



PET and sustainability – a contradiction in terms?

Sustainability report for 2015/2016



Sustainability report for 2015/2016

Many challenges still lie ahead, but the successes already achieved show that we are on the right path. Numerous directional milestones have already been established on the market, selected awards confirm our actions.

Award-winningly innovative

In 2015 we had the great honor of being named one of the most innovative companies in Germany. At the German SME Summit we were presented with the Top 100 Award for our successful innovation management. This award pays homage to the great importance we attach to innovative ideas and developments – and here particularly from initial employee development to the launch of the matured product to market.

June 2015

German Design Award honors sustainability

KHS subsidiary NMP Systems wins the 2016 German Design Award for outstanding communication design and sustainable packaging for its Nature MultiPack™ and Direct Print Powered by KHS™ packaging systems.

November 2015

Switch to green electricity

Since 2016 the entire KHS Group has been using only hydroelectric power at all of its German production sites. This enabled us to cut our CO₂ emissions by around 9,000 metric tons in 2016. This significant reduction also has a positive impact on the carbon footprint left by products manufactured by KHS GmbH.

January 2016

Sustainable mobility

In 2016 we were distinguished by German minister for the environment Barbara Hendriks for our participation in the Mobil.Pro.Fit sustainability campaign. Through intensive networking of the various participating companies this nationwide project devises measures on site and at numerous workshops designed to come up with efficient and environmentally-friendly mobility concepts for company employees.

September 2016

Line optimization winner

At the 2016 Enterprise Mobility Summit KHS won a prize in the Business Process Mobilization category for its successful digitization of processes during line optimization. Through detailed data acquisition and analysis we identify all potential areas for improvement on KHS lines.

October 2016

Management expertise ensured

In 2016 we set down the terms governing the development of our managerial staff in our Fit4Leadership program which is based on Salzgitter AG's Forward Program. The advanced training courses cover various interdisciplinary topics, such as basic leadership, communication, change management, leadership at KHS, internationality and strategy.

November 2016





Table of Contents

This Sustainability Report has been optimized for digital presentation. You have several options to navigate through the report. Of course, you can read the document chronologically. However, you can also focus on the topics that interest you most. Just click the respective chapters in the table of contents, or use the navigation elements to go to another chapter or back to the overview of all content.

Focus topic: PET and sustainability	5		Strategy and corporate management	12		Ecological awareness	33
Key figures	8		Our vision of sustainability	14		Saving resources	36
About the report	10		Sustainability management	16		Sustainable production	38
About KHS	11		Compliance	20		Container check	39
			Social commitment	22		Economic responsibility	40
			Sustainable personnel development	24		Innovation & standardization	42
			Occupational health and safety	26		Research & development	44
			Further training and development	28		Working together	45
			Social benefits	30		Products	47
		Equal opportunities	31	A passion for service	52		
					Water Footprint	54	

PET and sustainability – a contradiction in terms?

Our natural resources are limited. In many places sustainability is thus the subject of intense discussion – for good reason.

Conscious use of raw materials starts on a small scale – and can take on vast dimensions. As a rule, the actions of every single human being have an impact on the environment. A person's decisions have a direct effect on his or her own living environment. If many other people then support and copy these actions, this can have interregional or global consequences.

We at KHS also act according to the above basic principle. As to the question of how we can help to save on resources as a company which manufactures systems for the production and packaging of beverages and food worldwide, we focus our attention on each and every one of us. We work in an industry which requires resources. We have also been pioneers for almost 150 years and can rightly be expected to act with foresight, to actively demonstrate an awareness for the concerns of sustainability and to use our resources with sound judgement.

Our business is built on innovations which aim to combine the best possible efficiency and economy with high reliability in production for our customers – and to be able to offer the latter future-proof packaging systems. In order to make this possible we rely on the commitment of each and every one of our employees within our company. We explicitly support and challenge all of our personnel to make their contribution to the issues of sustainability. Working together our teams achieve what sets our company apart: the development of innovative and sustainable systems. Our customers can therefore expect to always receive holistic advice from us as they in turn are accountable to their customers – namely the end consumer, whose consciousness regarding sustainable consumption continues to grow. More than ever before the many aspects of sustainability thus play an increasingly important role in long-term decisions to invest. Ultimately they are the main drivers behind developments and innovations.



We explicitly support and challenge all of our personnel to make their contribution to the issues of sustainability.

One of the first decisions our customers in the food and beverage industries must make before opting for a machine or line is to choose the container their product is to be filled into. While the most important criteria for our customers include product safety, line availability and life cycle costs, consumers are increasingly calling for individual consumer sizes and safe handling. Many types of container already satisfy these needs. Beverage cans are becoming lighter and lighter, for example, and are supplied in many different sizes. The trend in glass bottles is also towards the lighter receptacle, with these also being geared towards the demands of the consumer. Like PET bottles, both types of container provide a high degree of product safety. PET scores with a number of further advantages, however: no other material provides as many opportunities for versatile design and cutting down on container weight. The bottles are also unbreakable and, like glass bottles, can be reclosed. Companies in the beverage industry especially are thus increasingly opting for PET container systems worldwide.

The benefits of this container type are obvious: it is extremely flexible as it can be used in many different ways. However, primarily with its low weight the PET bottle has the cutting edge over other types of container, particularly during shipping with its very low carbon footprint. At the same time we know that in the manufacture of PET preforms, which are later used to make PET bottles, finite raw materials are used, such as crude oil. Another challenge facing both our customers and us as a company is that in many countries of the world extensive recycling concepts are lacking. Many of our customers thus have to devise and apply individual recycling models in these regions – for the demand for PET products continues to rise. We are tackling this challenge within our means in a collaborative spirit. How can PET containers be even more environmentally friendly in their makeup and manufacture in the future, for instance? Which processes need to be optimized? What can be done to help our customers to find new packaging systems?

As a diversified systems supplier to the beverage and food industries we forcefully address these questions as we are a decisive part of this process. We are conscious of the fact that together we bear responsibility for and with our clients and would like to specifically set a good example in this area.



Never satisfied with our achievements

Our machines have been optimized to process preforms which are up to 100% recyclable or preforms with a certain percentage of biopolymer.. We have already readied numerous innovative systems for market – from the lightest 0.5-liter PET bottle for carbonated beverages with a screw cap, which weighs just 9.9 g, to our world-first Nature MultiPack™, which holds PET bottles together with nothing more than a few dots of adhesive and a carrying handle, thus doing away with the need for the usual packaging film.

And thanks to FreshSafe PET we offer optimum product protection through an ultra-thin glass coating on the inside of the PET bottles. In this way the product's shelf life is extended four- to sevenfold, enabling a wider range of distribution and 100% recycling.



However, we must not and do not want to stop here. The significance of our PET systems will continue to increase in the future as the global demand for beverages bottled safely and flexibly grows. In Africa and Asia alone the population will practically double by 2100. The subsequent demand for clean drinking water can be chiefly met by two possible solutions: by digging local wells or providing clean drinking water in safe packaging.

Sustainable supply of drinking water thanks to PET

In regions with a weak infrastructure PET systems will thus increasingly provide sustainable service in the future, as thanks to the material's unbreakability the product is protected during transportation and in the bottle itself until the last drop has been drunk. With the water safely packaged, this container system can also protect consumers from the spread of disease. Last but not least, a PET bottle can also be reclosed. The consumer can drink the beverage as he or she requires, thus actively preventing precious water from being wasted.

In order to also be able to ensure this supply in regions where local bottling is not possible or which have a poor infrastructure, a system of transportation which is as sustainable as possible is required. The carbon footprint plays a major role in this. The lighter the bottles are, for example, the more efficient and thus resource-saving are production and transportation. This is just one of the many issues which have to be taken into account, however. We also concentrate on continuously optimizing

methods of production with regards to saving materials and consumption media in an attempt to achieve a permanently small carbon footprint. We achieve this through special bottle designs, for instance, which require a lower blowing pressure. Furthermore, we use the compressed air several times over in a two-stage blow molding process.

All told, our aim is to consider the many chances and challenges associated with PET in equal measure and to master these in the long term. To this end, we rely on our committed employees at the special competence centers we have set up and on cooperation with various associations and research institutions. We want to find solutions together with and for our customers – just as they would expect from us as a pioneer. In this way, PET and sustainability need not be a contradiction in terms.

The key figures at a glance

You can find a summary of all of the relevant social, ecological and economic key figures for our 2015/2016 sustainability report here.

