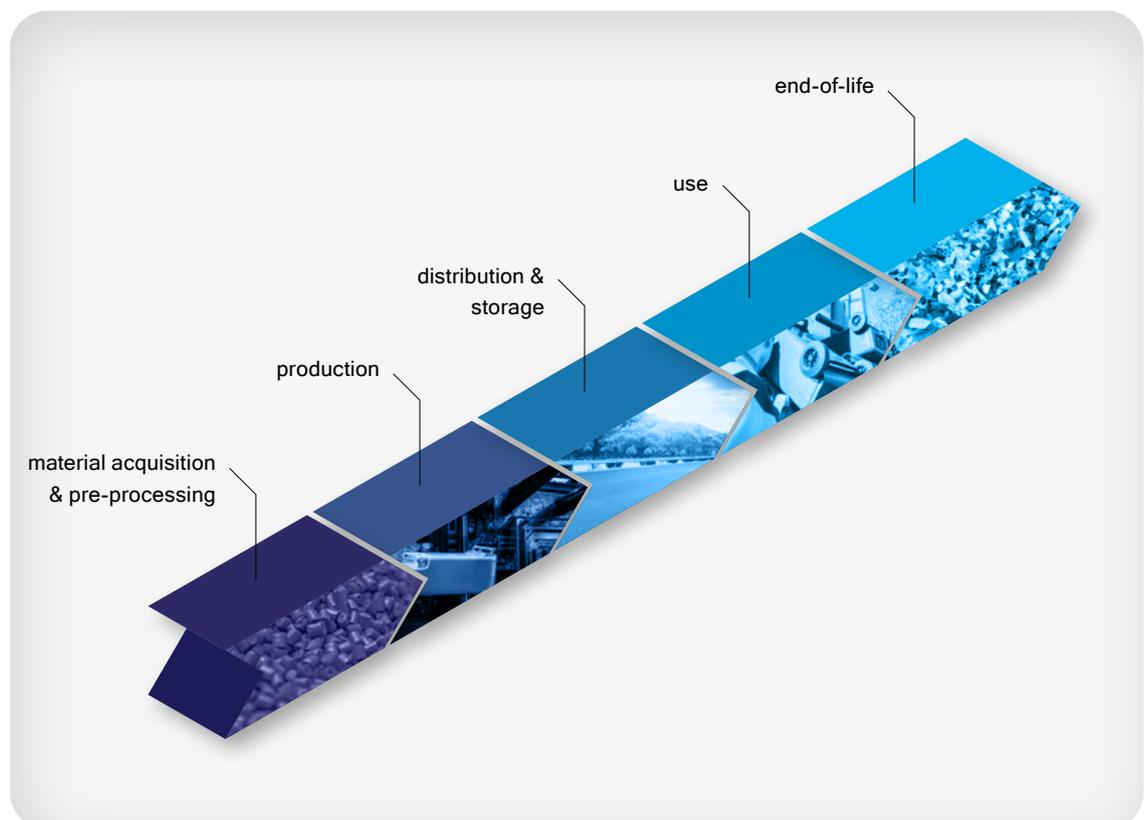
In 2017, ESE had a carbon footprint assessment drawn up for its standard plastic bins. A carbon footprint not only represents a survey of the current situation, but also opens up the potential for ongoing improvements in the design of more sustainable products.

The methodological basis of the analysis performed is the Product Life Cycle Accounting and Reporting Standard of the Greenhouse Gas Protocol. Proceeding in accordance with this internationally recognized standard guarantees the plausibility, precision and credibility of the accounting process. The

standard, developed by the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD), is considered a best-practice standard for the assessment of product emissions.

In order to represent all the greenhouse gas emissions caused by the products, we preferred not to restrict ourselves to production itself, but included all the phases of the life cycle, starting with the production of the raw material and concluding with the end-of-life treatment of the products.

