seranews

The magazine for **sera** Group customers

Issue 2019

The decision about the special number for this issue was very difficult for us this time. Is it 75? Or should we use the number 1945 or 2020? Whatever decision we made, an important element would be missing. We therefore decided for a series of numbers for this issue: **75 years / 1945 - 2020**.
These numbers bring together everything that we are building on, that we can be proud of and that will continue to drive us forward in the future. 75 years of expertise and experience. Tradition and reliability since 1945, the year we were founded. 2020 as the starting point for the future on which we are working with innovative products and highly committed employees to create added value for people and the environment.

In line with the motto for this year's company anniversary **YESTERDAY - TODAY - TOMORROW!**

EDITORIAL

Dear readers,

It is not just since the Fridays for Future movement that environmental protection has become a central issue in our society. Many people have been calling for more sustainability for some time now and, above all, more intelligent solutions for the problems of our time. The failure to meet climate targets and the sluggish pace of the energy transition are worrying more and more people around the world. And not only in their immediate environment, but across all areas of society. Implementing ambitious goals in the context of dynamically advancing technological and socio-ecological change on the one hand, and available resources and economic objectives on the other, places high demands on all processes, enterprises and us as people. Resolving these problems in a sustainable manner will be one of our central tasks in the near future. This issue of **seranews** is all about the environment. After all, we at **sera** see ourselves as a modern environmental and technological enterprise that accepts these challenges and aims to deal with them with the help of its employees and product innovations. This is something we work towards every single day, and accordingly we embarked on a path of innovative and sustainable change some years ago.

This issue of **seranews** presents you our solutions in the field of wastewater treatment at one of the world's most modern wastewater treatment plants in Prague. Read about the special features of CIP cleaning and our innovative technologies in the field of hydrogen technology, with the help of which we aim to tap into the energy of the future. You will also learn even more about why we are not only taking a technical approach to tackling environmental issues with our products, but also see it as a task for the entire enterprise.

In 2020 we will not only be celebrating our 75th company anniversary, but will also continue working towards a future for our customers, putting all our energy into solving their problems. True to our motto: We create added value for people and the environment.

So let yourself be inspired by our desire to tackle things and change them in a positive way. I hope you find this latest issue of **seranews** to be an inspiring and stimulating read.

Yours,
Carsten Rahier


sera

ENVIRONMENTAL ISSUES IN FOCUS

Environmental technology is the market of the future. It is not just since the Fridays for Future movement that the issues of environment and sustainability have begun to play a central role in our society. The desire to make projects more environmentally friendly and sustainable is becoming increasingly important. Germany has been a pioneer in this field for years. Implementing environmental issues in everyday industrial life is a demanding technological challenge. Moving in this direction is our declared goal – and it's worth it. An interview with Stefan Merwar, Head of Communications, on sera's environmental objectives.

Stefan, why focus on the environment?

sera's corporate motto is: "We create added value for people and the environment." The motto guides our actions. This mission is expressed in our commitment to social causes and in our environmental orientation. We try to put this claim into practice across all levels of the enterprise and orient our activities in accordance with it. For us, this is one thing above all – consistent. Only by consistently pursuing your goals you can act credibly and successfully as an enterprise. We feel that this orientation is more than merely promising; it is the only appropriate goal considering the current social discourse.

What does this orientation mean for the enterprise's daily routine?

It seemed only natural to continue orienting our activities towards environmental technologies in recent years and to want our products and services to be understood in this way. As a reliable industry partner, we have been developing and manufacturing products in the field of dosing and compressor technology for almost 75 years now. **sera** products are characterised by their excellent reliability and extreme longevity. This is already a high value itself and attests to the sustainability of our products over the long term. Our products are used for the exact dosing and compression of liquids and gases and can thus help avoid to use surplus quantities of critical substances. Many of the processes we support can also be leveraged to treat contaminated water or help eliminate pollutants. Based on this product range, we have thus decided to pursue this path even more consistently and plan to invest even more in environmental issues in the future.

What exactly is sera doing right now and what can customers expect?

Our current focus is increasingly on issues such as the service life of our products, energy-saving functions and integrating digital processes in systems. We can make many positive advances in these fields in the coming years. A key task will be coordinating products more efficiently and even more optimally with processes. This involves gradually optimising and expanding our range. It is about sustainable change rather than completely breaking with old ideas. After all, we are a reliable partner that continues – even decades later – to provide the same level of service our customers were given at the time of delivery. This is what sustainability means to us.

Where do you see the biggest opportunities in the future?

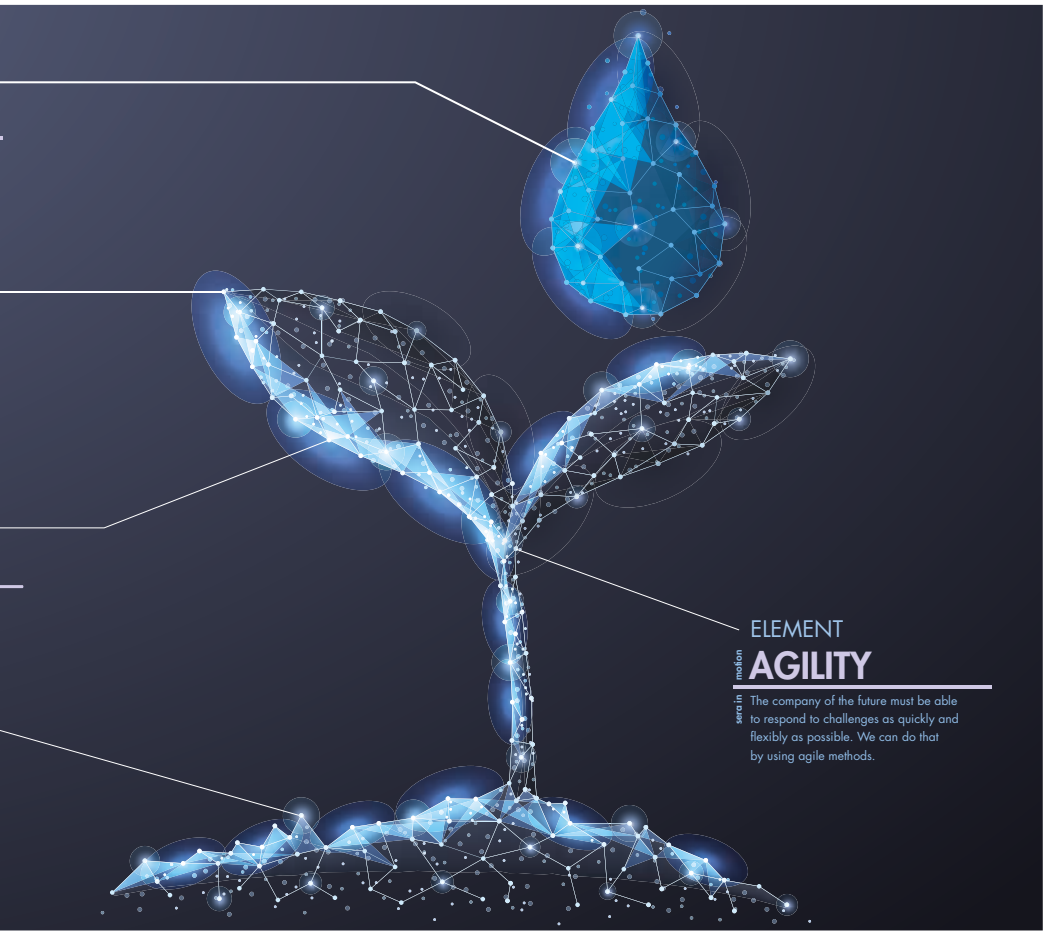
A very important component is our newly created hydrogen technology business area. Here we have the clear goal of becoming the technology leader in one of the promising markets of the future. We believe that hydrogen technology will not only develop extremely rapidly, but that it will be an essential building block in the energy mix of the future and the central element in sector coupling. By using hydrogen to store energy, we can make a significant contribution to reducing CO_2 and creating a sustainable energy economy of the future. **sera** is the only supplier worldwide to offer all three hydrogen compression technologies. This not only makes us a technological leader, it also enables us to provide an appropriate technical solution for all areas of hydrogen treatment.

Isn't sera breaking completely new ground in doing so?

No, quite the opposite. We can look back on decades of hydrogen treatment experience and have the accumulated expertise of installing more than 1,000 hydrogen compressors. This makes us a reliable and competent partner, which is something the increased demand in recent years also clearly attests to.

Are there any other areas outside of the product level in which sera actively deals with environmental issues?

We also try to promote environmental issues outside of our products and services. Because we believe that you can only be successful in this area by pursuing environmental goals in a holistic manner and with all your heart. That is why for many years now we have been organising our own Environment Day, in the course of which our employees participate in various projects (see the relevant article in this issue). We support our employees' switch to using a more environmentally friendly means of transport with our bike leasing offer. More than 10% of our colleagues have already taken advantage of this offer, and this number is increasing constantly. **sera** has been awarding the **sera** environmental prize as part of the business plan competition "promotion nordhessen" every year since 2015.



__sera__ has defined various topics that will be groundbreaking for the entire group in the future. Environmental technology and sustainability are key elements here.

Stefan Merwar has been with __sera__ since 2015 and is currently responsible for communication and digitization as a Member of the Corporate Management.