Key figures for social commitment

	2015	2016
Employees	4.813	4.995
Of which women	668	692
Of which apprentices and trainees	392	392
Employees under the age of 30	962	951
30 to 50 years old	2.440	2.505
Over 50 years old	1.411	1.539
Nationalities	67	71
Average age of the core workforce in years	44	44
Average age of apprentices and trainees in years	22	22
Average years of service with the company in years	13	13

Key figures for ecological awareness

	2015	2016
Electricity consumption per €m turnover [MWh/€m Sales]	24.0	24.1
Gas consumption per €m turnover [MWh/€m Sales]	27.2	31.5
Heating required per day heated and °C difference in temperature [kWh/d/ΔT]	1,388.9	1,467.9
Total consumption per €m turnover [MWh/€m Sales]	54.8	60.3
Water consumption per €m turnover [m3/€m Sales]	65.0	66.4
Amount of waste per €m turnover [t/€m Sales]	5.4	4.9
CO ₂ -emissions per €m turnover [t/€m Sales]	21.0	7.6

Key figures for economic responsibility

	2015	2016
Turnover (Salzgitter consolidation) in €m	1.172	1.180
EBIT (Salzgitter consolidation) in €m	15,4	19,7
Total business locations	50	50
Amount of sold products*	882	939
KHS Group donations to charity in T€	226	128

*Own products, without conveying systems

The KHS sustainability report

As a global company we find it important to accept responsibility – in the interests of our customers and partners, for our employees and for our environment. It thus goes without saying that we wish to give a transparent account of our commitment to the issues of sustainability. In our second sustainability report we will show which milestones we have already reached, which concrete measures, key figures and developments we are currently working on and which challenges we still face.

In doing so we have based our report on the internationally recognized global reporting initiative (GRI), a sustainability reporting standard. The KHS sustainability report is published every two years and gives an insight into our strategy and corporate management, social commitment, ecological awareness and economic responsibility. This report contains standard information from the GRI guidelines on sustainability reporting.

A company with values: KHS

Able to look back on almost 150 years of innovation based on a wealth of comprehensive expertise, KHS combines tradition with progress in the long term.

As a leading international manufacturer of filling and packaging systems for the beverage and food industries KHS enjoys a long tradition. Driven by the desire to tread new paths while providing top service, in 1868 Karl Kappert and Louis Holstein founded the company in Dortmund, Germany. Their vision was to be the first to build filling systems for what was then the new commodity of bottled beer. The innovative spirit which enabled this success still characterizes KHS today. In 1993 Holstein & Kappert AG merged with Seitz-Werke GmbH. As a subsidiary of Salzgitter AG KHS now develops and manufactures the full range of filling and packaging machines at five plants within Germany. Besides these factories in Germany KHS also operates production facilities in the USA, Mexico, Brazil, India and China.

We develop and manufacture very durable, reliable

and energy-efficient lines and machines which satisfy the demand for sustainability throughout their entire life cycle. This is also demonstrated by our local worldwide service which is available 24/7. In 2016 KHS was able to achieve a turnover of about €1.18 billion.

Every day our 4.995 employees ensure that our values of reliability, responsibility and ethical behavior are mirrored in all areas of our work. Together we are constantly working on new systems and innovative products – all driven by the issues of sustainability. The satisfaction of our customers and successful cooperation and partnerships re-endorse our actions and policies every single day.



Strategy
and corporate
management



Dear Readers:

Do you sometimes also ask yourself how you can best marry your modern lifestyle with practiced environmental awareness? On the one hand society is benefiting from many things which make our daily lives easier, from first-class technology and a diverse range of all kinds of imaginable products – yet on the other it is becoming increasingly aware of the fact that many urgent questions on sustainability still have to be answered. We are all faced with the enormous challenge of how to handle our limited natural resources responsibly. What effect do our own daily actions thus have in relation to future developments and what will be the consequences thereof for our employees, our business associates and our environment?

Precisely because we are a global company, you can expect us to act with a view to the future in this respect. In the almost 150 years of our company we have learned one thing for sure: it is absolutely essential to think outside the box – not just to secure our own success but also with regard to sustainability in the interests of our customers and our environment. Systems we have developed and established locally are also and always have been international indicators of the way forward for tomorrow. Here, the focus for us is on the most pressing global challenges: as one of the world's leading providers of packaging systems one of our most important goals is to constantly reduce packaging materials, thus also positively impacting the use of resources throughout the entire production process.

We thus have excellent knowledge of the design, manufacture and processing of PET bottles, for example. We are also familiar with the special advantages of this packaging system, chiefly its light weight, convenience factor and the fact that it can be reclosed. These are huge plus points when it comes to safe transportation or product protection. We are also aware of the public criticism of and discussion surrounding this material concept, however. We undoubtedly cannot answer all of the questions in this debate but would like to outline possible solutions which lie within our field of expertise as to what future packaging concepts for PET – and glass and cans – could look like. We would like to present you with a few examples of this in more detail in this report as we already supply these innovative systems – and are constantly striving to make them even better.

It is for this reason that we attach special importance to our employees. We can only come up with future-proof systems if we encourage and challenge the skills and ideas of the people who devote their services to our company on a daily basis. Their perspective is determinative and forms the starting point of each and everyone of our innovations. Joint employee initiatives with our parent company Salzgitter AG are one example of how we are holistically addressing this issue.

With our second sustainability report we hope to be able to give you an impression of the many ways in which we are committed to this topic and how, with all of you, it will continue to develop.

Best regards

Prof. Dr.-Ing. Matthias Niemeyer



Our vision of sustainability

Setting a good example is not easy. What we aspire to may not always tally with what is actually feasible; there may be quite a way to go before theory can be put into practice. What counts, however, is a conscious will to achieve our aims, with our ultimate goal pointing the way forwards. This also applies to KHS and its vision of sustainability. We would like to set a good example and be convincing with our measures to promote sustainability. We are absolutely determined to adopt a pioneering role when it comes to resource efficiency and to make a significant contribution to increasing environmental awareness. As a supplier of filling and packaging systems for the beverage and food industries we are also conscious of the particular challenges we face.

Broadening horizons

Packaging in itself is a sensitive subject – especially when we talk about plastics. Can we advance the concept of sustainability at all with our PET systems? This is a complex question – yet we can say one thing after almost 150 years of our company and over 40 years of experience in PET: the packaging material itself is just a small part of the whole. If you want to take a holistic view, you have to include numerous other factors in your observations. Among others, these include product protection, energy and fuel consumption during the transportation of goods to the consumer, recyclability and, finally, the sustainability of the lines and machines themselves. KHS stands out as it always takes into account the entire life cycle of the containers to be produced. We aim to make as good a contribution as we possibly can to the aforementioned aspects for more sustainability. In doing so, we especially concentrate on those areas we can have a positive impact on: the production of our own machines and the operation thereof, using less energy and saving on materials and packaging.

We aim to make as good a contribution as we possibly can to the aforementioned aspects for more sustainability.

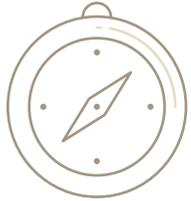
Less is more sustainability

We are constantly working on optimizing the selection and amount of the materials required to build our lines and machines so that these are as sustainable as possible. Here, we are increasingly relying on lightweight construction concepts and modular machine designs. These ensure that only the specific modules relevant to an innovation are replaced instead of the entire machine having to be replaced. For us, it also goes without saying that we attach great importance to the robustness and durability of our machines so that they can remain in service for many years. In the long term we would like to run our filling and packaging systems in a closed-loop system which draws on as few primary sources of energy as possible.

In order to save energy and cut down on other media, such as water and CO₂ emissions, we take the full range of possible approaches into consideration: from the recovery of energy on our pasteurizers and washing machines to the use of energy-efficient motors in our drive technology.

PET innovations for tomorrow

We specifically devote ourselves to the great challenge of cutting down on packaging materials through our innovative concepts for PET bottles. As a matter of conviction we develop especially light products which are low on materials. For example, we have produced the lightest 0.5-liter PET bottle for carbonated beverages with a screw cap, launched the lightest 1.0-liter PET milk bottle to market and will very soon present a further innovation in this field. Our machines can already process almost all PET containers with recycle or which include organic materials. The special systems we offer – such as barrier coating, direct digital bottle printing or the use of adhesives to create film-free packs – are all 100% recyclable. We want to continue to consistently build on this progress.



Sustainability management

We as a company are very much aware of our responsibility to the environment. This is why we take the subject of sustainability seriously, emphatically addressing all issues – for nothing is more inconsistent than to speak about a topic yet do nothing about it. In 2010 we set up our Environmental and Energy Management Department which is responsible for sustainability management throughout the entire company. This is communicated through various departments both within the company – i.e. to all employees – and outside it, in other words to our customers, partners and suppliers by means of numerous independent certificates. Our ideas and specifications regarding sustainability management are applied in various specific disciplines, namely technology/ innovation management, environmental management, occupational health and safety and quality management.

Group-wide commitment

Our close cooperation with Salzgitter AG plays a special role for us in this. For example, as part of the in-house group sustainability campaign a program was initiated in 2015 which together with KHS was aimed at creating a fundamental awareness and commitment to the issues of sustainability. To this end, all of the then 316 managerial staff met with the minimum goal of devising and presenting a viable sustainability project. On the one hand this was to effect a global awareness for the notion of sustainability and on the other generate direct added value for the company and its stakeholders. The meetings were very successful and resulted in a number of exemplary projects. In addition, networks for exchanging ideas and information now exist between the participants and the idea of sustainable action has been integrated into the company.



Inga Lindstaedt-Meister (Facility Management) and Joachim Peinemann are jointly responsible for global quality management.