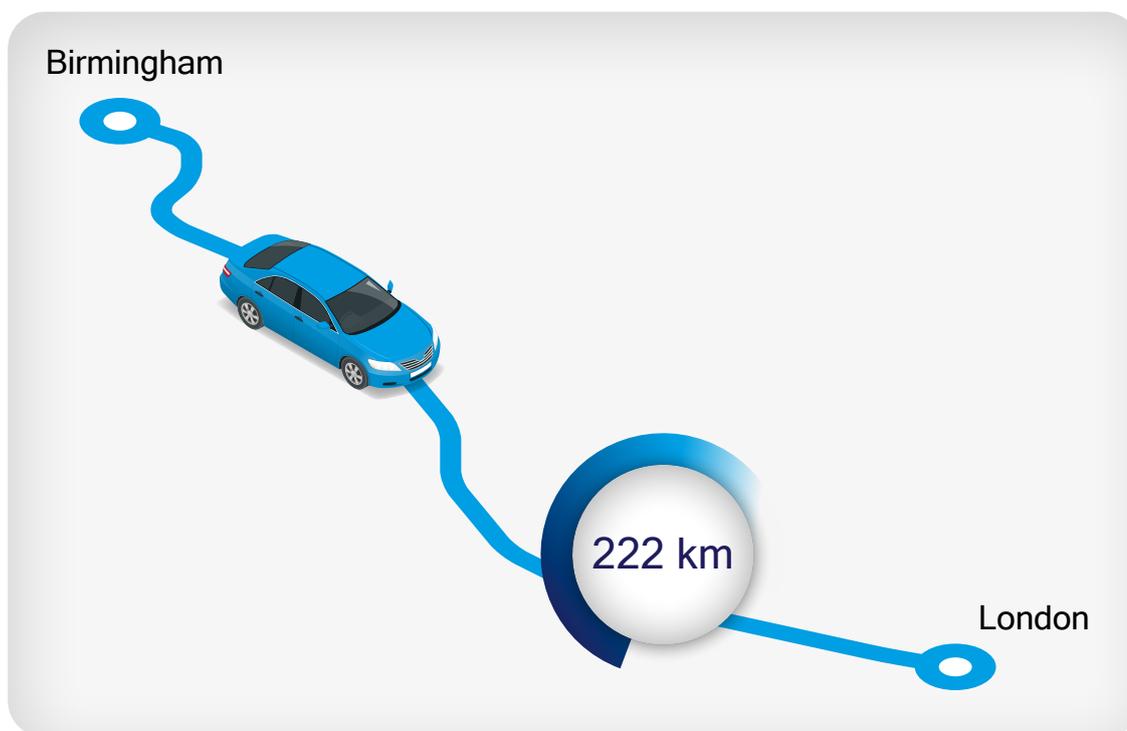
## INCLUSION OF ALL PHASES OF THE LIFE CYCLE



The figures yielded by the assessment showed that the most significant emissions occur in the phases of material procurement and pre-processing (63 % 2-wheel or 68 % 4-wheel) and disposal (25 % 2-wheel or 20 % 4-wheel). The zone directly controlled by us, production, is responsible for less than 1 % of the total emissions. A decisive reason for this is that we use green energy only. In the total carbon footprint of a bin, this leads to

life cycle and also enables us to identify the potential for improvement when using specific parts or materials.

It was no surprise that the share of recycled material used had a strong influence. For example, we compare the calculation for a 1100 L flat-lid bin made of 100 % new HDPE material with that for one made of 80 % recycled material, as required for the Blue Angel,



A 1100 L flat-lid bin made of 100 % new HDPE material compared with one made of 80 % recycled material has a much lower carbon footprint. For the difference between the two bins alone, a medium-sized car could drive 222 km.

a reduction of greenhouse gas emissions of about 12 - 13 % compared to consumption of conventional energy.

The carbon footprint of the bins shows the proportion produced by each phase of the

for instance. Other parameters being equal, the bin made of recycled material has a carbon footprint over 30 % more favourable. For the difference between the two bins alone, a medium-sized car could drive 222 km.