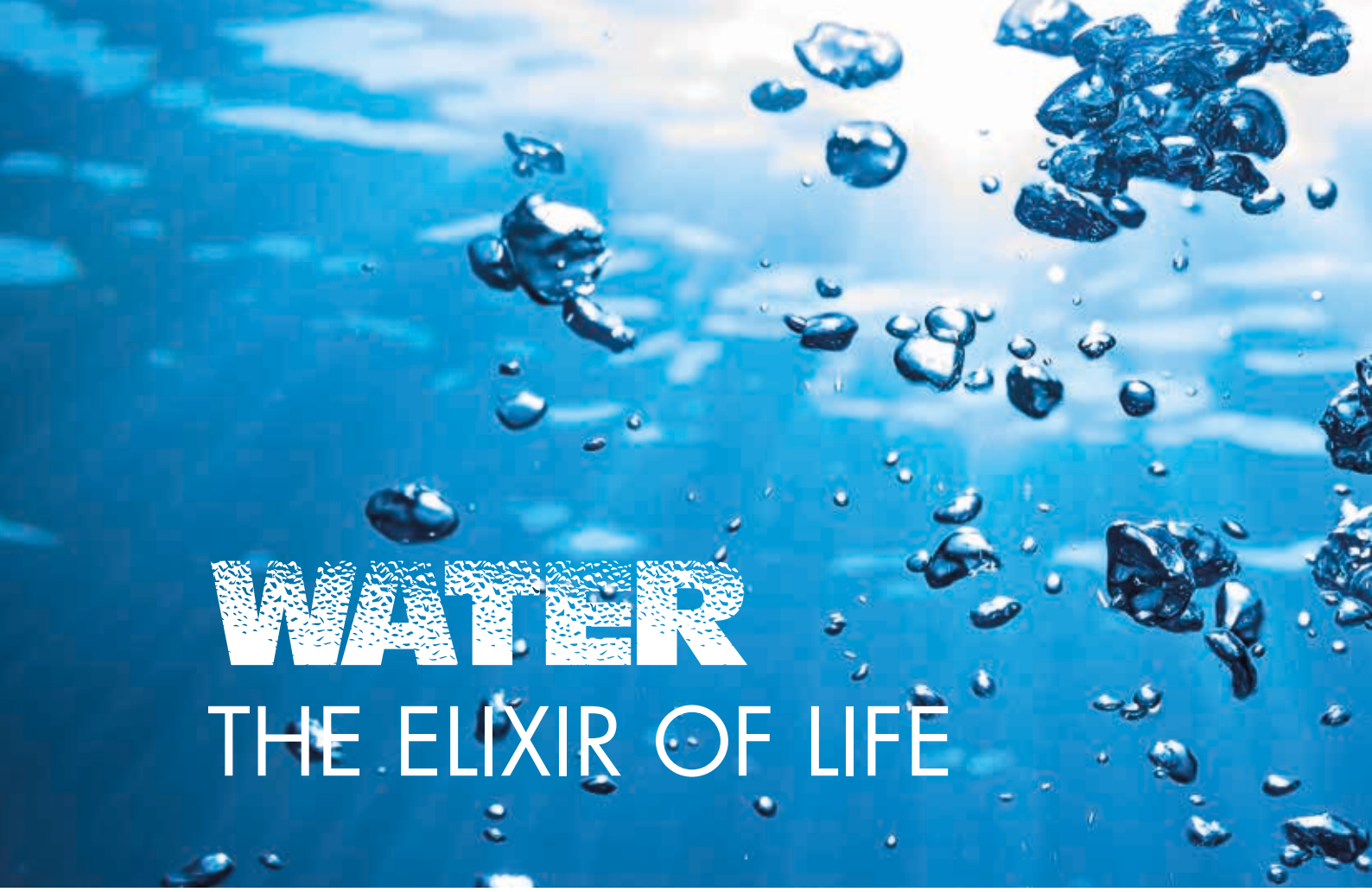
What other activities will there be in the future?

We are trying to modernise our Immenhausen site over the long term and are taking both energy-related and ecological considerations into account in planning the conversions. For example, we are currently building our own charging station for electric company cars and are also planning to open a new and improved hydrogen filling station on our premises next year. Further projects are in the pipeline and will soon be implemented.

It is clear that many measures are being taken. I therefore want to ask the following question one more time: Is the effort worth it?

From our point of view, there is no alternative to the current path. On the one hand, it is important to solve these general societal problems from a technical point of view. On the other hand, doing so also offers excellent economic prospects. Recently, at the Hydrogen Summit, for example, the German government declared the technology to be a key future technology and set itself the goal of making Germany a leader in this field. We are ready for it and willing to help shape this path.

We see these activities as part of our commitment to consistently pursuing the path towards environmental technology and an environmentally friendly orientation. Because we create added value for people and the environment!



WATER
THE ELIXIR OF LIFE

Life is not possible without water. That makes it all the more important to consider how people treat this resource at the moment: even though we in Germany are world champions when it comes to saving water (the average drinking water consumption per head per day has fallen in the last 20 years by 20 litres to 130 litres), the consumption of so-called virtual water is increasing steadily. This is the term used for the water required to make products. Germany's water footprint is around 1,430 cubic metres per resident per year, in other words about 4,000 to 5,000 litres of water a day. In total, our water consumption has doubled in the last 50 years.

The precise water footprint of a product always depends on the type of production system, its composition and the origin of the products required from suppliers. Back in 2007, Coca-Cola made public the fact that around 2.6 litres of water are required to produce one litre of Coke – this large amount can be traced back, in particular, to the water-intensive cultivation of the sugar cane it requires. In general it is true to say: if you use products that are produced sustainably and eat regional, organic food, it is safe to assume that you will leave a smaller water footprint than with imported goods and "fast fashion" clothing.

Wastewater treatment

The water we consume and the virtual water is fed as wastewater into rivers and seas or processed and reused. The degree of treatment and therefore the degree of contamination of the wastewater depends heavily on where we are in the world. Europe is certainly one of the pioneers in wastewater treatment, both in municipalities and in industry. The EU Member States, in particular, have had to meet ever stricter requirements in the area of wastewater treatment over recent decades, which has led to a clear increase in households connected to municipal wastewater treatment. In Malta, for example, only 20% of the population were connected to the municipal wastewater treatment system in 2010, according to eurostat. Following the construction of new sewage treatment plants, it was close to 100% by 2011. The highest connection rates in the EU are reported by the United Kingdom (100%), the Netherlands (99.4%), Malta (98.6%), Luxembourg (98.2%), Spain (96.9%) and Germany (96.2%). Although the UN announced its "Sustainable Development Goals" in 2016, goal no. 6 of which is concerned with water, sanitation and hygiene and applies globally, there are still countries all over the world where the water supply and

wastewater treatment are at the level of developing countries. In 2017, for example, around 2.2 billion people had no access to clean drinking water. Every year about 829,000 people die from contaminated drinking water and the diarrhoea illnesses it causes (WHO). Especially in developing and emerging countries, but also in China, for example, the awareness of water-saving and environmentally conscious processes is growing only slowly. In part, sewage is still being fed directly and unfiltered into rivers and seas. But slowly a rethink is taking place. More and more industries now have to follow strict regulations when it comes to treating process and service water. In addition, producers are increasingly looking for water-saving alternatives in their process chains. Over the following pages, you can read about some examples of how **sera** products have become part of a wide range of production processes and therefore provide clean water and help to protect the elixir of life.

OUR VIRTUAL WATER CONSUMPTION

In most cases, the consumer is not aware of how much water is needed – or even wasted – for their consumption behaviour. Some examples:

- A fifth of the quantity of water used throughout the world goes on cultivation of agricultural products (a large proportion of that for animal feed); one kilogram of rice requires 4,000 to 5,000 litres of water before it is harvested

- The production of one kilogram of beef requires an average of 15,000 litres of water, one litre of milk takes 1,000 litres of water

- 200 litres of water are needed for a non-organic egg; this comparatively high figure goes on the feed, in particular

- One kilogram of roast coffee requires 21,000 litres of water, so a cup takes over 140 litres. A cup of tea can be produced with 30 litres of water.

- The production of clothing made of cotton accounts for an average of 11,000 l/kg of virtual water worldwide. 85% of the water volume is needed to produce the cotton, more than half of that to irrigate the fields.

- Around 10 litres of water go into one 80g/m² A4 sheet of paper. To turn used paper into recycled paper, on the other hand, only about 20 litres of water per kg is required.

CLEAN WATER FOR PRAGUE

STATE-OF-THE-ART PROJECT IN AN UNUSUAL ENVIRONMENT

At European level, the Water Framework Directive (WFD/Directive 2000/60/EC) of 23 October 2000 sets out binding environmental targets for all Member States. One of the objectives outlined in this was to put all surface water and ground water into a good condition by the end of 2015. Unfortunately, this has not been achieved in any of the European Member States, including Germany. A new deadline has therefore been set for this important goal and it should now be achieved by 22 December 2021. Cleaning of contaminated wastewater is particularly necessary in this connection to protect European bodies of water from harmful discharges. In order to meet the framework of this Directive, extensions, conversions and new construction of wastewater treatment plants are necessary. In addition to a wide range of the latest dosing systems and technology, sera in particular offers expertise in helping municipal and industrial sewage treatment plants and partners to achieve their goals. A particular challenge was the construction of the new sewage treatment plant in Prague on Císařský island in the Moldau.

The Czech capital of Prague with its beautiful old town, many restaurants and the castle is a popular destination for tourists from all over the world. In 2018 over 7.8 million people visited the city on the Moldau, which is home to about 1.3 million people. So many people produce absolutely huge amounts of wastewater.

After a devastating flood in 2002 destroyed the existing sewage treatment plant in Prague, it was only partly repaired. Since, however, it was already clear at that time that the existing plant would not be able to meet the future requirements of the population or the strict EU guidelines on water quality, the call for bids for a new sewage treatment plant was set in motion back then. In order to manage this and at the same time comply with the high EU standards, the city of Prague gave the contract for construction of a new sewage treatment plant to a consortium consisting of WTE, Suez/Degremont, SMP and Hochtief in 2011. The construction site was Císařský island in the Moldau, opposite Prague Zoo. The task involved not only building a state-of-the-art sewage treatment plant with enormous capacity, but also fitting it into the island and the landscape.

The water treatment processes are always the same, irrespective of the size of the plant. This also applies to flocculation of polymers. The calculated capacity of the new sewage treatment plant in Prague was 1.2 million PE (see info box). The largest class of sewage treatment plant in Germany starts at 100,000 PE. So it was clear that the sheer size of the new plant in Prague would be a challenge for all the companies involved. At the beginning of 2015, the long-term partner of **sera** Hennlich s.r.o. from Litomerice/Czech Republic received a request from Degremont for the supply of eleven polymer preparation units of an appropriate size. **sera** and Hennlich were able to impress Degremont not only with a cost-effective quotation, but also with their experience stretching over more than 70 years and their expertise in the area of wastewater treatment.

In addition to stations for treatment at 4 m^3/h, units for 16 m^3/h and 23 m^3/h were also required. The tried and tested PolyLine Flow 3-chamber station from **sera** is available in standard design for up to 8 m^3/h. A tailor-made solution was therefore required. Following detailed calculations, the **sera** engineers established that a scaling of the design was not only theoretically possible, but also feasible in practice. The statics for the new tanks were recalculated and the agitators produced by **sera** were redesigned. A supply of large quantities of polymer powder had to be ensured, so that the big bag racks and the customised dry material feeders could be supplied. This equipment guarantees an even flow of the polymer powder into the tanks and thus a constant polymer quality. With the inclusion of the re-dilution units, which were also scaled to the necessary flow rates, **sera** was able to deliver a turnkey system for the customer's polymer requirements.

Two years after the initial contact and after several hundred hours of calculations, engineering and assembly, the PolyLines and all of the additional equipment left the **sera** site on four lorries at the beginning of 2017.
Successful commissioning was completed in autumn 2018 and since the start of the new sewage treatment plant on 19 September 2018, four PolyLine Flow 23000 S, two PolyLine Flow 16000 S and five PolyLine Flow

4000 S units, including big bag racks, dry material feeders and re-dilution units, have been working reliably and are helping to clean more than 4.1 m^3 of wastewater per second in the largest sewage treatment plant in the Czech Republic. The overall costs of the sewage treatment plant ran to EUR 250 million and the integration into the landscape was successful: the architects put large parts of the plant underground and created a park over the top of it, which the citizens of Prague can use as a place for relaxation on Císařský island. The entire project was so successful that it was nominated for the "Global Water Award 2019" as the best wastewater treatment project in the world in 2018.

sera is proud to have been involved in this state-of-the-art project and is looking forward to applying the valuable knowledge gained from it to new projects and to exceeding the high expectations of our customers.