Success in India

By way of example, the KHS factory in India shows just how well our system of sustainability management functions worldwide. In 2017 the production site celebrated its 20th anniversary and has continuously and successfully tackled the challenges of quality and sustainability management. Over 400 people now work at the plant.

The site's capacity, spread across four production shops, runs to around 150 machines a year. From the very beginning to the present day our factory in India has been awarded many certificates, earning itself a leading position in Indian industry. Certification includes the international ISO 14001 standard, for instance, which forms the basis for the creation of environmental management systems. In India this has helped to ensure a more efficient use of resources and reduce the amount of waste.

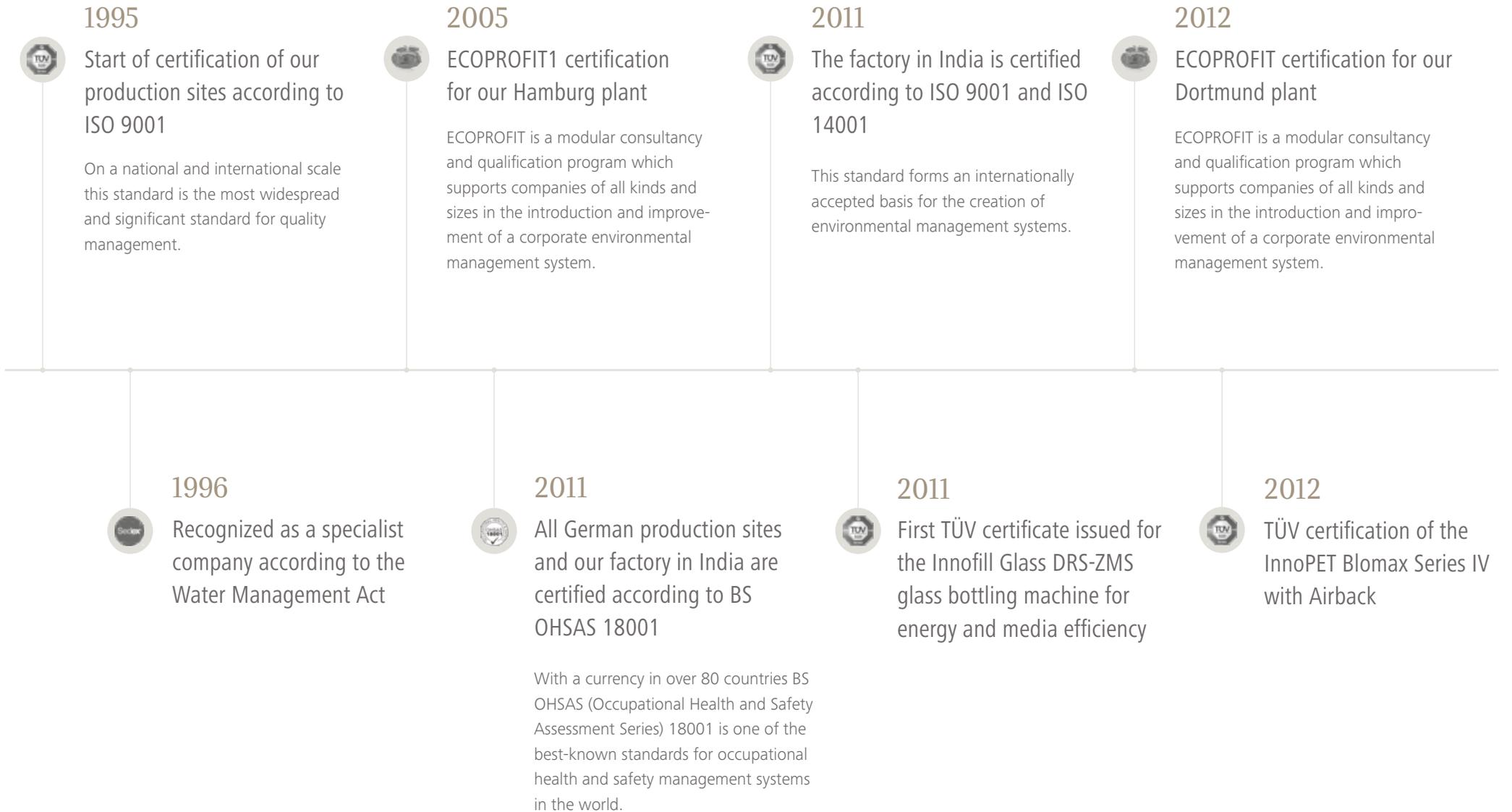
With its ISO 50001 certificate the production site adopts a system of energy management which sustainably governs the consumption, efficiency and selected source – an increasing percentage of this being renewable energy – of the energy required. Since January 1, 2017, our Indian plant has also been included in ISO 9001:2015 group certification which safeguards a high level of quality management. Various internal management and operational processes have been optimized to this end, for example.

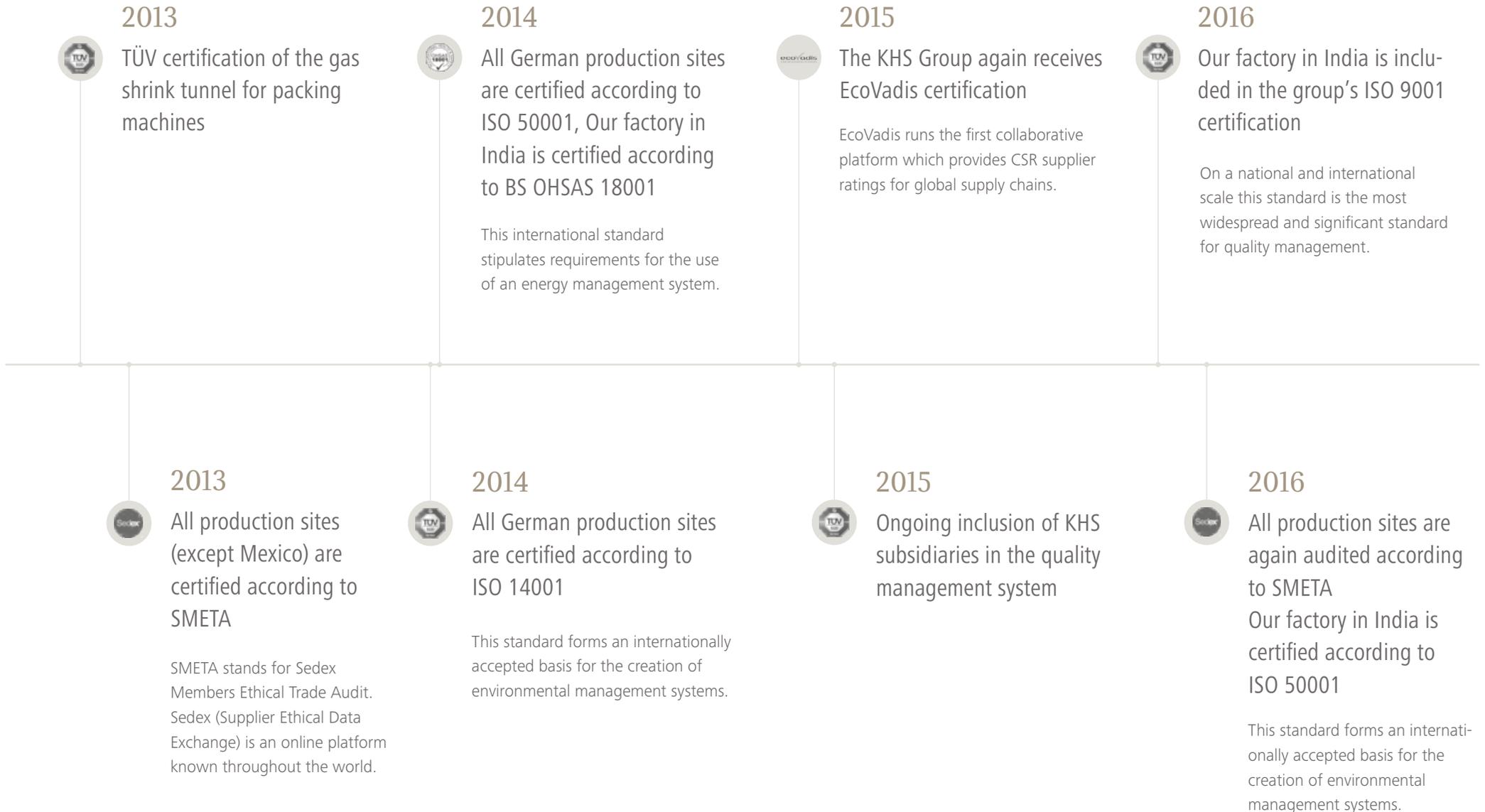
These are just a few examples of the many forms of certification which, among other factors, have helped KHS India to gain many prestigious awards in the past. Just recently it was named producer of the year 2017 by Time Inc., a partner of McKinsey. For the future KHS India has a vision: namely to create long-term, profitable growth through innovative technology and convincing services and to secure itself a position as market leader.