## CLIMATE-NEUTRAL RECYCLING BINS

Whole municipalities or states, Denmark and the Netherlands among others, have set themselves the objective of becoming almost or completely climate-neutral. The EU has laid down conservation targets for 2020 and 2030 which all member states are required to achieve.

Of course, reducing emissions must always take priority over compensating for them. However, there are few products that it will be possible to manufacture in complete climate neutrality. To compensate for the unavoidable emissions generated by the manufacture of our plastic bins, we offer climate-neutral bins. This option supports those of our partners who have set themselves the goal of climate neutrality.

Recourse to compensation projects remains a subject of controversy. Even environmental protection organizations, such as WWF are, however, of the opinion that in compliance with the corresponding standards and with independent monitoring, compensation projects can make a genuine contribution to climate protection.<sup>1</sup>

For certification of climate compensation projects, ESE uses only the highest quality standard: the Gold Standard. Projects meeting the Gold Standard not only reduce CO<sub>2</sub>, but also contribute to sustainable environmental and social development in the area of the project. The Gold Standard was developed under the direction of the WWF and in collaboration with the German Federal Environment Ministry. Climate protection projects must be supplementary projects, i.e. they would not be implemented without finance through certification. In addition to this requirement, numerous other criteria must be met to ensure sustainable development in the countries where the projects are to be put into effect.

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<sup>1</sup> <http://www.wwf.de/themen-projekte/waelder/wald-und-klima/standards-fuer-schutzprojekte/>



# THEORY AND PRACTICE - BASIC RESEARCH ON PLASTIC RECYCLING

Basic research under practical conditions yields pioneering results for the production of sustainable plastic containers.

Our group of companies has been concerned with the use of recycled plastic for containers since the 1980s. In the subsequent decades, the market situation has altered profoundly. Recycled material available today is subject to wide variations in purity and quality.

Over the years, on the basis of our extensive experience in this field, we have developed innovative approaches and processes in the cleaning, choice of additives and processing of recyclable plastics. This has led to our present-day capacity to make products from recycled plastic with the same level of quality as from new material.

However, one question that has remained unanswered until now was how often HDPE can be processed, ground and reprocessed in injection moulding procedures without fundamentally changing the structure and characteristics of the material.

Systematic research on recycled material is difficult to set up, because the material available on the market often lacks reliable information on its provenance, first processing, additives and use in production.

