



**TRO**









**life**

magazine no. 11

**Food and drink.**

Air purity in breweries.



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## Air purity in breweries.

Top-quality and healthy air is our mission. Given that people spend 90% of their time inside, ensuring exceptional indoor air quality is extremely important. As well as enhancing productivity and performance, it also plays a part in reducing absences, as levels of fine dust, infections and allergies can be avoided through the effective filtration of the outside air. For us and our industry, indoor air quality is the main topic that attracts our attention and presents a constant challenge. Whereas much has been said and written about air pollution and the greenhouse effect, the topic of indoor air quality has been nowhere near high enough on the public agenda.

Particularly with respect to the food and drink industry, which provides the focus of this issue of the magazine, a hygienic environment is essential when it comes to providing sensitive products with effective protection. In our title story, come and join us at the bottling plant of the VELTINS brewery, where our central AHU units play their part in ensuring the purity of the beer. What's more, you will come across a whole host of interesting and amusing facts on the topic of food and drink.

In this Olympic year, we couldn't let this issue pass without mentioning the Games in Rio. We report from Brazil, where TROX was responsible for the ventilation equipment in three sports venues, the International Broadcast Centre and the Main Press Centre. TROX do Brasil has also made a major contribution to the country's research institutes, which have been working at full capacity in the run-up to the Olympics in their efforts to investigate the Zika virus. Two of Brazil's most important institutes have been equipped with special clean benches, which ensure uniform, laminary airflow at the lab workstation and keep it free of germs and other air particles.

After 10 issues of TROX Life, we have decided to revamp the layout of our popular customer magazine – making it more colourful, larger and covering a greater range of topics – and we hope you are pleased with the results.



And now: Enjoy our magazine!

Yours

Udo Jung  
 CTO of TROX GmbH



# Beer is in the air. Ventilation in breweries.

For the past 500 years, German beer has been brewed according to the so-called “Reinheitsgebot”, or purity law, which allows only water, barley, hops and yeast to be used in beer. There is, however, also another type of purity “law” that applies to the actual brewing process. Specifically, hygiene in a bottling hall has to meet the most stringent requirements. While we described the various types of ventilation, standards, guidelines and requirements of the different air cleanliness classes in highly sensitive areas already in the Clean Room Air issue of TROX life, this current issue of our magazine deals with the hygiene version of a TROX air handling unit.



For the C. & A. VELTINS brewery in the hilly Sauerland region 150 km east of Düsseldorf, sustainability has priority. This includes using resources efficiently. Investment into a new brewing process and equipment has helped to save 30% of thermal energy and another 10% of electrical energy. While previously less energy-efficient fresh steam had to be used, the coppers are now heated with warm water from the energy storage system; this is much more energy efficient since waste heat can be used.



VELTINS BREWERY in Meschede-Grevenstein, Germany

# VELTINS Pilsener. As pure as German beer can be.



When VELTINS installed their new keg filling equipment, energy efficiency was a principal requirement. Kegs are reusable, can be filled on commercial filling lines and provide sterile storage. Ventilation and air conditioning of the brewery are handled by a large TROX X-CUBE air handling unit with a volume flow rate of 62,000 m<sup>3</sup>/h; the air handling unit has been configured to meet the bespoke requirements of VELTINS:

- High levels of air cleanliness and comfortable indoor air quality, to be achieved with a high air change rate and air filtration
- Excellent hygiene in order to protect the products

As you enter the floor with the filling equipment, you see immediately the high standards of hygiene, cleanliness and purity. The materials used are also hygienic. Shiny stainless steel everywhere, including the cable trays, and no sharp edges anywhere.





Intelligent controls allow for demand-based volume flow control.

An X-CUBE air handling unit provides 62,000 m<sup>3</sup>/h of fresh and hygienically safe air.

### High-tech indoor air conditioning.

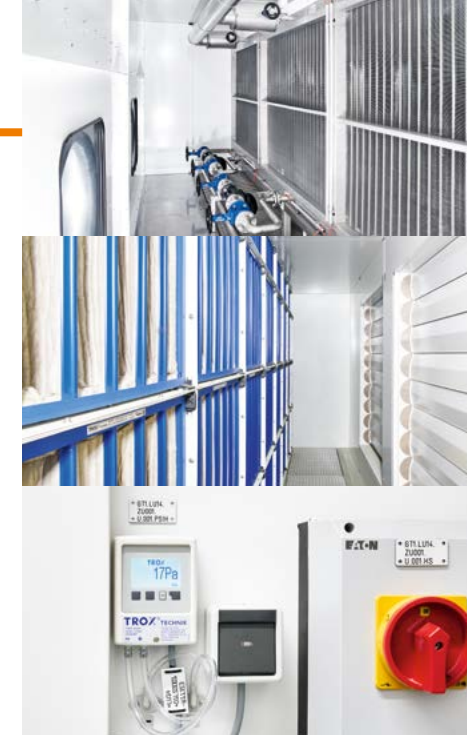
The TROX X-CUBE is a configurable air handling unit, and even the basic version boasts outstanding levels of safety, reliability and quality. When compared to this standard air handling unit, which is suitable for the most diverse applications, the hygiene version used by VELTINS has a number of additional advantages:

- Damper blades that comply with closed blade leakage class 4 to EN 1751
- Powder-coated attenuator splitters
- Stainless steel floor panels inside

A special benefit of the X-CUBE hygiene version is a stainless steel condensate drip tray for the heat exchanger unit. The condensate drip tray, developed by TROX, is sloped in all directions and hence ensures complete drainage; it also makes the unit easy to clean.