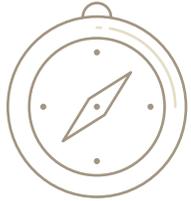
» Since its inception KHS India has been providing world-class service support, acting as a turnkey systems provider to the industry, giving Indian customers the latest technologies at an adequate price and consistently being an environmentally friendly and socially responsible organization and a caring employer. «



Yatindra Sharma
Managing Director KHS India







Compliance: satisfying demands

As a global company group it is especially important to us to keep to standards of behavior which demonstrate a responsibility to our fellow humans beings and the environment, are in accord with the respective legal situation and conform to our notion of integrity. For this reason KHS implements certain compliance guidelines which have already enabled us to achieve a high level of compliance worldwide. We of course wish to defend these in the future, too, and supplement them with further current and important issues.

Our company group is represented in more than 60 countries worldwide. With our code of conduct for employees, prescribed by both KHS and our parent company Salzgitter AG, in view of the large cultural variety within our corporate group

we have created a universal system of values and basic principles which is designed to act as a guideline to all employees regarding the manner in which they conduct themselves. Among other areas, the code regulates various general matters, such as applicable law, the avoidance of conflicts of interests, fair working conditions, loyal and transparent reporting, safety and environmental protection, the duty to observe secrecy and data protection. For further compliance guidelines a compliance officer appointed specifically for this purpose is available to all employees should they have any questions or are unsure whether certain behavior complies with the regulations or not.

You can find the full code of conduct [here](#).

In addition, we find it important that our suppliers also pledge to safeguard general human rights, uphold recognized standards and adhere to the law. Based on our code of conduct for our employees and on our vision, we have thus also established a code of conduct for suppliers which is binding for all suppliers in the KHS Group and their subcontractors. The issues it governs include legality and integrity, human rights and working conditions, environmental and climate protection, occupational health and safety protection and monitoring and audits. We reserve the right to carry out random checks of our suppliers.

You can find the full supplier code of conduct [here](#).

Self-regulation and competition law

We regularly subject ourselves to independent audits in order to have the manner of conduct we aspire to monitored by an external body. These include ethical audits for SEDEX – always with a relevant international focus, the results of which are made available to our customers – and self-initiated audits within our compliance management system CMS. Here, we believe it is important to act in a way which is both authentic and credible – and to also function as a role model for our suppliers and business partners.

We place special emphasis not only on the prevention of corruption but also on the subjects of competition and antitrust law. Using a dedicated e-learning system we hold special training courses for Purchasing, Sales and managerial staff throughout the group in order to sensitize personnel to these topics and anchor our standards in their minds. The aim is to recognize and curb any possible hazards when working with our suppliers and customers in this way and in good time.

» Compliance means also acting as a role model for practiced integrity in our day-to-day business. What we have achieved must be upheld and strengthened; we must practice compliance effectively and authentically in language which is plain and simple. «



Thomas Klempner
Compliance Officer for
KHS GmbH



Social commitment

Our sustainable concept
of social cooperation



Sustainable personnel development in every respect

We are absolutely convinced that a company must work with its employees sustainably in many respects in order to be able to cement its success for the future.

This all starts with the job advertisement. Here, sustainability issues are of great importance to KHS which aims, through the job description alone, to chiefly appeal to applicants who are sensitive to this subject. Based on this, we then support and encourage the commitment of our employees to the various issues of sustainability in a special way. However, we also believe that the cooperation itself between a company and its employees should be a long-term business. This is why in many different ways we make it clear to our personnel just how important it is to us to enjoy a sustainable – and thus appreciative – working relationship: from occupational health and safety through further training and social benefits to equal opportunities.

General key figures

	2015	2016
Employees	4.813	4.995
Of which apprentices and trainees	392	392
Average age of the core workforce	44,00	44,00
Average age of apprentices and trainees	22	22
Average years of service for the company	13	13



Employees with sustainable ideas

Innovative solutions and ideas for our company and customers always originate in the heads of our personnel. If our employees are geared towards sustainability, there is a lot they can achieve. One example is label specialist Jennifer Rumpf.

In the development of our innovative PET products container dressing plays a decisive role. In order to develop future-proof systems in this field which are aimed at sustainability and give our customers the maximum added value, we maintain a number of special job positions. These are inevitably filled by people who specifically challenge themselves to look to the future, see things from various perspectives and prove their powers of perseverance. One of these is Jennifer Rumpf. While writing her master's thesis in our label laboratory Jennifer tackled the question of how to characterize the suitability of film labels for processing in practical operation. She then completed our KHS Engineer4Future trainee program, gaining crucial insights into commissioning both at the factory and the installation site. Here, she realized that "the problems which arise here are chiefly caused by the poor quality of the consumables."



To her, the solution was obvious. "In the label laboratory film and paper labels can be examined as to their processability; after assessing their quality a number of problems caused by the materials can be avoided from the start." After successfully completing the trainee program she then took over as head of the label laboratory, full of energy and enthusiasm. Jennifer Rumpf's commitment is driven by the desire to facilitate timely prevention – and thus ensure line availability. This in turn saves on resources. "We want to support our customers by giving them good advice to prevent production problems or materials from being wasted up front."

Varied tasks for a higher objective

Besides performing standard tests according to STLB (special technical supply and procurement conditions for paper beverage bottle labels) and various DIN standards Jennifer concentrates on the depiction and management of actual processes. She thus develops measurement methods to describe machine operability based on label testing, for instance. She also supervises students who, like herself at the beginning of her career, are writing their scientific theses in the label laboratory. In the future she will devote more time to measurement methods which characterize hot melt and cold glue.

All of these aspects are important in order to ensure that lines can run efficiently – and thus save more on resources. Jennifer Rumpf finds the diversity and unpredictable nature of her job fascinating. “I especially like working with our customers and the new challenges I face every day. As the issues vary, no two days are the same.” In her job curiosity, discipline, persistence and being open to various points of view are essential. These traits are needed to develop systems which endure in the long term – in the interests of both the customer and the efficient use of resources.



Occupational health and safety

Our employees are what really drive our company – and we are well aware of this. This is why it goes without saying that we assume responsibility for their health and safety in as far as this is possible.

In order to ensure that our employees work in safe conditions and stay healthy, various protective measures, occupational health care programs and specific help in an emergency are fixed features of our agenda. Clear safety regulations apply to those working on our lines and machines, with regular courses of training and instruction given on this subject at all of our production sites. Safety when working on projects beyond the factory is ensured by internationally valid manuals and checklists, regular visits to installation sites and, where required, audits.

Those responsible in the HSE KHS Group (Health Safety and Environment) regularly converse on issues pertinent to occupational health and safety and the environment and present new projects. We are also in frequent contact with our customers on this subject and stage joint workshops on occupational health and safety and the environment, for example, with Carlsberg, Heineken and Molson Coors, to name but a few.

Travel safety writ large

Our membership of the International SOS/Control Risks network ensures the safety of our employees when they are away on business trips. In this way employees in the entire KHS Group are protected when traveling abroad and can turn to multilingual teams of experts all around the world 24/7 for advice. These consist of doctors, expert medical personnel, safety experts and coordinators, with advice provided by phone and online – and of course in person in the event of an emergency. Employees can use the services provided by this network both before undertaking their journey and during it – and if there is an urgent need to do so.

- Prior to departure employees can find out all about their destination and any events relevant to their health and/or safety.
- During a business trip the service team is available at all times should, for instance, our employees require medical assistance, advice on how to proceed on an issue of safety or if they need replacement documents.
- If there is an emergency, practical help is always ensured. For example, the service team will organize an ambulance service and repatriation, cover approved costs for treatment or make sure people are evacuated if there is an emergency safety incident.

An in-house KHS crisis management team is constantly prepared to cope with an emergency. In addition to this service KHS also provides its employees with international health, life and accident insurance.



Further training and development

Behind each of our innovations and successes stand our committed employees. It is thus important that we promote each and every one of them as best we can – through holistic concepts for basic and further training and a specific assumption of responsibilities regarding sustainability.

Practice makes perfect: with these words we pay special attention to the beginning of a person's career as regards basic and further training. We believe it is particularly important to think outside the box right from the start – to learn to see things from many perspectives, to adopt various points of view and to come to different assumptions. For this reason most of our trainee programs have a conscious international bent. KHS offers trainee programs which focus on various topics. Many of our trainees, such as those in our Engineer4Future and Fit4Customer programs, spend a

designated period of time at our locations outside Germany. Here, trainees work on various international projects, gaining an insight into the specific conditions prevalent in that country and being part of a non-German team for a while. Experience has shown that these assignments are of far greater value to a person's further career than many aspects of theory: to his or her personality, experience and development; to KHS as a company; and especially to KHS' customers.

Special skill: energy scouts

Regarding sustainability in particular we want to strengthen our employees in their desire to further develop their skills and assume responsibility. One example of this are our energy scouts who have been specially trained by the Chamber of Commerce. A number of interested trainees signed up for the course and were extensively schooled in energy efficiency and on how to save energy. As an employer we are especially pleased to see how committed these young people are, contributing their ideas to reap practical benefit from what they have learned in theory – in the interests of sustainability.