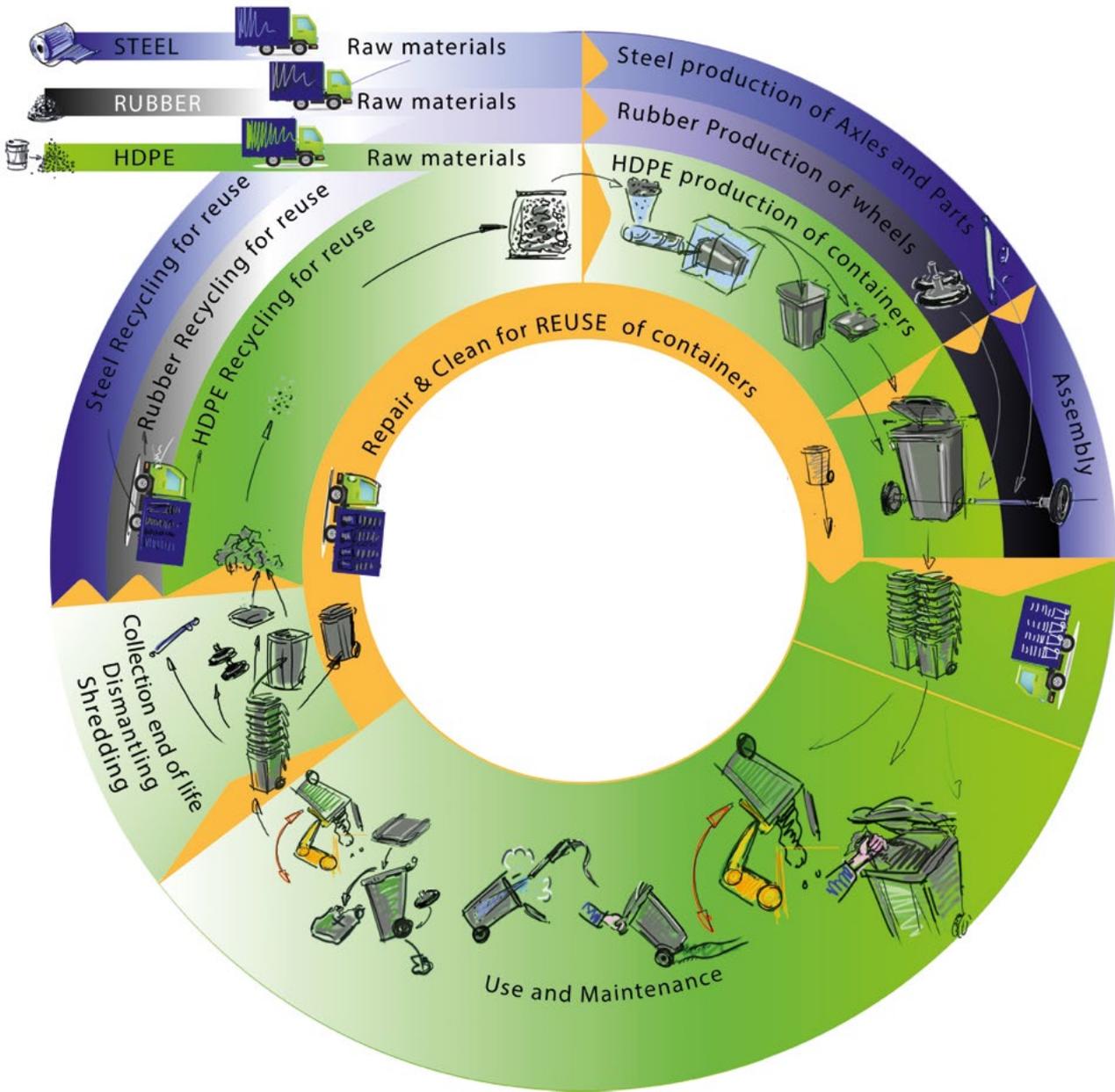
To lay the foundations for future research and development, in 2016/2017 ESE created the basis for a model project under practical conditions.

Our materials specialists started with new HDPE, in order to exclude unknown factors. The material was then used for injection moulding in ESE's plastic waste and recycling

bin production centres, shredded and processed again a total of ten times. After each cycle, the material was analysed by the most modern methods in collaboration with external research institutes. By this means, we showed that the injection moulding process and shredding of the principal plastic caused no consequential damage altering the characteristics of the material, after at least ten cycles.

Of course, in real life, the ideal conditions of the trial project are never found, although the material structure of the waste and recycling bins is altered relatively little. Even damage to the outer layers of the bins through UV radiation is only measurable to the extent of a few tenths of a millimetre, despite the passage of years. Yet even in first-time processing, the use of additives for the injection moulding process is as necessary as the use of supplements to guard against material damage through processing and from UV radiation. During product recycling, further mixing with other plastics and soiling can arise. Thus, the controlled use of recycled material with the stipulation that only the highest quality is acceptable is only possible with comprehensive know-how and corresponding processing experience.

The knowledge acquired from our test series now enables us to conduct even more focussed research and the development of further future-oriented methods, such as the use of plastic material from household waste, with a view to making true upcycling possible.



# AN EXEMPLARY CONCEPT: SUSTAINABLE PROCUREMENT IN THE NETHERLANDS

In September 2016, the Dutch presented a government programme which aims to develop a circular economy in the Netherlands by 2050. As an intermediate objective, a 50% reduction in the use of primary raw materials (minerals, fossils resources, metals) is to be achieved by 2030. By 2050, raw materials are to be used and reused, without generating harmful emissions. New materials must be made available by sustainable means. The goal of a totally circular economy by 2050 will be supported, among others, by companies, unions, environmental organizations, scientific and financial institutions.