Prague sewage treatment plant

» 1.2 million population equivalent (PE)
» 600 metres long / 130 metres wide
» 15 million litres of wastewater per hour
» 4 biological lines = 24 biotanks
» 40 sedimentation tanks
» Efficient measures to combat odours and noise
» 220 km of electric cable
» 25 km of pipes
» 144,000 km^3 of reinforced concrete

SAFE, COST-EFFECTIVE AND ENVIRONMENTALLY FRIENDLY – CLEANING IN PLACE

In the food production sector, hygiene is the top priority. The legal requirements of companies in the food processing industries, such as breweries and dairies, are very high and product safety plays a particularly important part here. Production systems must therefore be cleaned in regular cycles to ensure consistent product quality and compliance with the relevant hygiene standards.

With manual cleaning, plant operators face quite a few challenges: the production process has to be stopped and the areas to be cleaned, including tanks and pipes, must be exposed to reach them. Water and cleaning chemicals are rarely used to the extent required, which can quickly lead to residual contamination or waste. The water used is recycled only in part, if at all. Shutting down a production facility is always associated with huge costs, as is the imprecise use of water and cleaning agents.

Highest hygiene requirements in the production process

But since cleaning is essential, so-called CIP is used wherever the highest hygiene standards and product safety are important factors. This "cleaning in place" (CIP) is used in breweries, dairies and food production s to clean the entire production system including the tanks and pipes in cycles. The process of CIP usually runs in the same way: first, residues and sediments from the last production run are rinsed out with batch water, then lye is used to eliminate organic trace elements. Once mineral sediments have been removed using acid, the entire system is disinfected and rinsed with fresh water. The system is then ready for production again.

sera leads the way in the field of CIP. Many breweries and dairies in Germany and equipment suppliers in the international beverage industry put their trust in **sera** as a partner to clean their systems in accordance with specifications – and thus to save money and protect the environment. The chemicals required for cleaning are stored in IBCs, barrels or tanks in liquid form. The **sera** CVD compact dosing system doses the chemicals into fresh water in such a way that the cleaning agent or disinfectant required has the perfect concentration and can be added directly to the cleaning process. Before cleaning, sensors in the stacking containers measure the mixture of the lye, acid and disinfectant. If it is not the right concentration, the dosing system is used to add the correct amount of the base chemical – the concentration of the cleaning agent or disinfectant is increased.

Breweries mainly use caustic soda (50%) and nitric (up to 53%) or phosphoric (85%) acid for CIP. Lye, acid and disinfectant are all diluted to a 2% solution.
In the case of CIP for pipe systems, the fluid speed is particularly important: a turbulent stream with a speed between 1.5 and 2.1 m/s is required.

The safe solution for cost-effective use of alkaline cleaning agents

Caustic soda is not available in consistent quality and concentration in all countries of the world. Transport and storage of caustic soda is also associated with risks: before disposal in the sewer system, caustic soda must be neutralised with appropriate acids and diluted, as otherwise it is extremely caustic. The danger to people and the environment is correspondingly high if transport and storage are not carried out conscientiously. Especially in countries without reliable access to suitable caustic soda and in industries that have a fluctuating but large demand for the alkaline cleaning agent, the **sera** caustic soda preparation station enables safe, efficient preparation of caustic soda based on sodium hydroxide (NaOH) in solid form (pellets, flakes, pearls or powder) and water. The system consists of a stainless steel batching tank, an agitator and a special conveyor. The conveyor comprises a filling hopper and a stainless steel dry material feeder that carries the solids to the batching tank. As mixing NaOH and water creates an exothermic reaction (up to 95°C), the station is designed in such a way that the operating personnel are not in the immediate danger zone of the batching tank. If necessary, the station can be equipped with a suction device that prevents the formation and distribution of any hazardous dust as the material is transported.

Cost-effectiveness in the CIP process

The preparation of lye in its own preparation unit makes economic sense for breweries, in particular. Transport, delivery and storage of goods in sacks of undissolved solids is significantly less expensive than ready-made solutions. The extensive building work which is required to accommodate delivery of ready-made solutions in tankers containing hazardous substances is also unnecessary. Above all, however, well-known suppliers in the beverage industry value the flexibility that they have with their own preparation unit: solutions are prepared as required and their concentration can be adjusted by increasing or decreasing the amount of solid materials added.

Saving resources and protecting the environment

Producers can achieve further cost savings by reusing fresh water. This is used during intermediate and final rinsing. It is then returned as batch water into the CIP process and reused for the preliminary rinsing stages in the next cleaning cycle. These process stages significantly reduce water consumption in the production process and thus the virtual water consumption of the consumer. Chemicals are also used sparingly in the CIP process: they are always dosed in the required concentration and quantity, and waste is therefore avoided. That protects the environment and makes wastewater treatment easier.

Decentralised systems are replacing central plants

In the past, large, central systems were mainly used for CIP. Cleaning of every part of the system had to be designed and adjusted specifically. The associated effort was immense and has now led to the introduction and use of decentralised CIP systems that are dedicated to the system to be cleaned. Selectable cleaning programs ensure that the cleaning cycle can be adjusted flexibly to current requirements. Under certain circumstances, several local CIP systems can even be supplied from one store with cleaning agent and disinfectant. The procurement costs for decentralised CIP systems are significantly higher than for a large central system, but the costs can quickly be offset in ongoing operation, especially with big margins.

Planning CIP systems in the design

Even during the design of a production system in the food sector, it is important to include the CIP process in the plans. Fundamentally, it has to be decided whether CIP should be carried out with central or local systems and whether cleaning agents should be prepared on site or supplied ready to use. It is also essential that the entire production system can be cleaned by CIP. In other words, all the parts that have to be cleaned are food-safe. Aseptic and technical sterilisation specifications must be observed in this context. The geometry of the individual parts and of the entire structure must be designed in such a way that no dead spaces are created and that all surfaces can be covered at an appropriate flow speed during CIP. CIP-compatible diaphragm pumps from **sera** meet these specifications: seals and connections meet DIN standards, pump bodies and all other materials that come into contact with the medium are electropolished.

sera offers solutions for central and local cleaning and components that can be cleaned using CIP, thereby creating added value for people and the environment.

sera ENVIRONMENTAL PRIZE – A SUCCESS STORY

As part of promotion nordhessen business plan competition, sera has been awarding the Environmental Prize to young companies in the field of environmental technology and environmental issues since 2015. Here we briefly present our prize-winners and what has become of them.

In the coming year, the promotion nordhessen business plan competition will be celebrating its 20th anniversary and can look back on a long history of success. Initiated by Regionalmanagement Nordhessen and supported by a multitude of companies based in North Hesse, the competition is designed to support the establishment of more companies and create a start-up culture for the region of North Hesse. The competition has achieved this objective extremely successfully over the last two decades. In the meantime, the region is regarded as one of those with the strongest growth in the whole of Germany and a multitude of successful companies have been founded as a result of the competition.

sera not only supports the competition as its sponsor, but since 2015 has been awarding the Environmental Prize within the framework of promotion nordhessen. In accordance with our company motto "We create added value for people and the environment", this is aimed at new business start-ups in the area of environmental technology. The prize serves, on the one hand, as another component in the start-up finance, on the other – and primarily – as recognition of what has been achieved to date, the idea and the opportunities in the future. It can therefore be used above all to raise the company's profile and draw attention to it in the initial phase. In awarding the Environmental Prize, we want to play our part in the development of the region of North Hesse and of the area of environmental technology.

The business start-ups which we have recognised to date have developed successfully since the award. We present them here.

"The sera Environmental Prize has played an important part in getting the GloW project (which was then in the set-up phase at Kassel University) off the ground. The project turned into GloW efficiency off-grid GmbH at the end of 2015. Through the award and the reports about us in the context of promotion nordhessen, we were able to make new contacts and expand our network."

Markus Espeter, GloW

GloW
efficiency
off-grid

2015

Founded in 2015
Currently 4 employees
www.glow-energy.de

GloW yaMbao – Energy-saving cooker with carburator attachment

The first environmental prize went to GloW efficiency off-grid GmbH in 2015.

Three billion people worldwide burn wood and dung to cook. With dramatic consequences for their health: according to the WHO, 3.5 million people die every year as a result of the consequences of the air pollution coming from open cooking fires – more than from malaria and AIDS. Inefficient combustion of fuels is also one of the main causes of climate change.

In order to combat these problems, GloW manufactures and markets energy-saving cookers in kit form for developing countries. The kits can be transported much more easily than the end product and can be assembled where they are needed with very few tools and little effort.

Since June 2016, GloW has been distributing its solution with strong partners in the southern hemisphere, such as the "Awareness Raising and Implementation of Clean Cooking" project in the Tanzania-Uganda border region. 100 cookers are being provided to families in combination with training courses on both assembly of the cookers and their use for cooking. To date, the cooker is being used in 15 countries in the world and is helping people to cook in an environmentally friendly way. As a social project, the company does not make any profits or generate salaries, but works purely on a voluntary basis.

betterspace

2016

Founded in 2016
Currently more than 40 employees
www.betterspace360.com

The company Betterspace has developed particularly successfully with its smart home solutions for saving energy and avoiding CO_2 in hotels. Shortly after receiving the award, the company took off and developed extremely successfully through and beyond its site in Kassel.
With its 360° software, Betterspace offers smart, intelligent, digital solutions that are revolutionising the work-

ing lives of hoteliers and delighting guests. In addition to happier guests, the hotels benefit from increasing income, lower operating costs and automated processes. At the same time, Betterspace is supporting hoteliers in making their hotels more sustainable and protecting the environment. The portfolio of Betterspace covers everything from smart solutions for guest communication, through intelligent energy management solutions, to hotel infrastructure services. The smart solutions impress with their easy application and uncomplicated integration into existing structures, in line with the motto: "Smart, digital & simple".

Currently Betterspace is working on new solutions at its sites in Kassel, Illmenau, Salzburg and Singapore for more than 700 customers in 10 countries.

„The sera Environmental Prize 2017 at promotion nordhessen was an important milestone for us in an early phase of our development. On the one hand it showed us that we were on a right path with our idea and on the other hand we could gain important supporters through public attention."

Alexander Zacharuk, Thriving Green

Breeding plant Turkana, Kenia
Temperatures over 45° Celsius
Daily average income of EUR 1,50
Region: extreme heat, drought and poverty
Aggravated by climate change
Child mortality: approx. 25%

Thriving Green
Power To Grow

2017

Founded in 2017
Currently 20 employees
www.thriving-green.com

The non-profit company Thriving Green has put an unusual idea into practice to resolve nutritional problems in one of the poorest areas of the world.

Thriving Green cultivates the alga spirulina in the desert of Kenya and is combating hunger and malnutrition with this superfood. The team members work with the locals to set up farms and train them in cultivation, operation and distribution. Through regular workshops, they are given the skills to feed their families and their entire village sustainably.
The micro alga spirulina is the perfect food for the target region: spirulina is a superfood, grows under conditions in which plants cannot survive and protects the environment.

The profile of the food (290kcal, 65g of protein per 100g and numerous vitamins) prevents the serious consequences of malnutrition. Daily harvests, high yields, low water consumption and effective binding of CO_2 make spirulina the best food product for the future.