Key figures for basic and further training

	2015	2016
Further training courses in house	226	457
Personnel development measures ¹⁾	2.760	3.666
Trained employees	1.454	1.588
Expenditures for further training (Mio. €)	1.1	1.1

¹⁾Total number of all personnel development measures (each participation by an employee is counted)



+102%

Further training courses from 2015 to 2016



+38%

KHS campus (in-house further training program) from 2015 to 2016



Social benefits

Our employees form the basis of our success. This is why each and every one of them should be allowed to develop his or her potential as best they can – in a pleasant working environment with attractive additional benefits.

When the people who work for us are content and motivated, the most important foundation for the success of our company has been laid. We take our responsibility to create a positive working environment and provide long-term support to our personnel seriously.

Flextime work models, ongoing further training and a fair salary have long been included in our corporate policy as a matter of course. Here, we always heed the specific situation of the individual. Together we discuss measures and create general conditions which best suit all employees.

Supporting the life/work balance

A new addition to the family must not be construed as a disadvantage to a person's working life. We thus enable our employees to continue to take part in our informative events and further training measures during their period of parental leave. We also help to make their return to work as smooth as possible. This is why at the end of their leave we ensure that they can achieve the best possible life/work balance by offering them flexible working hours.

Attractive benefits: salaries and pensions with vision

We believe that the service the employee gives the company should be echoed by the service the company gives the employee. To show our appreciation for the time and skills our personnel invest in us, our employees receive a fair, performance-oriented salary – whether they are on the regular pay scale or not. Special services to the company are separately recognized.

We also take care of our employees' retirement provisions with a view to the future. As part of the company pension program they can save a percentage of their salary for their retirement; we bump up these payments. In this way KHS enables its personnel to benefit from their present commitment to the company long after they have stopped work.



Equal opportunities

She sees herself as an ambassador on a double mission: Ramona Brenner shows how you can make a career for yourself at KHS irrespective of your gender or origin.

As a global key account manager Ramona Brenner finds one thing extremely important: to be able to see the full picture. Only those who have a full overview can provide sound support to customers at a global level and cater for their individual needs. This basic conviction is mirrored in the details which we as a company also like to actively pay attention to: adopting a number of different perspectives, being open to variety and taking various approaches and experiences into account. For this reason we attach great importance to

diversity and equal opportunities. We consciously encourage those who are underrepresented in our company. Due to the nature of our branch of industry the majority of people who work for us are men. It is thus all the more important to us that we support those women who contribute their expertise and experience to and at KHS. It also goes without saying that we integrate as many nationalities as possible into our company – all the more because we are a global company and see each new perspective as an asset.

Adopting a number of different perspectives

Ramona Brenner originally comes from Romania and has been a fixed feature of our company for nine years. The business administration graduate began her career at KHS in After Sales. She then moved to Sales and was managing director of KHS' Romanian subsidiary for a while before taking up her current position in the Global Key Account Management Department in 2013 at the KHS plant in Bad Kreuznach, Germany. She has always been interested in technology and particularly appreciates the innovative spirit at KHS which allows her to be actively involved in new products and optimizations. As a key account manager she chiefly sees herself as an ambassador – in a dual role. „In our everyday work a key account manager is primarily an ambassador for the customer within the KHS organization – and also ambassador for KHS when he or she is with the customer.“

Here, she finds it especially important to work towards long-term goals and build up a partnership.



In her experience, this works best “by catering for the customer’s requirements and creating a win/win situation which benefits both sides.“

This statement can also be more widely applied to our attitude as a company: we want to cater for each and every employee in such a way that the best is achieved for all those involved – without restriction or prejudice. This is what we understand by equal opportunities.

Key figures for diversity

	2015	2016
Employees	4.813	4.995
Women	668	635
Employees under the age of 30	962	951
30 to 50 years old	2.440	2.505
Over 50 years old	1.411	1.489
Nationalities	67	73



Ecological awareness

Resource efficiency and sustainable production motivate us to constantly improve our range of products and services.



Always think one step ahead

The issue of sustainability drives us. This applies particularly to those areas we can exert a direct influence on.

We attach great importance to sensitizing our employees to the issues of resource efficiency and environmental awareness. We set a good example here with our energy and environmental guidelines and fixed targets for 2020 on the one hand. On the other we rely on the responsibility and willingness of each and every individual to work with us and do their bit for sustainability. We also focus specifically on our own opportunities and innovations in the field of sustainable production – starting with the selection of the raw materials used right up to our lean manufacturing concept.

» The protection of the environment and sustainability when using natural resources are important company objectives of the companies in the KHS Group. We thus systematically record and analyze the environmental impact of our production sites. Based on these findings buildings, plants, tools, equipment and production processes are constantly improved as part of our sustainability strategy. «



Ralf Pentinghaus
director Facility Management
KHS GmbH

Key figures for ecological awareness

	2015	2016
Electricity consumption per €m turnover [MWh/€m Sales]	24.0	24.1
Gas consumption per €m turnover [MWh/€m Sales]	27.2	31.5
Heating required per day heated and °C difference in temperature [kWh/d/ΔT]	1,388.9	1,467.9
Total consumption per €m turnover [MWh/€m Sales]	54.8	60.3
Water consumption per €m turnover [m3/€m Sales]	65.0	66.4
Amount of waste per €m turnover [t/€m Sales]	5.4	4.9
CO ₂ -emissions per €m turnover [t/€m Sales]	21.0	7.6



Saving resources at all levels

Concerning the matter of resource efficiency we consider it our business as a company to set an example, dictate the agenda and encourage the individual's sense of responsibility. With our goals for 2020 and our energy and environmental guidelines we have drawn up important regulations and criteria governing the handling of resources at our German production sites. Our understanding of responsible environmental protection does not end with our adhering to legal provisions. We exploit the opportunities we have as a company – namely by using green electricity

in Germany, for example. We also rely on each of our employees to make use of the options available to them personally. This starts with day-to-day actions – such as turning off devices and lights and making a conscious decision as to whether and how documents are printed – to larger decisions – such as which type of company car should be provided by the vehicle fleet or whether a business trip can be replaced by a phone or video conference call.

Ecology – our targets for 2020

Energy consumption within the KHS Group	Status quo*	Goal for 2020*
Energy consumption [kWh]	-16,5 %	-9,7 %
Gas consumption [kWh]	-3,1 %	-7,6 %
Water consumption [m3]	-3,8 %	-4,5 %

* Percentages refer to basis year 2012

In order to ideally encourage the individual responsibility and expertise of our employees regarding sustainability, we have supplemented our annual safety training courses to include various environmental and energy issues. In this way our personnel are regularly given valuable information on the subject of energy consumption and how to deal with waste and hazardous materials. In addition to the above we also hold special training courses on saving resources and stage our own sustainability days featuring an informative and entertaining range of activities which focus on occupational health and safety, energy and the environment. These activities also include talks and practical exercises. It is our aim to permanently sensitize our employees to this topic and to give them ideas they can apply to their own everyday (working) lives. This applies worldwide – also and especially to managerial staff who have the role of setting an example.



Sustainable production

We should get to grips with what we can do ourselves: according to this motto we make our own production as sustainable as possible.

For us, sustainability starts with the choice of the raw materials we need to build our machines. We are thus always mindful of the durability and value of these materials. One example of this is that we use glass instead of plastic housings for our filling machines. The windows thus do not cloud during cleaning intervals which reduces the maintenance effort. The glass can also be 100% recycled when the machine is scrapped.

As we have production sites all over the world, we help to avoid covering long distances for transportation; this also creates jobs, generates greater customer proximity and cuts down on our carbon footprint.

Lean manufacturing

In order to establish uniform prerequisites and processes for production which are committed to the issue of sustainability we have developed KHSps – a production system which is practiced at all of our sites worldwide. This ensures that standards apply to all areas relevant to production. These include tools for the organization and methods of production, training courses and regular online coordination meetings once a quarter where our international plants swap their knowledge and experiences. The aim here is to create better processes regardless of the country and site of production, to strengthen communication in this respect and to generally heighten awareness for international exchange.

All of our factories should work as closely to this process as possible, even if – as in the USA and India – they do not have a flow production setup. The concrete measures and benefits, from which not only KHS but also our customers profit,



The team (Patrick Bürger and Julia Arndt) headed by Angela Souza (middle) has successfully applied itself to the topic of lean manufacturing in the last few years.

include clean and tidy production sites where occupational health and safety is writ large. Another important aspect of KHSps is the uniform structure of our plants, for example in the fixed color and layout schemes. We would also like to improve the process and quality of assembly and our delivery performance. This allows us to cut down on our lead times and commission our systems faster.



Container check

PET, glass, cans – do you want a conventional container or something completely different? Selecting a type of packaging and opting for a specific material are not always easy choices for our customers to make as they have to weigh up and take into account many different fundamental considerations.

The care involved in the handling of our resources is taking on an ever more important role – both for companies and end consumers. However, there is often a lack of reliable information on the sustainability of various materials. As a supplier, we understand sustainable packaging to be a type of packaging that reduces and saves on materials and energy consumption to the greatest possible extent. Transparent communication is especially important to us for this reason. There are, after all, countless factors which speak in favor of or against a certain type of container when contemplating individual filling requirements. We are thus happy to advise our customers individually and extensively in order to help them decide which container best suits them and their beverage. It is important, however, to study the options for yourself.