The NVRD also supports these objectives. The NVRD is an association of Dutch municipalities and public waste disposal organizations responsible for waste management and the public domain. In 2017, the NVRD launched a market survey of the partners concerned, to draw up the outlines of a circular economy in the waste industry. It was concerned in particular with the procurement of plastic 2-wheel bins. On the basis of this survey and discussions with market players, the NVRD intends to support its members in their invitations to tender for sustainable waste and recycling bins.

Thus, in future, sustainable criteria in tendering should make the difference. With the aid of an assessment matrix, points may be awarded, for example, for a higher proportion of recycled material. The use of new material can be restricted. Post-consumer material, i.e. recycled material from used products, will be rated especially positively with respect to the desired completely circular economy.

Clear, legally watertight recommendations will help contracting authorities to manage sustainable procurement. The dynamic process can be further developed with progressive opportunities in the market and thus contribute to enabling the immense purchasing power of public authorities to better exert its influence on sustainable development.

Growing demand will lead to positive development with more sustainable products on the market. The demand by our customers for greater sustainability of bins is a basic precondition for us to further increase the proportion of recycled material in our products.

# REACHING OUR GOAL TOGETHER!

We can only achieve our goals together - with all our staff, customers and suppliers.

In past years, we have proved in a variety of projects that we can plan our progress deliberately and control it. By integrating colleagues from the most diverse fields into our activities, we succeeded in getting results more quickly, and especially with more sustainable effect.

## PROJECT WINNING TOGETHER

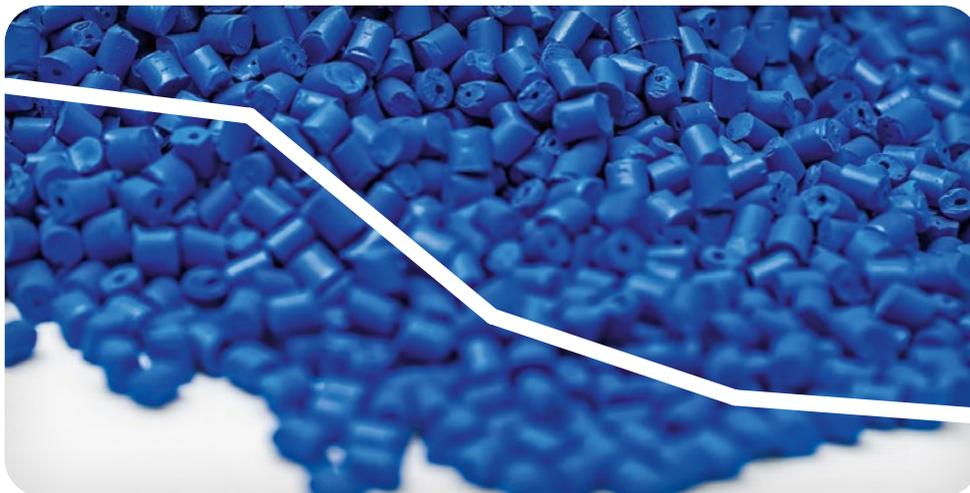
In the period from 2014 to 2017, the team in the French plastics factory at Crissey carried out the cross-departmental Winning Together Project. Sustainability, customer satisfaction and the health and safety of our staff are central to the objectives which were set. The

management is proud of achieving the goals set, but equally proud of the purposeful way in which all together as a team continuously implemented measures for three years.

These measures included changes in processes and organization, but also technical investment. New methods and further progress in colours and materials development also contributed to this success. And so, in the relatively short space of three years, overall plant efficiency was significantly increased. Reject rates were greatly reduced.

Industrial accidents and sickness-related absences could be further reduced. To achieve this, in addition to measures to change behaviour and technical investment, a monthly safety audit was introduced.