10 times more people can be fed with the same farming area than with wheat. The innovative food is therefore widely accepted on the market.
The income generated from independent cultivation of the farms also triggers an economic upswing which opens up an entirely new basis for people's lives, e.g. access to education and medical care. The technical solution has been verified by TÜV Nord, its ecological sustainability confirmed by the WWF and the project has won, among other things, the "Social Innovation Award" of the Bayer Foundation and the "GreenTec Award 2017", the largest and most important environmental prize in the world.

sera is very proud of having given this project an award at a very early stage and thus to have helped enable the start of this success story.

HydroNeo
Smart in Aquaculture

2018

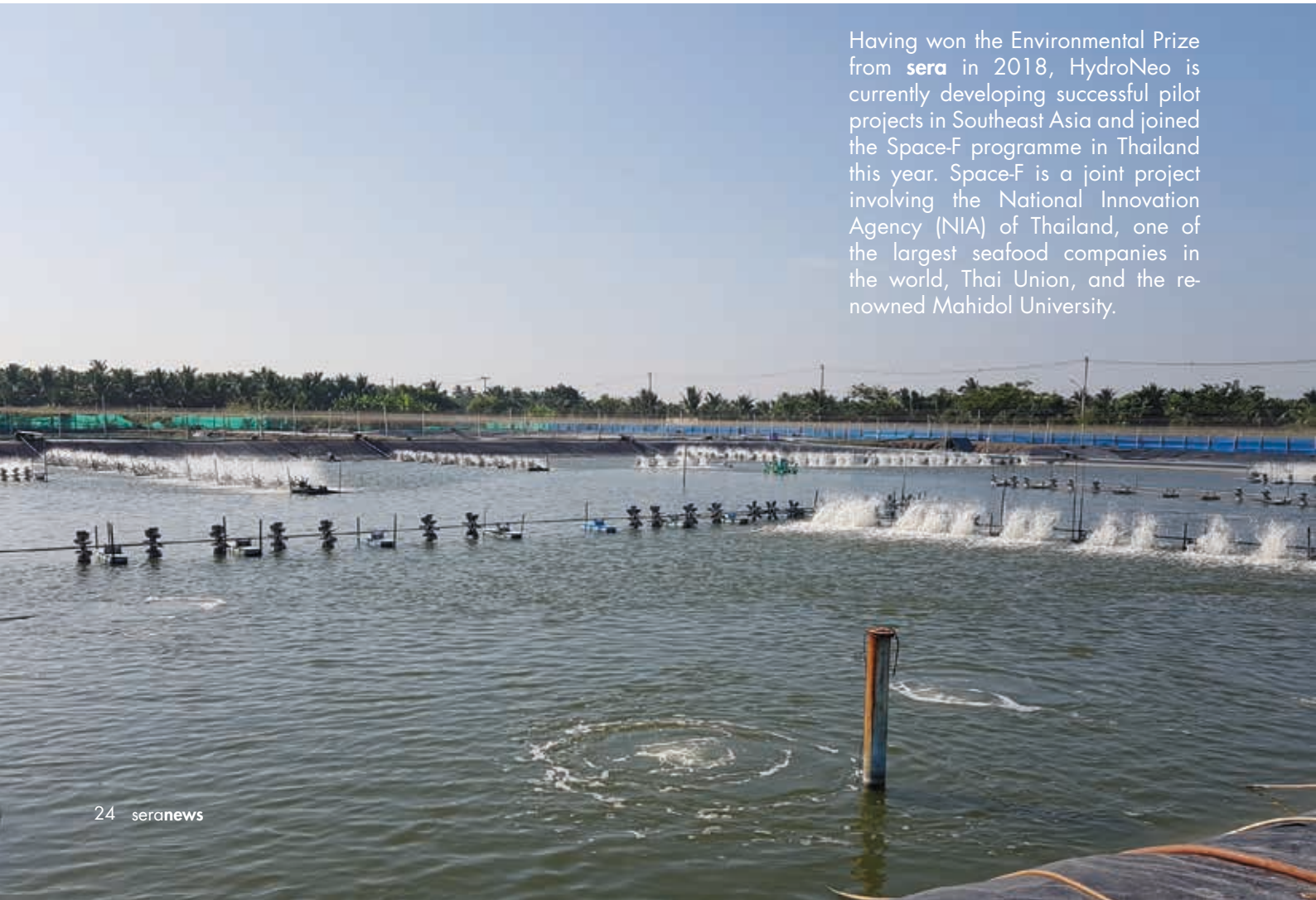
Founded in 2018
Currently 7 employees
www.hydroneo.net

Digitization and automation have now arrived in almost every industry in the world – only aquaculture

remains highly analogue. Farmers suffer from substantial animal losses, high production costs and inefficiencies because of a lack of operational transparency. HydroNeo is developing a comprehensive, IoT-based (Internet of Things) Smart Farm Management System for aquacultures. The product is a tailor-made solution for the requirements of the open pond systems in which prawns worth an annual EUR 22 billion are bred in Southeast Asia and South America in particular. The modular system allows the farmer to monitor the water quality in real time and raises the alarm in the event of undesirable changes.

In addition, the intelligent, cloud-based algorithms automate and optimise the two largest cost blocks of a farm: the use of energy-intensive ventilation motors and the animal feed. This system saves valuable resources, increases productivity, improves the water quality and is therefore an important step in the direction of sustainable management of aquacultures.

Having won the Environmental Prize from **sera** in 2018, HydroNeo is currently developing successful pilot projects in Southeast Asia and joined the Space-F programme in Thailand this year. Space-F is a joint project involving the National Innovation Agency (NIA) of Thailand, one of the largest seafood companies in the world, Thai Union, and the renowned Mahidol University.



“Promotion nordhessen and, in particular, the Environmental Prize sponsored by sera have helped us to gain the trust of business partners and contacts for a business idea which is rather unusual for Germany. This support has been invaluable”.

Fabian Reusch, HydroNeo

VARIOKAN

2019

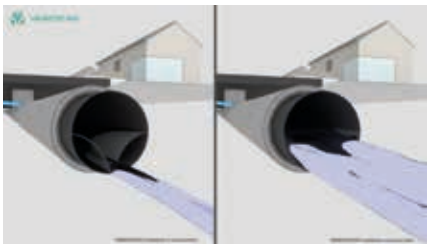
Founded in 2019
Currently 2 employees
www.variokan.de

The latest prize winner from 2019 is the Variokan start-up.

Variokan is developing the first and only sewer system in the world that adapts to the flow rate of the wastewater under its own steam and thus ensures the optimal flow velocity for any level of effluent in the sewers. Variokan was established as a private company in 2016.

Existing sewer systems with fixed internal diameters are unable to adapt to fluctuations in the volumes of effluent according to the time of day or year. As a result, sewer pipes of this sort are either too big or too small, which leads to various problems (e.g. frequent need to clean sewers or serious water damage). Climate change is also causing ever more severe heavy rain events, which overload the sewers and flood cellars. But we are also experiencing longer drought periods.

This causes high costs and a constant need for action on the part of the sewage companies. By contrast, the way Variokan works is easy: in its starting state of normal sewer use, Variokan minimises the cross-section of the sewer by means of a “V-profile”. Optimal hydraulic operation for dry weather flow is therefore ensured. During wastewater peaks in the day (e.g. morning shower times) or the year (e.g. heavy rain events), the air-filled chambers sag under the load of the wastewater and increase the cross-section so that the additional wastewater can be fed away harmlessly. When the wastewater level falls again, Variokan returns to its starting state with a “V-profile”



(“memory effect”). The system is completely self-sufficient in terms of energy, no actuators or sensors are required to control it. Instead, the system works exclusively through the intrinsic weight of the wastewater.
The solution is therefore simple but provides solutions to all the current problems. Variokan is currently in the set-up phase and is preparing for market entry.

The **sera** Environmental Prize winners have all developed well and have equally bright prospects ahead of them. We can therefore be very proud that our commitment has made a contribution to developing the start-up scene in North Hesse in a positive direction and that we have supported new companies. An innovative North Hesse benefits everyone in the end. Supporting environmental awareness and promoting environmental technology is just as important to us as creating new, effective businesses.

The **sera** Environmental Prize has therefore become a fixed part of the promotion nordhessen business plan competition and we are already looking forward to the next exciting projects.

HYDROGEN

THE STUFF THAT CLIMATE PROTECTION DREAMS ARE MADE OF?

Under the Paris Climate Protection Agreement, which was ratified by the European Union in 2016, national greenhouse gas emissions are supposed to fall by at least 80% by 2050 – measured against the starting point of 1990 – which is a very ambitious target.

In order to achieve this target, new technologies for energy and transport that are more efficient and emissions-free have to be developed and, in particular, become established. High investment and operating costs and the development of new infrastructures are not insignificant hurdles in this context. They are difficult to overcome for businesses alone, without the support of the political world and the associated funding.

At the "Conference on National Hydrogen Strategy" at the beginning of November 2019, that was precisely what was discussed, and hydrogen was declared to be a "key raw material for an energy transition that is successful in the long term". This was a big and important statement which could make it easier for products that were developed years ago and are ready to launch to make the jump onto the market.

Hydrogen is a true all-rounder and can be used in all sectors (including transport, industry, building services). It will therefore play an important part in the energy system of the future.

Excess electricity from renewable energy sources (wind, sun, water) can be stored with the aid of power-to-gas systems and offers various downstream options for use. From conversion into synthetic energy carriers, through reconversion into e.g. fuel cells, use of the substance in the (petro)chemical industry, to direct use in pure form for sustainable, emissions-free transport with fuel cell vehicles (cars, commercial vehicles, buses, lorries, trains and ships), it is hugely important in all areas.

As an environmental technology company, **sera** has over 50 years of experience with the fascinating, energy-rich gas hydrogen. Initially "only" working in the area of compression of the gas by means of metal diaphragm compressors, the Compressor Technology division developed some innovative products and solutions for the hydrogen market and is now the only provider of the full spectrum of compressor technology. The **sera** "H2 – ENERGY OF THE FUTURE" products offer solutions for building services (seasonal energy storage), mobility and the transport of the future (hydrogen fuel stations), power-to-gas systems and decarbonisation of industry.

Over the following pages, we give you an impression of what these solutions actually look like and where they can be used in practical terms.

Definition of terms

What is "green" hydrogen?

When the energy required to split water into its two components oxygen and hydrogen is generated from wind or the sun, the term "green hydrogen" is used, as it is made without CO_2 emissions.

What is "grey" hydrogen?

In industry, hydrogen is created as a by-product (e.g. in methane reformation from natural gas). As it is not made without CO_2 emissions through this process, it is referred to as "grey hydrogen".

What does power-to-x-mean?