PET

- Light, unbreakable, reclosable and shape retentive.
- Low weight means fewer transportation emissions and thus a smaller carbon footprint
- Can be easily reused: Over 90% of the PET bottles used in Germany are recycled back to bottles. More than 99% of used bottles are recycled. More than 99% of all used PET bottles are recycled.
- Returnable PET can be refilled up to 25 times

GLASS

- Is made of natural raw materials which are permanently available
- High level of product protection and a pure taste
- Can be recycled into new glass packaging any number of times with no loss of quality
- Returnable glass bottles can be reused up to 50 times

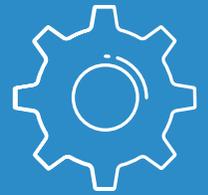
CANS

- Light and unbreakable
- Excellent product protection (impermeable to light and gas)
- Over 95% recyclable: high recycling rate for a low carbon footprint
- Marketing benefits through individual printing, embossing and shape



Economic responsibility

Our biggest source of motivation: to combine sustainability and added value for our customers.

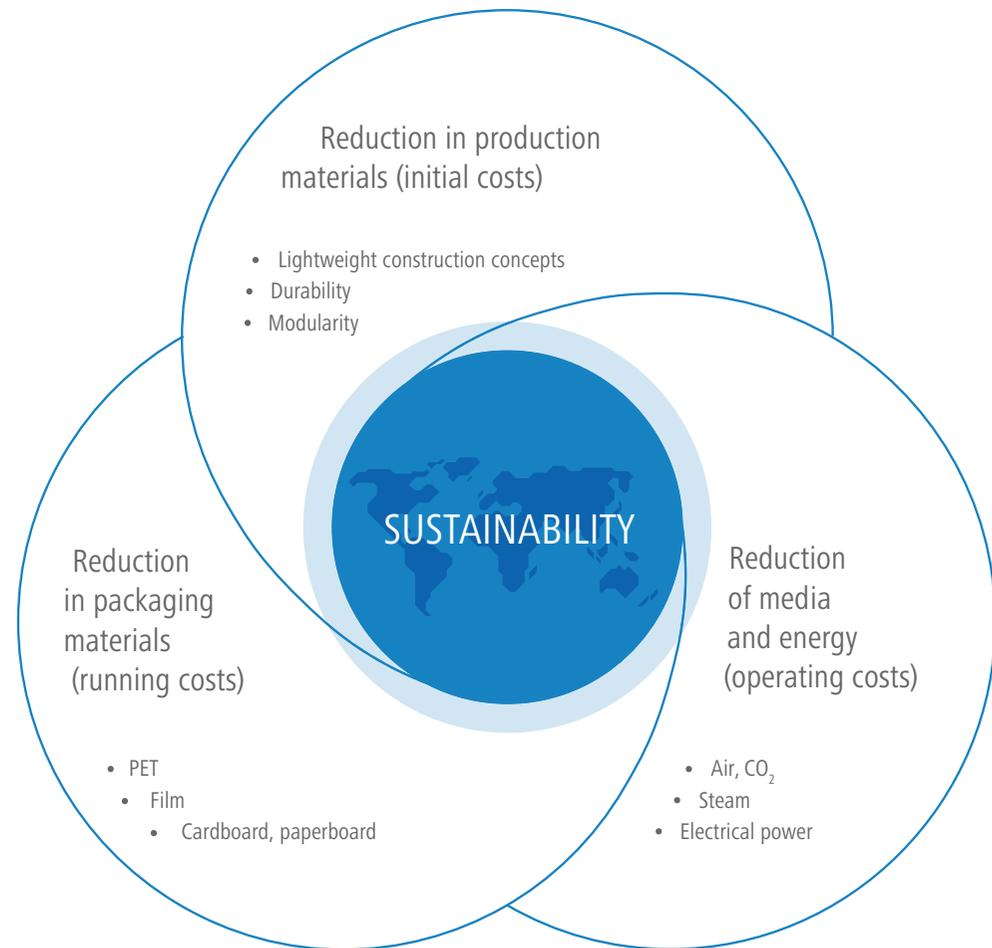


Efficiency in the interests of the customer

It is our aim to provide sustainable, resource-efficient systems and products in a manner which meets the requirements of our customers to the greatest extent possible. The objective is clear: all the innovations we develop are based on the concept of sustainability. With a greater efficiency of resources we protect the environment and also create a considerable amount of added value for our customers.

This is accrued from the three pillars upon which our sustainability concept is founded and which form the basis for all of our product developments: the use of resource-saving materials during the design engineering of our lines and machines, a reduction in packaging materials as the most cost-intensive component of our customers' day-to-day costs and a drop in the amount of media and energy used. For our customers this means that they cut down on the consumption and thus the cost of wear parts and maintenance, materials, energy, water and other media. For us economic responsibility therefore means making a contribution to sustainable and efficient production for our customers with all of our available means.

Thanks to our drive for innovation we do so by continuously further developing our range of products and services – whether through IT system solutions or automated systems on our machines. For this reason, in the field of research and development we are heavily committed to sustainability, innovative product development, modularization and standardization, service and work with associations.





Innovation and standardization

The quest for innovation is what permanently drives the development of our products. This is induced by the objective to master the challenges of tomorrow – and not just in theory but also with conclusive results which prove convincing in practice.



For us, innovation and standardization are two sides of the same coin. By introducing new systems, at the same time we can establish and implement standards. Fully developed innovations, which really are sustainable and yield in the long term, are based on standardized systems. When innovative ideas are implemented which have been tried and tested in practice and proved their ability to function, our customers benefit in several ways. They can rest assured that they are acquiring a matured product which they can combine with existing or older lines. We thus attach great value to innovations and new systems – and to standardization processes.

One outstanding example of this is the development of our KHS Nature MultiPack™ innovation which we first launched to market in 2016 with the Evian brand sold by French food and beverage group Danone Waters. This no-film pack, which does away with the need for shrink film and thus an energy-consuming shrink tunnel (the bottles are held together by dots of adhesive), was presented at drinktec in 2013 where it attracted Evian's attention. Through intensive cooperation, during the course of which we specifically focused on practical testing, taking two years to ready the product for market, a standardized innovation was developed. Finally, in March 2016, Evian put

the pack without film on the market, thus making a vital contribution to the success of this novel packaging concept.



Many perspectives get results

This success is not only of great significance to us but also to our partner and customer Evian. Frederic Maetz, vice-president for Global Engineering at Danone Waters, is especially appreciative of the way in which our common goal was pursued. “The special quality of our partnership with KHS and NMP Systems* lies in the joint ability to bring together the right experts from all fields – right from the very start.” We see ourselves as specialists here. We consciously adopt a number of different perspectives, obtain opinions and expertise from various fields and communicate openly with all those involved from the beginning. In our view this is the only way we can build a promising foundation for the standardization of a product or process. After all, a trusting partner-

ship is never aimed at just the very first stage in the process. This is how Frederic Maetz also sees it. “We expect permanent support in order to constantly optimize the efficiency of our existing plant engineering. To this end you have to maintain very close links to all of your contacts, not just at the headquarters but everywhere locally. This has a lot to do with people – and with proximity.”

We are happy about and proud of this joint success. Further success was not long in coming; just one month after the market launch in April 2016 Evian’s pack without film won the Grand Prix Stratégies for design and brand strategy.

* NMP Systems is a 100% subsidiary of KHS

» With its pioneering innovations KHS is setting a new standard in product differentiation and sustainability. We’re constantly working on alternative methods of production. One important aim here is to manufacture using the minimum amount of energy and with the smallest possible carbon footprint. «



Prof. Dr.-Ing. Matthias Niemeyer
chairman of the Executive Management Board
KHS GmbH



Research and development

Those who see themselves as we do to be a driver of innovation believe that one of their core tasks is research and development. No other field has as much potential to really significantly push the concept of sustainability.



From left to right: Dr Peter Stelter (KHS), Ranga Yogeshwar, Rolf Staab (KHS)

Each and every innovation undergoes a long development before it is introduced to the public. Initial ideas, development, prototype manufacture and tests take time – and the knowledge of just how important a role research and development play in the march of progress. At KHS this takes top priority. We have made it our goal to design and manufacture innovative and sustainable products. This applies both to our lines and machines and to our packaging concepts. In order to build on our past successes and continuously test the feasibility of promising new ideas, we believe it is essential to work together with other experts and scientists. A large number of collaborative research projects with well-known partners from graduate schools and industry is proof of this approach. Here, we apply ourselves to a whole range of different topics: from innovative technologies through functional materials and efficient processes to smart IT systems.

In addition to our self-funded projects we also run many research and development projects which are supported by the German Federal Ministry of Education and Research in Berlin or the European Union.