## DEVELOPMENT OF SCRAP RATE IN OUR PLASTIC FACTORIES



2013                      2014                      2015                      2016                      2017

One of our most important objectives for better environmental protection is increasing the proportion of post-consumer recycling material in our plastic bins. Good communication and information are essential here for understanding and acceptance by our customers. By this means, and in combination with a range of measures in the context of the Winning Together Project, the proportion of recycled material could be increased again.

Customer satisfaction is one of our core values. On-time delivery and faultless quality are our highest priorities. Thus the corresponding indicator figures are always central to our optimization measures. In the context of the Winning Together Project, the proportion of on-time deliveries could be raised again. Customer complaints were reduced even further in the period 2014 to 2017.



## LEAN MANAGEMENT

A LEAN Management process was introduced at our Neuruppin factory in 2013. The so-called LEAN journey is not a project, but an ongoing process. LEAN Management comprises all the thinking principles, methods and procedures for efficiently configuring

the whole value-creation chain of industrially manufactured goods. It is a management and organization concept that aims to ensure, not only in production, but in every field, the avoidance of every form of waste, error and unnecessary cost, while at the same time striving for the best possible quality. It is decisive that the existing system should be

continuously scrutinized from two viewpoints and improved: from the point of view of the customer, whose wishes for availability, individuality, quality and a good price must be fulfilled to the best possible degree, and from the point of view of the company itself, which must operate profitably and be competitive.

The team at ESE GmbH in Neuruppin has defined the LEAN mission as follows:

- With a highly motivated workforce, we want to develop our site in Neuruppin to be one of the most efficient production companies in the world
- 100% customer satisfaction and error-free production motivate us and are the foundation of our successes
- For us as a company in the waste disposal sector, sustainable action is taken for granted

The strategic course of action is defined by a cross-functional team with members representing the entire value-creation chain. In what are called Rapid Improvement Events (RIE) lasting five days, interdisciplinary teams work to find approaches to solve previously identified problems.

The inclusion of colleagues from every department of the company provides an all-round view of the theme and allows creative approaches. It is especially relevant that this significantly enhances the acceptance by staff of the measures to be taken to implement the solutions. This again leads to successful - and above all, sustainably successful - implementation of the measures. Since the introduction of the LEAN Transformation in 2013, improvements in all the significant company indicators have been achieved.

In March 2017, the 100th participant was welcomed to a five-day RIE. By the end of 2017, over 50% of the staff at Neuruppin had taken part in at least one such event.

It is not surprising that in the first years, the focal point lay in the operational field. Here, significant optimizations in procedures and processes could be achieved. Since 2017, the focus has shifted somewhat to sustainability and conservation of resources. In this connection, optimizations in internal transport and logistics are also planned.

## HEALTH AND SAFETY

The promotion of the health and safety in the workplace of our colleagues ranks high at ESE. The RPC Group, to which ESE has belonged since 2017, offers us outstanding structures and possibilities for further continuous improvement in this domain.

RPC staff from more than 150 sites take part in the annual RPC Safety Week. This year, ESE branches also organized a comprehensive programme. The motto for the event last October was, "Safety. It's in our hands." The production sites were banking on long-term learning success through active participation. Following information events, workshops and fire drills, during a game of "Hunt the Risk", colleagues moved around in the factory in Crissey competing to identify possible hazardous situations for themselves. An anonymous poll on health and safety in the workplace was analysed by the management and used for input into future measures.

There was also a very varied programme in the Neuruppin factory. Fitness and diet in the workplace were covered, and workshops were held on safety precautions and ergo-

nomics. A dramatic test for emergencies was carried out in collaboration with Neuruppin fire brigade, which arrived unannounced with several fire engines and 28 firefighters. The steel processing unit of the company in Wenden-Gerlingen circulated a safety quiz to check learning success over the week, with prizes for the winners, of course.