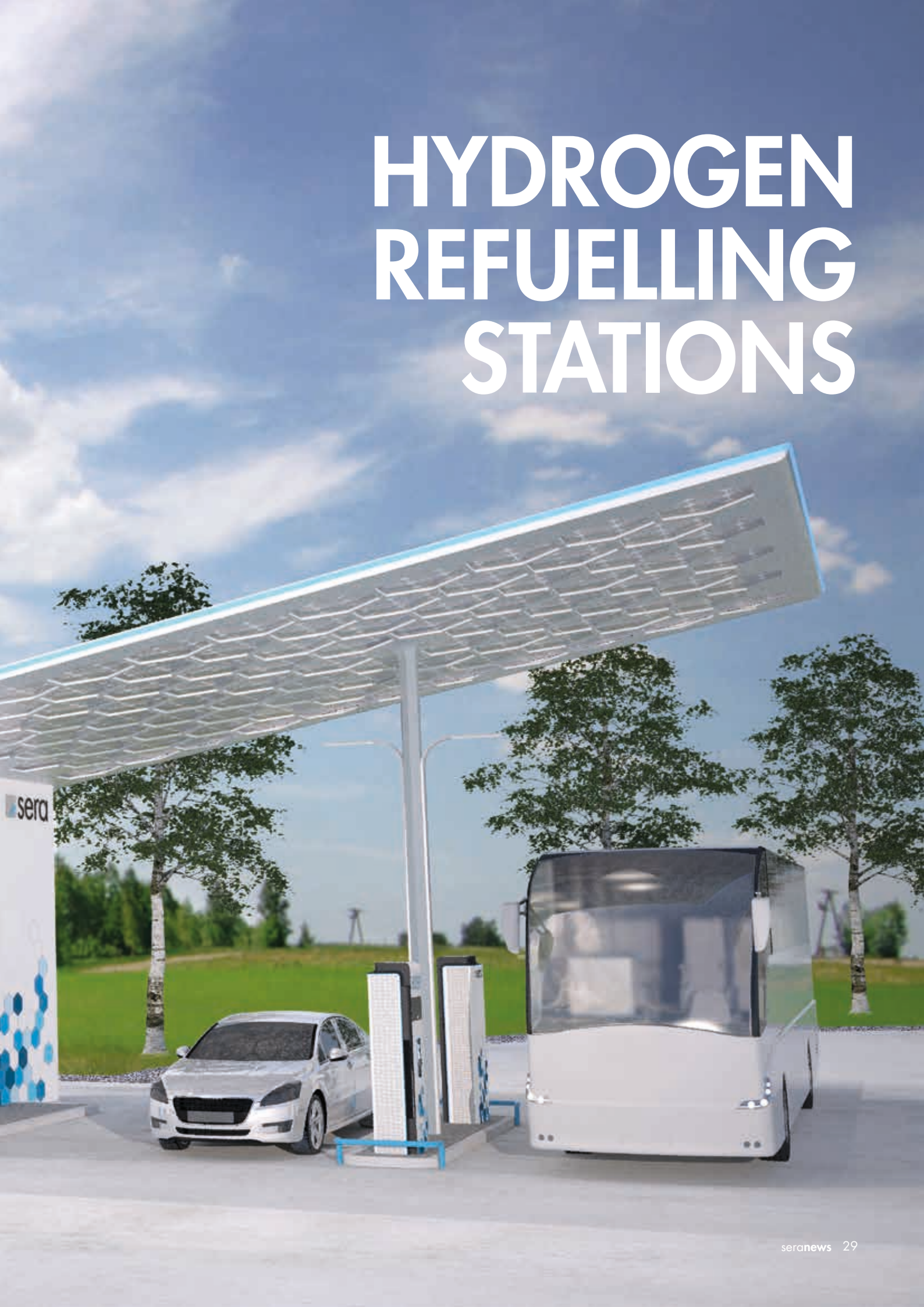
Power-to-x-systems are various types of technology that store excess electricity from variable renewable energies (wind, solar or water power) and make it available at a later date. power-to-x-systems are important components in coupling sectors.

What does sector coupling mean?

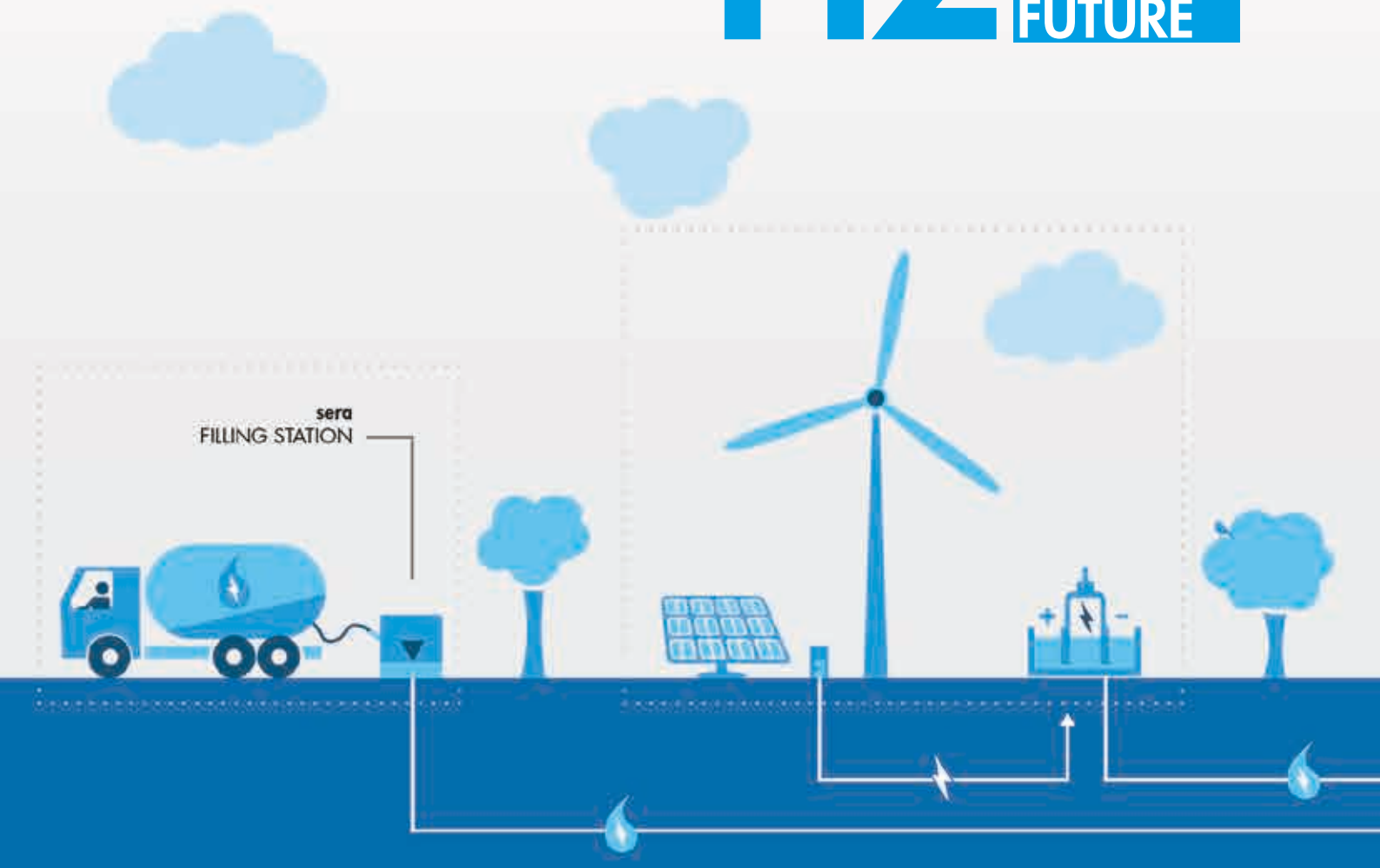
This refers to a holistic approach to the energy generation sector and industry to create synergies. All areas of the economy can be decarbonised with the aid of renewable energy sources, while lowering energy consumption and ensuring energy security. It is therefore a key concept in the energy transition.

"Water is the coal of the future. The energy of tomorrow is water which has been decomposed by electricity. Its elements that are broken down in this way (hydrogen and oxygen) will provide the Earth with an indefinite supply of energy".
– Jules Verne realised this as long ago as 1870 in his novel "The Mysterious Island".

HYDROGEN REFUELLING STATIONS



H2 ENERGY OF THE FUTURE

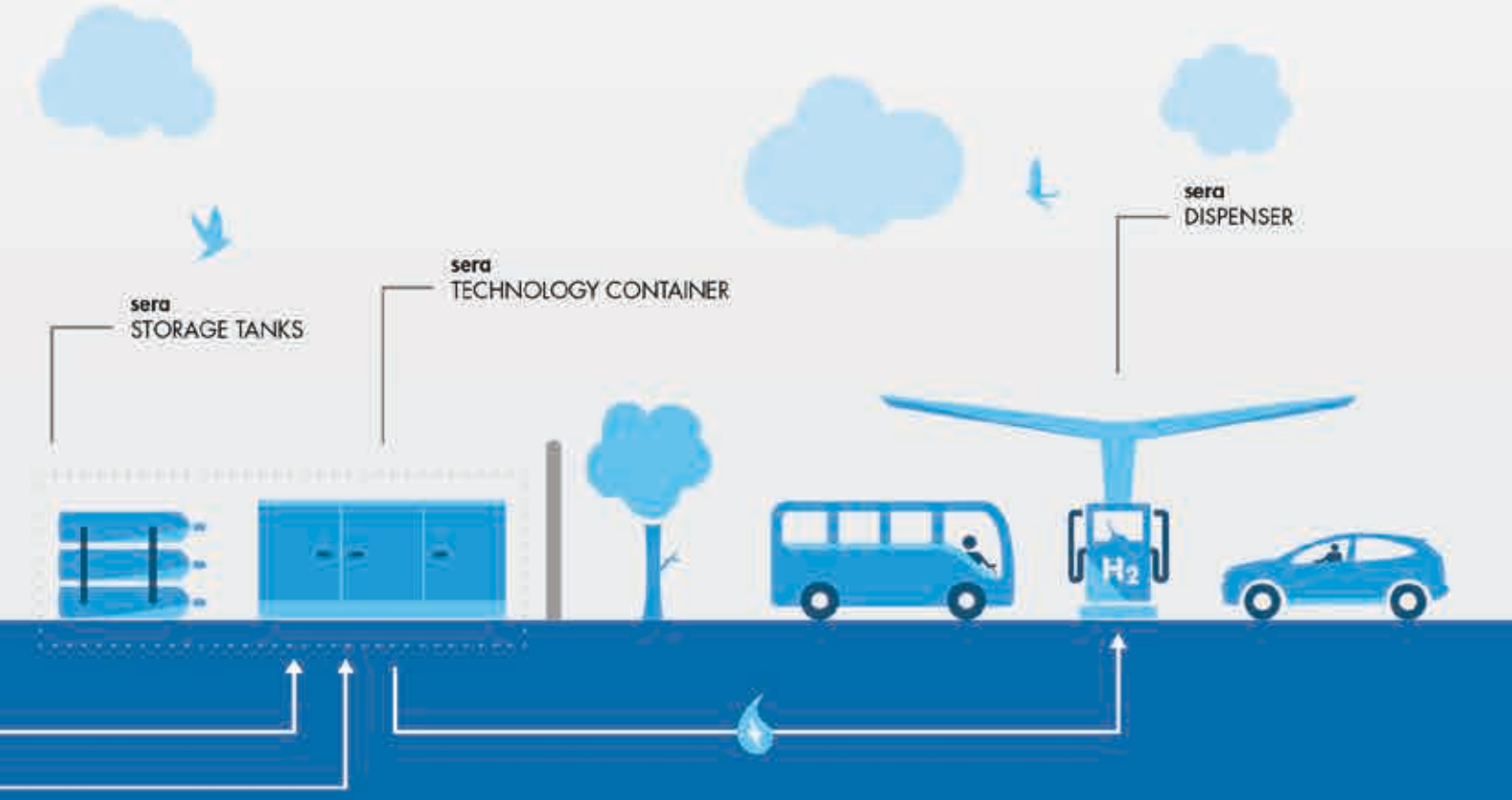


How hydrogen gets to the refuelling station:
Where does it come from, how is it stored and then used?