One special field of attention for us is how the company can gear itself to the future – in other words, how we can come closer to what is known as Industry 4.0. For example, we have researched the Cyber System Connector together with the TU Dortmund; this generates machine documentation which automatically updates itself. At the time of writing we are also launching an EU-funded project on the ergonomics and operation of machines, among others. The aim here is to develop a system of prompted machine operation with active feedback, in particular to reduce the operator's stress level. The system is to have a voice recognition and speech synthesis feature for interaction with the machine operating panel. The operator can then work directly on the machine with a headset without having to walk back and forth or keep referring to the operating manual. We are committed to research and development from absolute conviction. We are also driven by the fact that in 2015 we were named one of the Top 100 Innovators, an accolade we naturally wish to continue to be worthy of.



Working together

Together we can achieve more. This is why we have long been an active member of a number of associations. This promotes the exchange of experience and transfer of knowledge – with all those companies involved and their customers reaping equal profit.

To be right up to the minute so that you can push your innovations: this is what many companies aim for who, like us, stand for top technology and want to enable sustainable change through their product portfolio. It is thus all the more important that we form networks, pass on new findings, discuss possible solutions and represent our shared interests. This is all possible if we work together under the auspices of an association which for us is an established tradition – and also one which is constantly subject to change. While this exchange

used to be specific to a certain branch of industry, with brewery associations playing the most important role, for instance, networks are now more usually formed across several disciplines. Superordinate topics, such as recycling, plastics and adhesives or material specifications, are becoming an increasing area of focus when solutions need to be found to current questions. It is thus essential that we work together across our various sectors, adopting a number of different perspectives and coordinating our wealth of experience.

Focus on sustainability

Sustainability is now a central theme in all associations. Practically every innovation is rooted in the endeavor to practice resource and energy efficiency. In an attempt to afford this objective an even greater awareness, the German Engineering Association (VDMA) has launched its Blue Competence sustainability campaign which KHS is committed to out of conviction. Our references for Plasmax coating, water cascading system and water cooling during beer filling show just how fruitful this commitment can be.



Our Plasmax coating comprises a flexible, ultra-thin layer of silicon oxide whose properties correspond to those of chemically pure glass. This layer applied to the inside of PET bottles gives premium product protection, allowing neither oxygen to penetrate the bottle from outside nor carbon dioxide in the beverage to escape from the inside of the receptacle. Furthermore, the bottle remains 100% recyclable and its weight can be reduced by up to 17%. This freshness protection, which we promote under our FreshSafe logo, preserves the product's properties almost as long as a glass bottle.

Our water cascade was developed with the aim of saving water and heating energy when sanitizing systems and filling returnable kegs. By cascading water across a number of machines we can now use this precious commodity four times and have thus almost halved the amount of fresh water consumed from 12 to seven liters per keg liter. The system's hot steam consumption has even sunk by 70%.

Another example of resource savings is our highly efficient new water cooling system for vacuum pumps during beer filling. The water required to lubricate, seal and cool vacuum pumps must be permanently cooled. As it warms up during operation, this water used to be regularly replaced, consuming an average 12 liters of fresh water per hectoliter of beer filled. Our new system now uses a heat sink which had previously gone unnoticed: the cold beer itself (4°C). In a hygienic, safe heat exchange system the required amount of cold is extracted from the beer and added to the water. This enables up to 98% of fresh and wastewater to be saved, plus a maximum of 45% of the required pump power. In addition, no coolant is needed in the filler section.

Besides our campaigns within the VDMA we are a member of the Central Association for the Electrical and Electronics Industry (ZVEI), where we actively

support the various issues surrounding Industry 4.0. Here, we have developed important applications which can devise concrete solutions using Industry 4.0 technologies.

Together with Kronen AG and Sidel International AG we have also founded the Association of the Beverage Machinery Industry (ABMI). This association gives European manufacturers of filling and packaging machines the opportunity to find out about topics that are relevant across the industry. We are also a member of the European Hygienic Engineering & Design Group (EHEDG) which campaigns for hygiene awareness in the processing and packaging of food. Likewise we work with large associations such as the Association of German Engineers (VDI), with whom we are currently running a research project on condition-based maintenance in conjunction with RWTH Aachen University.

Our commitment and cooperative partnership in and with various associations is thus extremely targeted and always dependent on the topical challenge we happen to be tackling. This gives us a very wide scope regarding the perspectives and expertise which flow into our commitment to sustainability.



Innovative systems

Sustainability also means thinking ahead. This is why we focus on upgradable plant technology which is capable of growing and on future concepts which intelligently supplement tried-and-tested technology.

It is becoming more and more important to devote oneself to the question of how companies can set themselves up for the future and develop intelligent systems which enable man and machine to work together. This also – and especially – applies to KHS. Faced with a growth in automation and communication processes, particularly in production, and in view of our endeavor to be and remain a driver of innovation, we look for new answers every single day – in the full interests of

our customers who just like us are geared towards sustainability and who benefit in many different ways from our efficient line concepts and plant technology. Thanks to this consistent approach many innovative products have already been developed. Our most recent concepts for success, which are already well established on the market, show which path we have taken and which direction we aim to further pursue.

Highlights from our portfolio as a line supplier

Behind each and every one of our products is a basic principle which defines us as a company: we see ourselves as a partner with a holistic vision. Our core expertise lies in our systems and in the optimization of entire lines and machines. Each innovative new and further development we launch to market pursues this goal. Digitization and intelligent machines play an increasingly significant role in this; they give our customers as yet unprecedented ways of optimizing their processes, production and range of products, at the same time allowing them to produce while saving on resources.



The InnoLine MES software solution

With our manufacturing execution system or MES line IT solution we have developed standard software which is specifically tailored to the demands of the beverage industry and makes the production process transparent on all levels. For us, this integrated holistic system is an important step towards the smart factory. What is special about the software is that it collects and processes all existing production data at all production sites. This data is entered in the system in such a way that it can be put to better and easier use than before to coordinate all processes. The procedure is assisted by six different modules which can be used singularly or in parallel on any number of filling lines.

This intelligent dovetailing of production and business processes is the result of a [successful pilot project between KHS and Bitburger](#), a company which has consistently had a pioneering role on the market. The line management tool is now successfully established within the industry and the demand for it is considerable. For good reason: with InnoLine MES producers in the beverage industry can significantly sharpen their competitive edge by saving materials and energy and optimizing their operating procedures in the long term.

» What's important for us is that the system can learn. When we come up with new requirements, we then continue to develop the system with KHS. All told, I consider this pilot project to be a real win/win situation. «



Rudolf Wahl
head of the Central Filling and Filtration
Department at the Bitburger Brewery Group

Communicative conveying system: Performance Control 4.0

Another example of a digitized system which is already successfully established on the market is our Performance Control 4.0. This conveying system boosts line availability and lowers media consumption in production. It can precisely track the product flow on the line so that fewer sensors are needed in the system. As the operating statuses of machines are also taken into account, better use can be made of the buffer capacity, such as when changing labels or film reels. This then permits continuous, smoother line operation which in turn cuts down on energy consumption and makes operation gentler on the products. The innovative counting controller is an integral part of the conveying technology for one-way PET lines, ensuring a pressureless, optimized line product flow.

accordance with their wishes. The advantage here is that the concept can also be integrated into existing systems as a line optimization measure. From the draft design to the production of bottles ready for market we support our customers throughout the entire process with our wealth of experience. This allows a bottle to be designed which has good marketing properties and saves energy in the production process.



Expert advice for optimum packaging systems

We also consistently apply our innovative spirit regarding efficiency and sustainability to our general consultancy program which finds the right packaging system for our customers. Each client has their own individual basic requirements, goals and ideas. This is why we have introduced our innovative Bottles & Shapes™ program: an all-round service with which our customers can have their PET bottles designed and produced in full

One key element is to save materials in what is known as the lightweighting process. With our decades of expertise in PET we are in the position of offering what is currently the lightest 0.5-liter PET bottle with a screw cap for highly carbonated beverages (9.9 g), plus an extremely light 1.0-liter PET bottle for milk (20 g). Saving materials in the PET sector is and will remain a major topic for us: one to which we attach great importance and have already been very successful with. Our Bottles & Shapes™ concept will thus continue to be a consultancy program which holds great potential for the future as regards sustainability.

Saving materials, food, space and resources

With our innovative Plasmax coating technology for PET bottles we have developed an especially sustainable system of product protection under the FreshSafe PET® brand name. This concept lengthens product shelf lives for storage and transportation, thus preventing any unnecessary waste of food. In turn this results in a number of benefits for the end consumer. The quality of premium products or sensitive beverages – such as juice, wine, beer and other sensitive foodstuffs – is better assured and protected. This applies to both the taste and vitamin content. The innovation behind this system lies in the ultra-thin layer of flexible silicon oxide (chemically pure glass) applied to the inside of the PET bottle which keeps the product fresh for longer. It ensures that oxygen or other substances do not penetrate the bottle and that carbon dioxide and other components responsible for the taste do not escape. This secures a high level of quality even over a longer period of time which also helps to save on resources.



At the same time all materials can be fully recycled. The first European company to introduce this technology for juice is Eckes-Granini. The customer appreciates the perfect vitamin protection, fresh taste, easy handling – and most notably the bottle's full recyclability. There are also cost advantages over comparable material systems.