As requested by VELTINS, the X-CUBE includes two-stage filtration with F7 and F9 pocket filters with NanoWave®. Extract air is also filtered in order to keep the extract air ducts clean. To ensure overall hygiene, the HVAC contractor had all supply air ducts cleaned and disinfected before commissioning.

Since steam is required for the brewing process anyway, the air in the X-CUBE is heated with steam. With steam heating the X-CUBE's condensate removal solution is particularly useful.



Smooth surfaces, clever condensate removal and easy access to the unit ensure the highest hygiene standards.

F7 and F9 pocket filters made of NanoWave® help provide clean supply air.

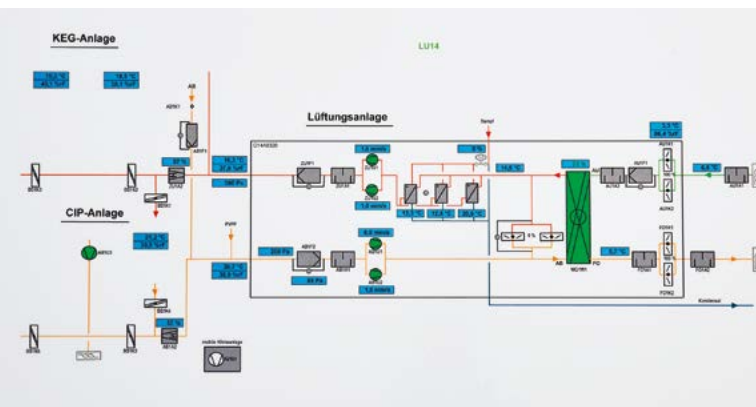
Differential pressure transducers capture the pressure upstream and downstream of the filter units.

### Intelligent indoor air management.

Communication between the X-CUBE and the central BMS is with plug and play. All operating values for the air handling unit are measured, collected and evaluated. The VELTINS facility manager knows at any time the operating status and the relevant parameters. The intelligent control system ensures demand-based ventilation. This means that the supply air flow, which the fans produce, is adapted to the actual demand; dampers are controlled accordingly. All this results in considerable savings.

The use of innovative heat recovery systems, highly efficient fans and aerodynamically optimised components such as filters or splitter attenuators means that the 2018 requirements of the ErP directive have already been met.

Differential pressure transducers measure the pressure upstream and downstream of filters and signal the current state such that a filter change can be scheduled if the dust load exceeds the maximum. Needless to say that this also increases energy efficiency.



Comprehensive information is made available thanks to an intelligent building automation system.



**Planning pays off in logistics and delivery.**

The air handling unit is easy to move and to place due to its modular construction. It was a wise decision by HVAC contractor Gebro Herwig GmbH to wait with erecting the front wall to the installation area until the air handling unit had arrived at its final installation location. This way the entrance to the building was large enough such that the air handling unit could be delivered in only four parts. The fewer parts there are, the easier it is to install an air handling unit.

*Adjusting the doors of the X-CUBE, e.g. after transport, is easy. It is important that the doors fit exactly and close precisely since a low-leakage casing is directly related to energy efficiency.*



The X-CUBE is available with welded base frames of up to 14 m in length and 2.50 m in width such that also larger units can be moved in one piece with a crane.

The floor in the manufacturing facility is always different from the floor at the installation location. This is why the X-CUBE units are shipped with standard fit doors. If the doors do not close exactly, e.g. due to transport or due to an uneven floor, they can easily be adjusted with an Allen key or TORX key. This ensures that the doors close tightly such that no energy is lost.



*Special welded base frames made of steel are available up to a size of 14 x 2.50 m and make it possible to ship and move even large sized units in one piece.*



*The excitement is palpable during any football match in the VELTINS Arena. And the fans appreciate a cold beer.*

**VELTINS Arena and below.  
An underground beer pipeline.**

Saturday afternoon. 62,261 thirsty throats. The VELTINS Arena is packed. And the football fans are thirsty. Very thirsty. The beer is flowing steadily. When Schalke, the local football club, plays at home, 30,000 litres of beer are sold.