On-site production: Hydrogen can be produced locally by an electrolyser and fed directly into the refuelling station system. Here it is compressed by an innovative **sera** compressor (metal diaphragm or dry-running piston compressor with electro-hydrostatic drive), brought to the appropriate pressure level (300-700 bar) and then put directly into the storage tanks. It is then available whenever required.

By delivery: If the hydrogen is made elsewhere (electrolysis or waste product of industry), it is put in a trailer (in liquid or gas form) and transported to the refuelling station. The tanker driver attaches it to the **sera** supply cabinet and allows the hydrogen to flow into the storage tanks. From here, the process is identical to on-site production.

At a time when fossil fuels are running out and environmental protection is becoming increasingly essential for our planet, sera Group has made a commitment to this very vision. Driven by this, sera has developed and launched an innovative hydrogen refuelling station as a ground-breaking step towards the preservation of our environment, and has therefore played its part in the energy transition. Hydrogen technology: the fuel of the future.



ADVANTAGES OF THE sera HYDROGEN REFUELLING STATION

Reliable & low maintenance
*The slow stroke of the **sera** compressor puts little strain on wearing parts, giving them a long service life.*

Low energy consumption
*The electro-hydrostatic drive and low friction in the innovative **sera** compressor technology ensure low energy consumption.*

High flow rates
*The innovative **sera** piston compressor allows high flow rates. This makes frequent refuelling easily achievable even with high discharge volumes.*

Easy to service
*The **sera** system container has been designed so that every technical component is easily accessible. This minimises servicing time and guarantees ease of use.*

Quiet operation
*During development, special care was taken to keep noise emissions as low as possible so that the **sera** hydrogen refuelling station can also be used in noise-sensitive areas.*

Modular design
Thanks to standardised modules, the hydrogen refuelling station can be perfectly tailored to customer needs. Subsequent add-ons are no problem.


ENERGY OBSERVER
ACCOR
thelem
BALANCY
ONCIC

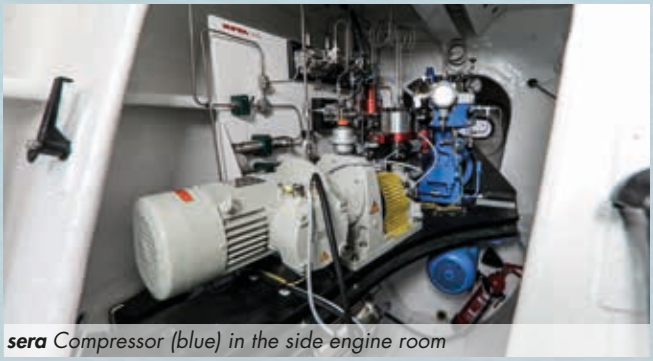
ENERGY OBSERVER

www.energy-observer.org

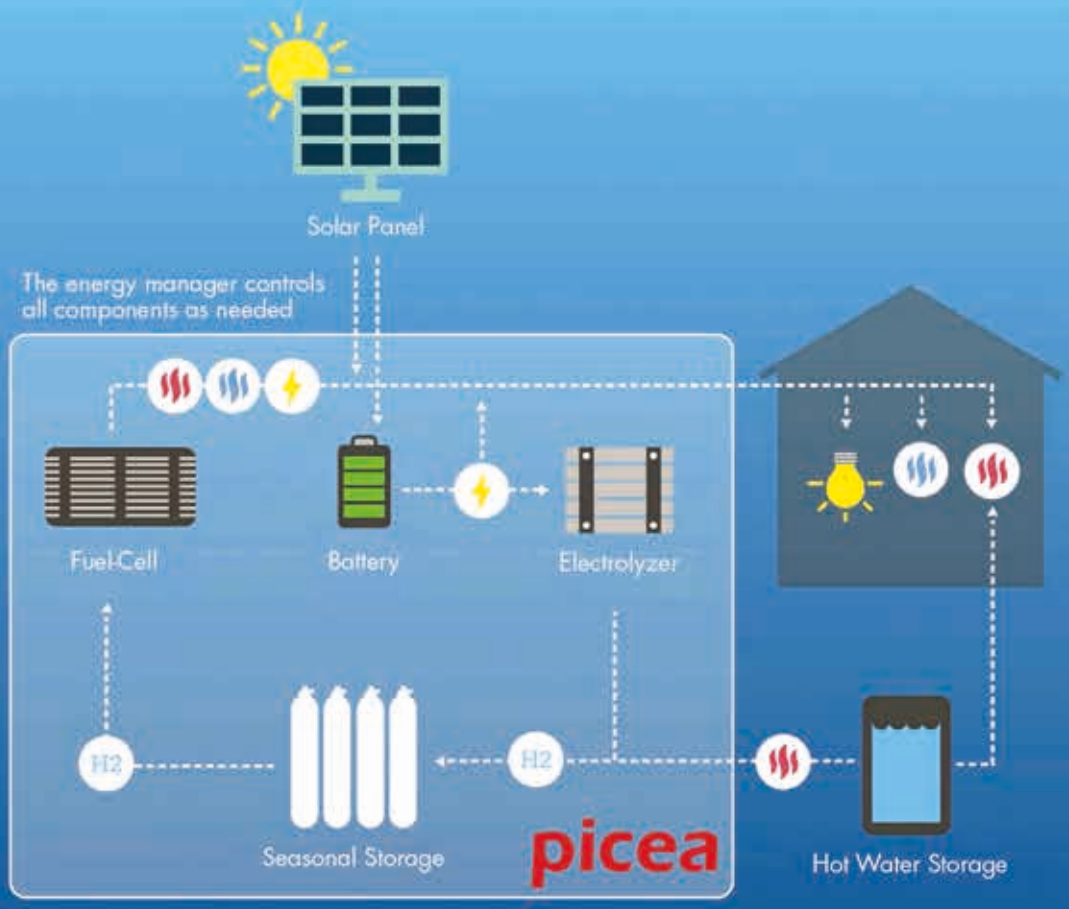
The Energy Observer is the world's first hydrogen ship. It set sail for the first time in April 2017 off Saint-Malo in France. It is a solar-wind-hydrogen catamaran. It is driven by two electric motors, which are supplied with the electricity required using various technologies. The catamaran is equipped with solar cells and two wind turbines.

The Energy Observer also has an electrolyser and a hydrogen tank on board to store energy for night trips and unfavourable weather conditions. It works using reverse osmosis with desalinated water and can produce up to 4 m^3 hydrogen per hour. The reconversion of electricity then takes place using an integrated fuel cell system. The Energy Observer is on a 6-year world tour planned from 2017 to 2022, visiting 50 countries and a total of 101 ports of call, including historic ports, nature reserves, endangered ecosystems and international events.

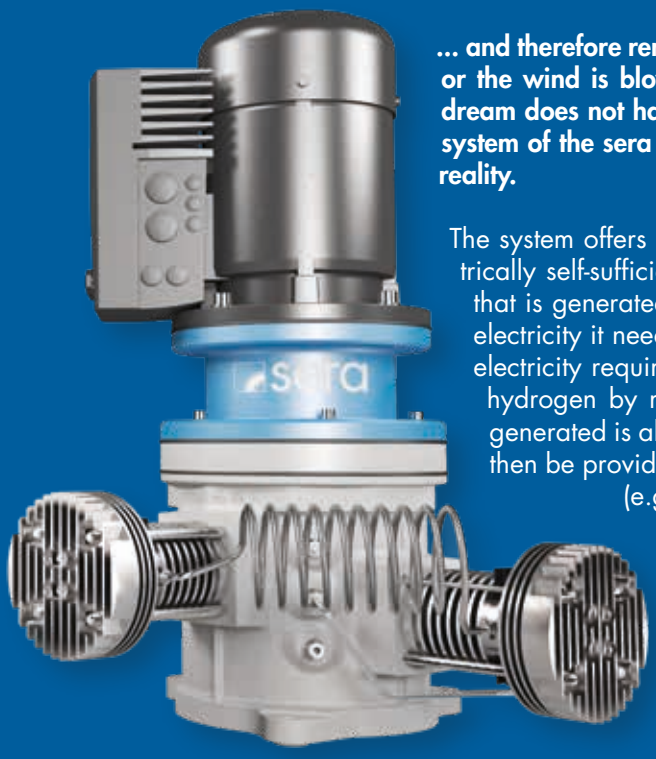
A **sera** product is also on board for this journey around the world to play its part in research into the energy of the future. The **sera** compressor forms a compression system together with a compressor from our distribution partner Nova Swiss. This compresses the hydrogen produced from seawater by an electrolyser, first from 30 to 160 bar by means of a "booster" (from **sera**) and then in a second stage to 350 bar. This is then stored. As soon as all the batteries have been charged by wind and solar energy, the electrolyser is driven by excess electricity. As required, the stored hydrogen is converted back into electricity by a fuel cell.



sera *Compressor (blue) in the side engine room*



GENERATING AND USING YOUR OWN CO_2-NEUTRAL ENERGY...



... and therefore remaining independent, no matter whether the sun is shining or the wind is blowing – that's the dream of many home owners. But the dream does not have to remain a dream, as the innovative building energy system of the sera partner HPS Home Power Solutions GmbH is making it a reality.

The system offers energy management which facilitates a sustainable, electrically self-sufficient and freely scalable home energy system. The energy that is generated by a photovoltaic system can supply the home with the electricity it needs during the day and store some of it in a battery for the electricity required over night. The excess electricity is stored in tanks as hydrogen by means of electrolysis according to the season. Any heat generated is also used for hot water in a hot water storage tank, and can then be provided whenever it is needed. If the solar energy is insufficient (e.g. in winter), the seasonal storage unit comes in to supply the home with electricity as usual by means of the fuel cell. If there is no sunlight at all, the fuel cell supplies all the heat and electricity with the aid of the seasonal hydrogen storage tank.

HYDROGEN – THE NUMBER 1

Hydrogen (H) is a chemical element. It was discovered by Cavendish (England) in 1766. Hydrogen is in the 1st period and the 1st group of the periodic table, so it is in first place. Hydrogen is characterised by a simple atomic structure. It consists of a single proton in the nucleus and a single electron in the shell.

This gives it two properties:

- H_2 is 14 times lighter than air
- H_2 has the highest diffusion capacity of all gases

Hydrogen is a component of water and of most organic compounds; in particular, it occurs in all living organisms. Hydrogen makes up 75% of the entire mass or 93% of all atoms in the solar system. Hydrogen itself is not explosive. Only a mixture with oxygen or other oxidising gases in a certain concentration and with sufficient ignition energy is explosive. In hydrogen tanks, the liquid consumed is not replaced by air, as is the case with petrol or heating oil tanks, so hydrogen tanks are even safer than these.