» The great benefit of our Plasmax-coated bottles is that they don't need any additives. This ensures 100% recycling. The process has thus already won many sustainability and packaging awards – which we're naturally very pleased about. «



Bernd-Thomas Kempa
global product account manager for
Barrier Technology

Another focus of our portfolio are compact systems. Blocked single machines give our customers the greatest benefits as they take up little space yet provide a multitude of processing options. An ever larger variety of packaging concepts can thus be implemented on a single piece of equipment. Besides saving space, which also cuts down on the number of conveying segments in production, the block enables very efficient productivity, operation and maintenance of the system, thus yielding a convincing saving in resources throughout the entire life cycle of the machinery. For this reason we aim to develop more space-saving systems in the future. Furthermore, we are also noticing that many SMEs increasingly want filling and packaging systems which are based on our experience in the high-capacity range and give them flexible production options at the lowest possible life cycle cost. We therefore already offer a selection of fillers and packers which precisely satisfy this demand. Our aim here is always that our customers can process their products reliably and in the best quality – with the best possible resource efficiency.

Experts for systems that grow

If you start small, you need a small system, as this is when you have to consciously target the use of your own resources. This is the case with newly founded craft breweries, for example. Once the desired level of growth sets in, systems with more power and larger capacities are gradually required. This challenge also touches on important issues of sustainability. How soon does a system reach the end of its useful service life and have to be replaced? Can innovations and new developments be integrated into existing machines? With our modular plant technology we always have the right answers to these questions. We think sustainably and would like to enable our customers to have their systems grow to match their success. We thus give craft breweries an especially high level of flexibility with our new modular keg system solutions, for instance. Depending on the required capacity our systems can be expanded at will to include extra filling and cleaning elements, be optionally combined with a flash pasteurizer and permit returnable and non-returnable kegs to be racked – all at a low cost of investment and operation. Thanks to our experience and expertise in modular technology we are a recognized partner to start-up breweries who believe in using sustainable systems.

If you start small, you need a small system, as this is when you have to consciously target the use of your own resources.

As a supplier of turnkey systems and lines, for us it goes without saying that in our developments we continue to address the pressing issues of sustainability, resource efficiency, environmental awareness and especially of saving water in the future to an ever greater extent. Innovative products which also give our customers verifiable added value are our instruments of choice. To a greater degree we rely on combined and supplementary options for existing systems which we constantly continue to further develop.



A passion for service

Our products merely form the basis of a long period of co-operation with our customers. KHS is not only distinguished by its innovative spirit and demand for quality but also by its absolute conviction in the provision of service – both now and in the future. This becomes even more important when the objective is to help our customers to produce more sustainably.

The durability of our lines and machines is something which makes us proud and which conforms with our policies on sustainability. The flip side is that once the plant technology has reached a certain age, it is no longer state of the art – and thus no longer satisfies ideal requirements regarding energy efficiency and performance. This is where our concept of service comes into play which drives us in all sections of our company – especially when customers express the desire to save on resources.

From conviction we provide comprehensive advice on audits, conversions and upgrades to prevent the procurement of a new machine while maintaining the state of the technological art. Our dedicated KHS line optimization team individually tackles each separate inquiry. Working together in detail and in trust with the customer's designated personnel we identify possible problems which occur when operating the line and which affect its performance.

To this end we make detailed studies, observations and measurements which enable us to find out where the snags in the line or process are. We then make specific suggestions as to how the line's performance and energy efficiency can be improved. More and more customers are using this service because the results are well worth the effort.

The devil is in the detail

It is important to take enough time to identify any problems and to trust in the experience of our expert team who work closely with the line operators. Problems often only become visible on closer inspection: in many cases the root of the problem does not lie with the large machines but in the little details which add up and influence the course of production. General organizational conditions may also affect the efficiency of line operation – but are usually never questioned. An outsider's view can also help here. Sometimes very little things can have a big impact.

One good example here is the Pivovarna Union Brewery in Ljubljana, Slovenia, who are extremely satisfied with their cooperation with KHS. The KHS line optimization team first audited a returnable glass bottle line at the brewery. The resulting suggestions were then quickly implemented without exception by those responsible.

The result is that the filling system is now running much more efficiently than before. The suggestions also included a number of very simple measures, such as acquiring new electronic light barriers for the pallet lifts which with their frequent failures had caused repeated downtimes



Christian Schlichtenbrede, head of Service Products at KHS

in production. Organizational aspects also played a role. KHS thus suggested staggering personnel lunch breaks so that production did not have to be interrupted for this purpose.

Whether the suggestions and recommendations made by the line optimization team are implemented or not is of course always up to the respective customer. What has proved its worth at all events, however, is the open, appreciative form of communication adopted by our service team and the customer's designated personnel – with the full focus on sustainability.



Saving water

The manufacture of lines and machines and operation of beverage filling and packaging systems always consume energy and media. Cutting down on the amount used is one of the most important objectives of our sustainability strategy. Reducing water consumption in particular is a chief area of focus.

Drinking water is an essential precious commodity. The United Nations have made it one of their top objectives to try and ensure the supply of clean water worldwide. It is thus a great aim to reduce the consumption of fresh water for industrial purposes in as far as we can. For many years we have been developing systems to this end for our customers' turnkey lines and will lend even greater weight to this task in the future.

Our water footprint is an important indicator of the amount of water consumed in this respect. This refers to the amount of water a company (or a nation or a consumer) uses – and not just directly but also indirectly. This is calculated by also taking into account the quantity of water required to manufacture the products used, such as machines. For us as a company our water footprint is

thus relevant in two ways: in reducing our water consumption we not only influence our own water footprint but also that of all customers who use our systems.

The more efficiently our machines are manufactured and run and the less water used in the production and operation thereof, the smaller the water footprint of those who operate them. This is one more incentive for us to work on innovative, resource-saving systems which increasingly focus on water consumption in particular. This applies

both on a large scale – the new development of a system, for example – and on a smaller one – such as when we optimize existing lines and can have a big impact by making smaller changes, such as doing away with water lubrication. We are also working on various sensors which can assess the level of cleanliness in a system so that sanitizing cycles are only run until everything is clean and not according to a fixed time. Filtration systems can also recycle water to a great extent, again helping to keep fresh water consumption down to the absolute minimum.

» The more efficiently our machines are manufactured and run and the less water used in the production and operation thereof, the smaller the water footprint of those who operate them. «



Mario Beck
Head of sustainability management
KHS GmbH

Water savings on select KHS systems

	At a production of	Annual water saving* (in liters)	How
Can fillers**	Up to 70,000 cph	Up to 1.2 million l	Water-free roller lubrication, expansion joint instead of a sliding seal
Tunnel pasteurizers	Up to 105,000 bph (330-ml glass beer bottles)	Up to 25 million l	Speed control and cooling tower for maximum efficiency in the pasteurizer
New bottle shower in glass bottle fillers	50,000 bph	Up to 8 million l	New bottle shower development with respect to hygienic design
ECO carrier bottle washer (also possible as an upgrade)	Up to 50,000 bph (500-ml glass beer bottles)	Up to 32 million l	ECO carriers reduce heat and water consumption as they are designed in such a way that they carry over less heat and thus cut down on the amount of cooling water required.
InnoPET BloFill stretch blow molder/filler block	Up to 36,000 bph (1.5-l PET bottles)	Up to 33 million l	Elimination of the PET rinser
Mixer vacuum pump without sealing water	Up to 72,000 l/h CSD	Up to 1.2 million l	Constant temperature with its own cooling system as a closed circuit
Glass beer bottle filler: vacuum pump	Up to 50,000 bph (500-ml glass beer bottles)	Up to 31.8 million l	Constant temperature through an external cooling system

* Calculation based on 6,000 hours of production per year

** This system is offered for small can fillers up to 70,000 cph. We also offer can fillers in the high performance range for up to 132,000 cph.



1.2 m L

Can filler



32 m L

Bottle washer



31.8 m L

Vacuum pump

KEY FIGURES

Contributions

Julia Arndt, Mario Beck, Tim Becker, Fabienne Böing, Ramona Brenner, Gottfried Eisenberg, Paul Kaiser, Bernd Kempa, Thomas Klempner, Inga Lindstaedt-Meister, Prof. Dr.-Ing. Matthias Niemeyer, Joachim Peinemann, Ralph Pentinghaus, Michael Schlegel, Christian Schlichtenbrede, Yatindra Sharma, Angela Souza, Dr. Peter Stelter, Jan Stöckemann, Karsten Vollmer, Marc Weinberg, Arne Wiese, Kristina Yabar-Jilka.

Editors

Nicole Pohl (KHS), NetFederation

Photos

Frank Reinhold, Getty Images

Online realisation & Layout

NetFederation

Contact

Dr. Peter Stelter

Telefon: +49 231 569-1905

[E-Mail](#)

KHS GmbH

Juchostraße 20

44143 Dortmund/Germany

Telephone: +49 231 569-0

Telefax: +49 231 569-1541

[E-Mail](#)

More information

www.khs.com

sustainability.khs.com