The great challenge, however, for management and staff, lies in every working day between Safety Weeks. Health and safety have top priority. In addition to the learning effect of Safety Week, numerous measures are taken to prevent harm to health and accidents at work.

In the context of the Winning Together Project, for example, the accident rate at Crissey was significantly reduced between 2013 and 2017.

A company suggestion scheme in Neuruppin encourages and rewards suggestions from the workforce. These, too, often relate to the domains of health and the environment - a clear sign that these themes have become ever-present in day-to-day work.

## RISK MANAGEMENT

A systematic approach with clear concepts and specifications aims to ensure throughout the next few years that the behaviour and processes for workplace safety in the everyday working environment are anchored in the best practices of all employees.

In order to achieve these goals, an additional extensive Risk Management system with annual audits conducted by external auditors was introduced in our plastic plants in 2017. These audits, carried out according to strict standards, identify potential improvements which are continually realised according to the level of priority. An internal safety committee meets monthly to examine the progress.

Technical installations, to reduce stress from loads during physical activities such as, for example, new container stacking equipment, as well as improvements in the workplace, are continuously being implemented. The attentiveness of employees themselves for risky situations is being heightened, amongst other things, by a very positively received hazard reporting system. This attentiveness and the acceptance by each employee of their own individual responsibility is viewed by our management as one of the most important factors in the long-term on the road to safety in the workplace. Careful employees who are aware of their own safety and that of their colleagues, are also those who represent quality and progress in our company.

# BASED ON PARTNERSHIP

Customer satisfaction - Customer First - is one of our corporate values and essential for a sustainable business policy. Measures to verify and improve the parameters that are important for our customers are continually taken. In this way, as mentioned above, the Winning Together Project in the Crissey factory successfully achieved outstanding scores in important areas such as on-time-delivery and quality.

In both plastic factories, Neuruppin and Crissey, quality management is certified to ISO 9001. This standard demands, among other things, regular measurement and analysis of customer satisfaction. From this analysis, appropriate conclusions must be drawn and measures for optimization must be defined. Implementation must be checked, not only in the internal audits required by the regulations, but also by independent accredited testing officers.

For both production and sales sites, a professionally conducted customer survey is planned for 2018. The management sees this as an opportunity to broaden its own angle of view and perhaps be able to identify new modes of improvement.

For collaboration with our suppliers, we have laid down certain rules, and make sure these are respected, both by the suppliers and by ourselves. Our suppliers have to respect a code of values that is in harmony with our own. We too are seeking a fair collaboration in partnership, for sustainable business on both sides.

Our corporate values Customer First, Creativity and Responsibility determine the relationship with our business partners.

# ON THE ROAD TO THE FUTURE

Recyclable products only have a positive environmental impact when high-quality products can be produced out of the material. This challenge is taken up by ESE together with its partners.

Europe has a limited capacity to absorb plastics that are not recycled, but downcycled, meaning that in each cycle they are processed to form a product of lower quality. These plastics, from household waste, for example, often continue to be recycled for energy generation. They are incinerated in waste-to-energy plants and used for energy recovery - by far the least favourable method from the point of view of resources. ESE is working intensively on making more material flows usable for the production of high-value bins, and so performing genuine upcycling.

ESE is currently undertaking such a project in collaboration with a partner company that specializes in the manufacture of polyethylene and polypropylene compounds from post-consumer packaging waste. Large quantities of plastic products or packaging are marketed as recyclable. A true circular economy will only become possible, however, when more manufacturers produce high-value products from recycled packaging.