Physical properties of hydrogen:

- non-toxic and non-irritant
- environmentally harmless, not harmful to water
- odourless and tasteless
- invisible, almost invisible flame
- volatile and escapes through the smallest openings
- embrittling effect on some materials
- non-corrosive
- non-radioactive
- non-carcinogenic

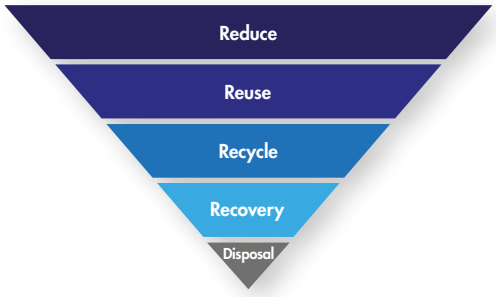
THE WASTE RECYCLING PLANT IN BONN

Energy generation with the latest technology

It is now illegal to deposit untreated waste on disposal sites in Germany. But new methods of waste recycling are required to cope with more than 400 million tonnes of refuse a year.

The statutory waste hierarchy specifies avoidance, reuse and recycling as the most effective approaches to dealing with waste. Conversion of waste into energy, i.e. incineration, is in fourth place in the hierarchy. Incineration of refuse is actually an important component in current waste management, as it contributes to environmentally friendly waste disposal through destruction and exfiltration of pollutants. MVA Bonn is an outstanding example of this.

Recycling of the waste from Bonn and the surrounding region is carried out by Müllverwertungsanlage Bonn GmbH (MVA), a subsidiary of Stadtwerke Bonn (Bonn Public Utilities). Over 1,000 tonnes of waste, which has to be disposed of in a safe and environmentally friendly way, is delivered to it every day. In a complex thermal process, the waste is first incinerated and then processed. Stadtwerke Bonn obtains energy from waste using state-of-the-art technology. The Bonn waste processing plant produces steam when waste is incinerated and this is supplied to the neighbouring Stadtwerke Bonn cogeneration plant. Here the steam is turned into electricity and district heat.



Flue gases are created when the refuse is burnt. Their energy is recovered by means of a boiler or steam generator that is downstream from the incineration process. As the hot flue gases flow through the boiler, they are cooled down, while the boiler feed water heats up and evaporates. The steam created is then used to generate electricity and heat. In the downstream condenser, the steam is liquefied again and returned to the feed water.

The feed and boiler water must meet certain requirements to operate a boiler safely and without causing damage. **sera** designed and supplied a special dosing system for the boiler plant at MVA Bonn. Two independent dosing systems for caustic soda and ammonia water have been installed in this plant, which condition the boiler water in such a way that it corresponds to the specifications of the VGB (technical association of energy plant operators) guidelines for power station operation. Both systems have dosing pumps, fittings, 500 litre batching tanks, fill level sensors, collecting basins and space for delivery containers. As ammonia water is a volatile chemical, this part of the system has a gas-tight design. A shared control cabinet monitors the two dosing systems and provides information to the control centre at MVA Bonn. Decentralised monitoring and control of the systems are therefore possible.

The application solutions are both made fully automatically and with level monitoring from a mixture of concentrate and water. Dosing of the prepared solutions is carried out with controllable **sera** diaphragm and/or piston pumps. The demand on and adjustment of the pumping capacities depend on the operation of the higher level system

parts. **sera** dosing pumps ensure that there is a consistent pH value in the boiler feed water by adding caustic soda and that the condensate has a pH value of approx. 9.5 to protect the feed water and condensate pipes. In this way, the boiler and pipes in the thermal section of the MVA have the optimal permanent corrosion protection. Here, too, our dosing systems create added value for people and the environment as an important component of the thermal waste treatment process.

MVA Bonn

» Year of construction: 1992
» Commissioning of the second bunker: 2016
» Incineration lines: 3
» Total capacity: 250,000 t
» Steam supply: approx. 500,000 MWh
» Electricity generation: approx. 97,000 MWh
» Production of district heat: approx. 182,000 MWh

WE CREATE ADDED VALUE FOR PEOPLE AND THE ENVIRONMENT

Preservation of biodiversity is important to us all. The UN estimates that, of the eight million or so species of plants and animals, up to a million will be threatened with extinction in the coming decades. There are a variety of reasons for this: monocultures in agriculture and gardens, the use of chemical fertilisers, environmental pollution and climate change are just a few of them. The effect on us will be massive if we do not counteract the extinction of species and change our thinking.

Dramatic decline in biodiversity

Extinction of species is not just a phenomenon of the modern age. Enrichment of the atmosphere with oxygen, significant cold spells, the rise and fall of the sea level, volcanic activity and the suspected impact of asteroids are just some of the momentous events that have caused mass extinctions. The extinction of species is therefore nothing new. But, depending on the species and the estimate considered, the rate of extinction is now at about 100 to 10,000 times that of the natural figures, which amount to the extinction of 1–3 species a year. Scientists have determined that in Germany one third of the insect, millipede and spider species have already died out. The number of animals has also fallen dramatically: in forests by a third, in grassland even by two thirds, according to a Tagesschau report at the end of October 2019. The picture is similar for bees and butterflies, too. The drastic rate of extinction of species at the moment is caused by human beings, and those causes are varied. Three quarters of the natural areas on the continents have been changed significantly by human beings, in the oceans that figure is two thirds. According to a UN report, agricultural harvests have quadrupled since 1970. Logging has increased by almost 50 percent. 60 billion tonnes of renewable and non-renewable raw materials and resources are extracted every year – almost twice as much as in 1980. The total area covered by cities is now twice as large as in 1992. Plastic waste pollution has increased tenfold since 1980 and large quantities of heavy metals, toxins and other waste materials from factories are ending up in bodies of water, according to the report.

The long-term consequences for us are difficult to imagine: we are at the end of a food chain. With dwindling biodiversity, our variety of food will be significantly smaller in future and sources of food will simply disappear. With the decline in the variety of species, we will also lose sources of medication, as we get our medicines from the plants on Earth. And we are already suffering from crop failures due to climate change. The estimated annual value of the global crop harvest which is at risk from the decline in the populations of pollinators is between EUR 210 and 515 billion. In China, insects are dying out to such a dramatic extent that the flowers of plants have to be pollinated by hand – although human beings come nowhere close to the pollination rate that bees would achieve in the same time. The loss of biodiversity is not purely an environmental issue, but is also affecting development, the economy, political stability and social factors such as flows of refugees. The national and global efforts and concessions of governments and the agreed climate protection targets unfortunately fall very short of the mark when it comes to stopping

climate change and counteracting the extinction of species. It is time for scientists and the climate activists of the "Fridays for the Future" movement to be heard and to take more extensive, concrete measures to maintain the planet Earth in a habitable state for future generations. Moreover, every one of us has the opportunity to change things in our own "microcosm" and make a contribution to securing the future of the Earth. You will find some practical tips on pages 42 and 43.

The sera Environment Day

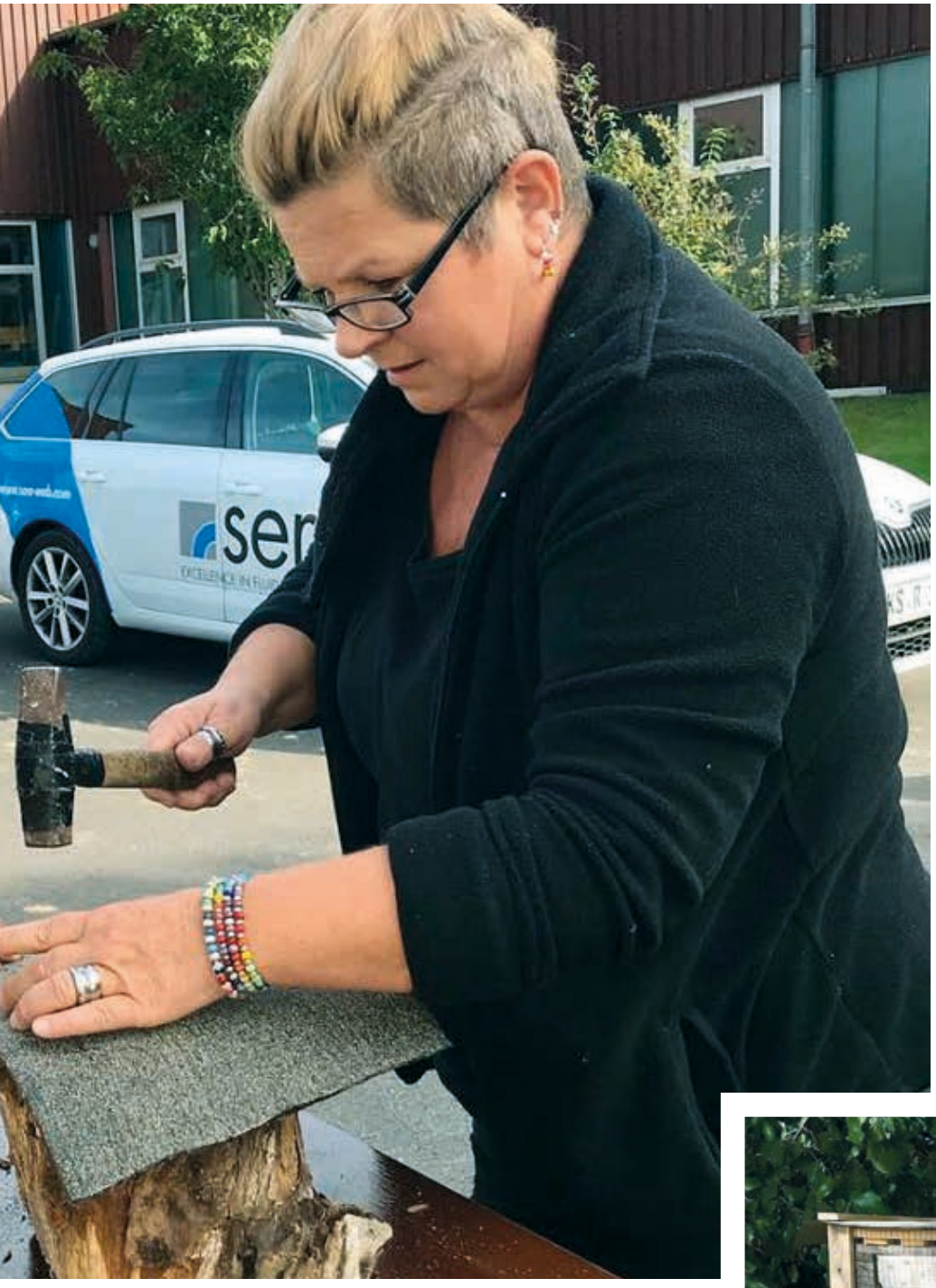
We at **sera** take our responsibilities very seriously. As an environmental technology company, we are always striving to benefit the environment with our products – whether it is in wastewater treatment, in the field of alternative energies or in processes for saving water. We have internalised our guiding principle "We create added value for people and the environment". With bike leasing, we are encouraging our **sera** employees to switch from the car to the bike, we are gradually converting our vehicle fleet to electric and hydrogen mobility and we always have an eye on the environment. The main **sera** site has large green spaces which we have left to nature as far as possible; planted with apple trees it borders directly on a stream with lots of undergrowth and retreat for animals of all sorts. But that is not enough for us, so we set up the **sera** Environment Day several years ago. Initially it was a day of action when we at **sera** devoted ourselves to one project – collecting rubbish on site or cutting back weeds in the neighbouring woods to give the young oaks planted there room to grow – we simply rolled up our sleeves.

But two years ago we decided to devote the Environment Day to the topic of "biodiversity and preserving species". Since then, we have run one day in early spring and another in late autumn. Our aim was and still is to create living space for animals and thereby to ensure that many species can live safely and in a way appropriate to them.

We used the first day to build various places of refuge, nesting sites and opportunities to find food:

- *A 5* insect hotel is available for various insects and spiders, away from the hustle and bustle of **sera**. We have set up the individual floors in different ways to provide appropriate living space for various species such as bumblebees, earwigs, spiders and many other animals.*
- *For spiky quadrupeds, we have created hibernation facilities made of stones, dead wood and leaves.*
- *A total of 20 homemade bird boxes were put up at the two **sera** sites in Immenhausen.*
- *In addition to a large meadow, we have created small areas with bee-friendly flowers and plants all over the site.*

Although this was a lot of work, as a team we have created something really special – also thanks to the experts who work at **sera**: some colleagues are apiarists and gave us great advice when it came to creating the meadows, other colleagues made wild gardens and areas that protect certain species. Not only did we benefit from this, nature does too. Since the first of the "new" Environment Days, we have been using the date in autumn to make everything ready for winter: more



Info box

» Eight million species of animals and plants live on Earth, including 5.5 million species of insects.

» About one million species of animals and plants are threatened with extinction. This means that one in eight species of animals and plants is under acute threat of extinction.

» About 500,000 species do not have the living space they require for long-term survival.

» 33% of fish stocks in the world's seas were over-fished in 2015.

» 85% of the wetlands that existed in 1700 had disappeared by 2000.

» About half of the planted area on the earth is agricultural land.

» Almost 30 million hectares of forest is cleared every year – that corresponds to about 42 million football fields.

leaves are provided for the hedgehogs, the bird boxes are checked but left in place for dormice, and the insect hotel is refilled with material. At the end of February, all the areas are made ready for spring. The bird boxes are taken down and cleaned – so that they do not still smell of human beings in spring and the birds can move in, the meadows are ploughed and prepared for sowing and the insect hotel is also cleaned and filled with completely new material. With our Environment Day, we show that everyone really can make a contribution. We are proud to create added value for people and the environment, and we hope that many readers will follow our example – nature will thank us for it!

OUR TIPS

FOR AN ENVIRONMENTALLY FRIENDLY LIFE

Every person living in Germany produces around ten tonnes of CO_2 per year – simply by living in a consumer-orientated industrial nation. With small changes to everyday life, however, each one of us can make the world a little greener and more sustainable.

1,36 tonnes of CO_2
CAUSES ROAD TRAFFIC EVERY YEAR

Short distances can be covered on foot or by bike. Over 100 kilometres, you will save 18.9 kg of CO_2 in this way. If you really have to use the car, create car pools and "share" your CO_2 footprint. A flight creates almost six times more CO_2 than an intercity railway journey over the same distance.

18 million tonnes of waste
WERE PRODUCED IN GERMANY IN 2018

Germany is a recycling country! Sort your rubbish consistently to make recycling possible. As much as 80% of paper and glass waste can be recycled, as can half of plastic waste. Large proportions of the remaining waste are converted into heat and electricity in waste incineration plants.

60.2 kg of meat
CONSUME THE GERMANS PER YEAR

Pay attention to the origin of foods too. Organic and regional are always better for the environment than cheap and from the other end of the world. The mass production of meat, in particular, is very harmful to the environment as far as water consumption and CO_2 emissions are concerned. Better to eat meat just once or twice a week, but higher quality meat. In this way, you are doing something for the environment, animal welfare and your health.

2 billion plastic bags
ARE USED IN GERMANY PER YEAR

In 2016 every German created 38 kilograms of plastic waste. Use net bags instead of plastic carriers, bamboo toothbrushes instead of plastic ones, reusable wax paper instead of clingfilm, avoid takeaway coffee cups, use glass instead of plastic bottles and be aware of plastic when shopping.

60 garments
GERMANS BUY EVERY YEAR

H&M, Primark and others offer cheap, modern clothing and their collections change 52 times a year. Of course, the "old" stuff is quickly removed from the shelves and disposed of to make space for new items. Production, transport and disposal do enormous damage to the environment. Opt for sustainable labels and materials of good quality and durability. Reuse your favourite items, go to clothing bazaars and second-hand shops – you can find real treasures there.

3,000 kWh of electricity
CONSUMES A TWO-PERSON HOUSEHOLD

Think about your electricity consumption! The recommended annual electricity consumption is about 1,500 kWh per person and 2,500 kWh for a two-person household. But very few households keep to this figure. Save electricity by not leaving any devices on standby, use master-slave plug sockets that can be switched off easily and consider the energy efficiency of new appliances before you buy them.

130 litres of water
ARE CONSUMED BY GERMANS PER DAY

Jump into cold water – under the shower! Or reduce your shower times a little. Because heating water takes a lot of energy. A full bath also uses approx. 140 litres of water. A shower, on the other hand, uses 15 litres per minute. With economical shower heads, considerably less.

74 million trees
WERE PLANTED BY ECOSIA USERS

Keep an open mind! There are many ways to help the environment – without really having to do much. Support "green alternatives" in various areas of life. Our tip: use Ecosia (www.ecosia.org) as your search engine and browser and have a tree planted for every 45 searches. Ecosia is more than CO_2-neutral – its servers are operated entirely by renewable energy and the trees planted take CO_2 out of the atmosphere.

10 grams of CO_2
PER EMAIL SENT

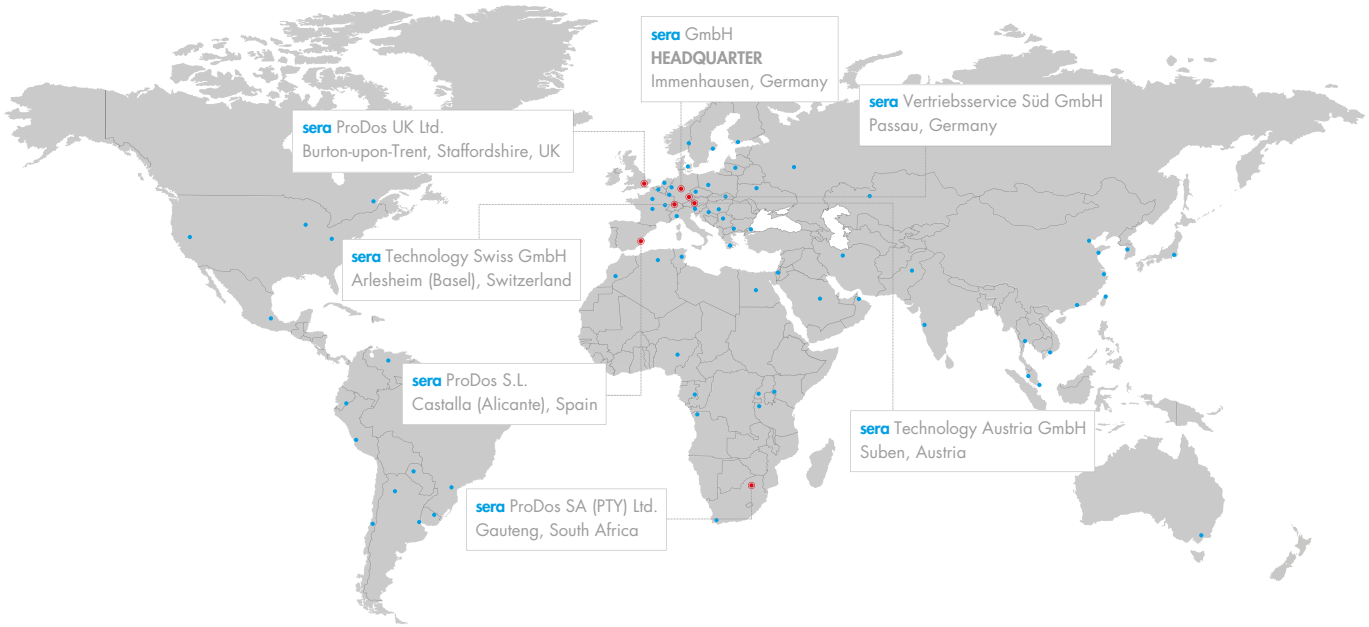
Emails cause CO_2! Whether you are sending them or saving them – nothing works without servers. But as servers require large quantities of energy, they are producers of CO_2. Consider whether your emails are really necessary and delete unimportant emails and SPAM quickly and regularly. We could save 91,000 tonnes of CO_2 a year if every one of us in the world deleted eleven emails a day.

WORKING FOR YOU ALL OVER THE WORLD

Your sera contacts

With headquarters in Germany and subsidiaries in the UK, Spain, Austria, Switzerland and South Africa, as well as a global sales and service network with over 30 partners in more than 80 countries all over the world, **sera** guarantees the best possible customer care on-site.

FOLLOW US



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EXCELLENCE IN FLUID TECHNOLOGY

"Print CO_2-checked" initiative

In the print and media industry, too, awareness of climate change is ubiquitous at the moment. The "Print CO_2-checked" initiative, led by the associations of the printing and media industries, is raising awareness of harmful emissions in the sector. "Print CO_2-checked" was set up by the Bundesverband Druck und Medien (Federal Association of Print and Media (BVDM)).
The Association developed the principles for its approach and the CO_2 calculations in consultation with the Federal Ministry for the Environment and the Öko-Institut Freiburg. Companies interested in participating in the initiative simply have to be members of an association in the printing or media industries. Across Germany, more than 100 businesses are already working to improve their climate balance with the aid of "Print CO_2-checked".

The "Print CO_2-checked" seal stands for three basic objectives:

- determining CO_2
- avoiding CO_2
- offsetting CO_2

If you wish to join the "Print CO_2-checked" initiative, you also undertake to review your energy consumption with the help of independent experts. Opportunities to make savings can often be identified in this process.
At the end of it, companies are shown ways to neutralise harmful emissions and thus to get involved actively in climate protection. The company First Climate, which promotes renewable energies in cooperation with the WWF, is responsible for neutralisation. The CO_2 certificates in the printing industry support a project to reduce flue gas in Kenya.

This edition of **seranews** was printed by our partner printshop in the region in a CO_2-neutral process. The waste heat from the printing machines, for example, is used to heat the building. In addition, only mineral-oil-free inks were used during printing, as they contain plant oils from sustainable agriculture that are easily bio-degradable and thus leave no residues when recycling used paper.

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