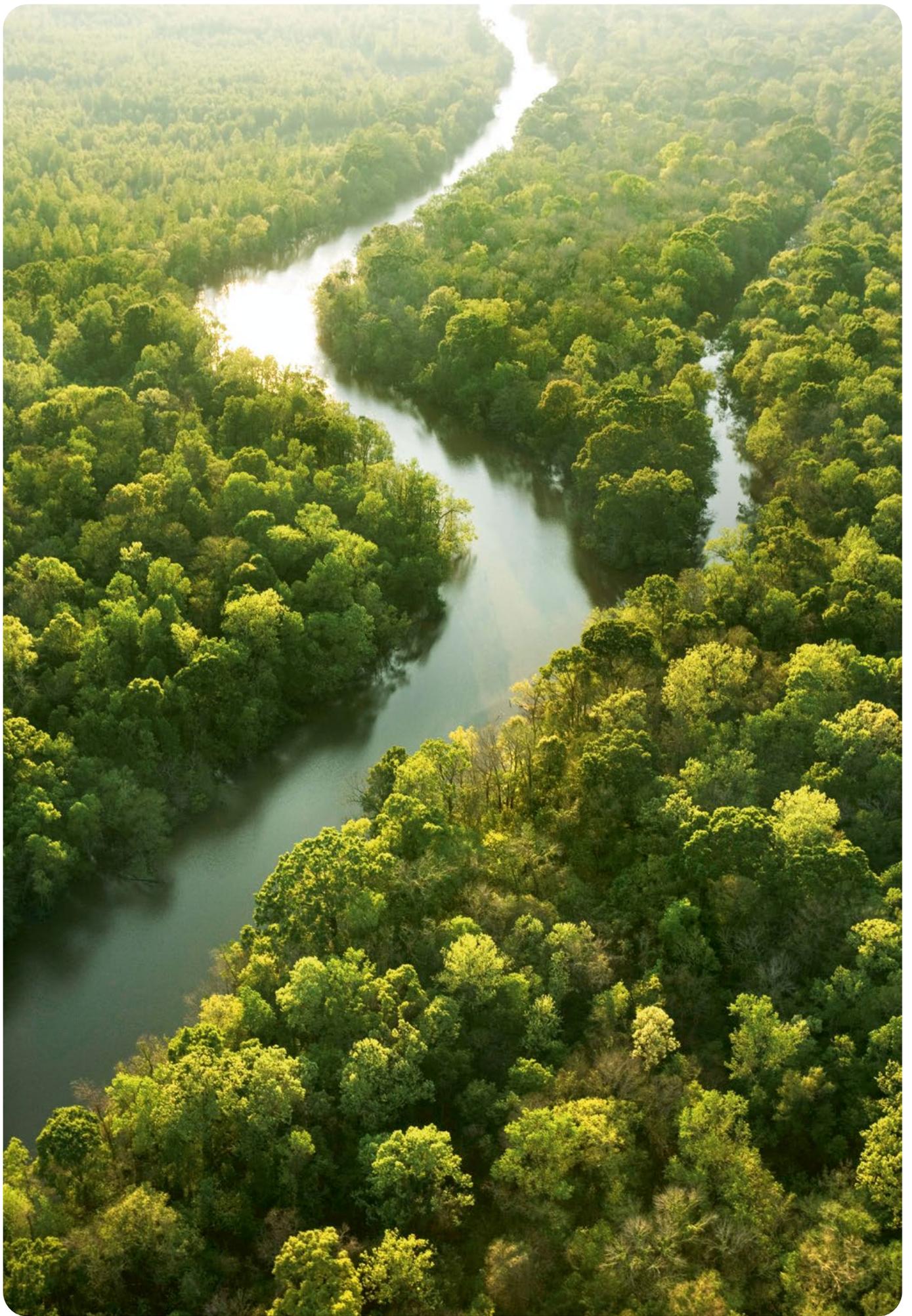
ESE and its partner are jointly developing the potential to produce qualitatively high-value, sustainable recycling bins from shampoo bottles and detergent packaging, for example. Research and development are in progress in the fields of material recipes, extrusion and cleaning technologies, as well as on the production side in process optimization and production technology.

The first waste and recycling bins with a considerable share of these materials have been under test in the field for some months already. Knowledge gained in practice will drive development onward.

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Our customers' sustainability goals are another driving force for us. Innovations arise in this way on the road to the totally circular economy of the future.

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