**The world's longest beer pipe.**

To soothe the thirsty throats, five kilometres of pipes have been laid in the VELTINS Arena. The Pilsener is stored in 52 barrels of 1000 litres each. 126 nozzles in the Arena can dispense 52,000 litres of frothy Pilsener from the underground. Sensors in the pipes measure the volume flow rate – in this case the fluid flow rate. The quantity sold is displayed on screens. If there is any risk of a pipe running dry, an alarm is issued.

VELTINS is not the only company from the food and beverage sector that has TROX components installed; TROX can in fact be found at many well-known manufacturers in that sector all over the world. It is in the highly sensitive areas of health care, research and development, and clean room production where the intelligent LABCONTROL system provides reliable conditions.

And so TROX is also present in the VELTINS Arena. TROX sound attenuators ensure that the deafening noise in the Arena remains inside.

If you want to know more about ventilation and air conditioning in highly sensitive areas, why not have a look at the "Clean room air" issue of TROX life and at the "Clean Air" application brochure.

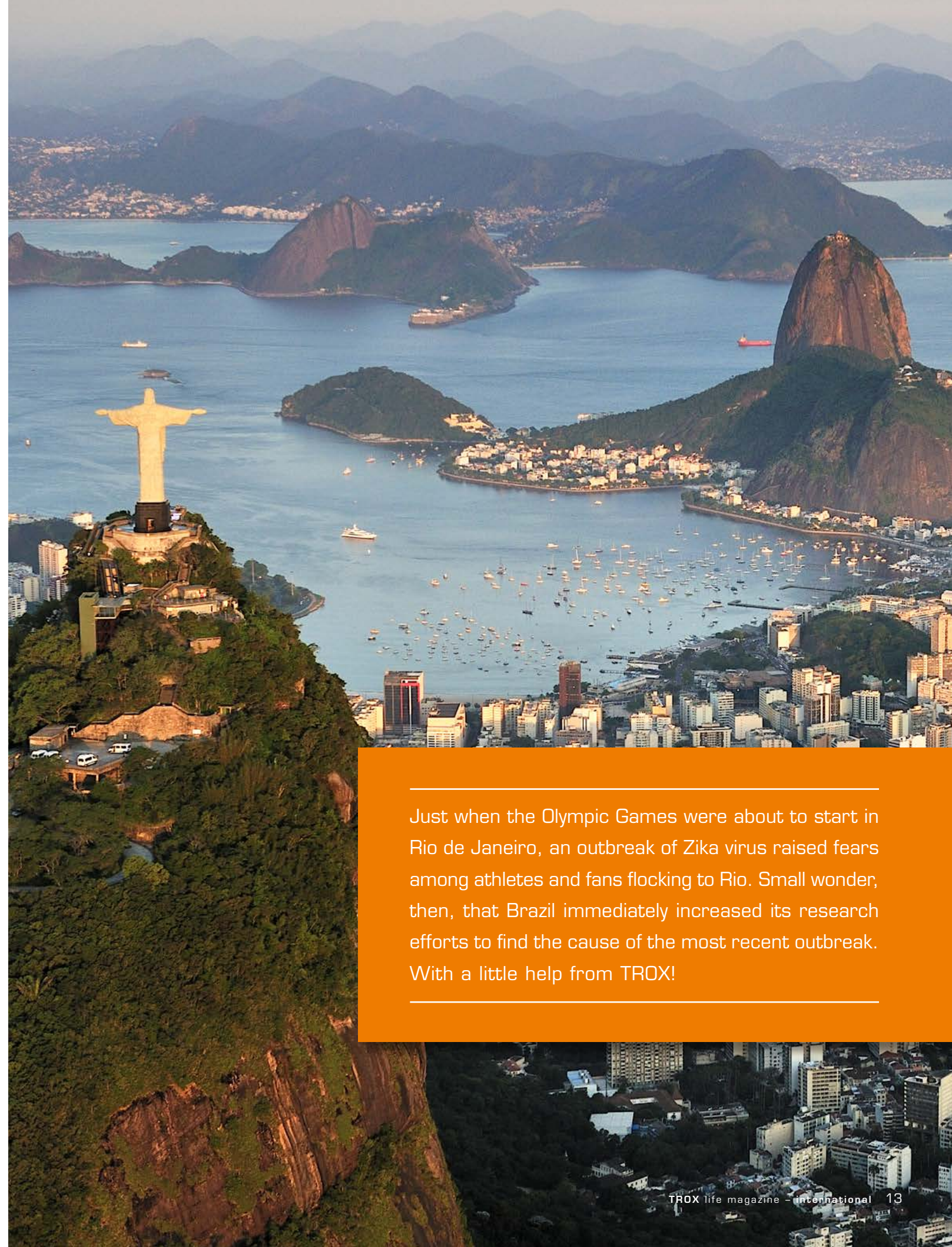


**If you would like to order any TROX life issues and application brochures you may have missed, just send us an e-mail (trox@trox.de).**





# Olympic air hygiene. TROX do Brasil.



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Just when the Olympic Games were about to start in Rio de Janeiro, an outbreak of Zika virus raised fears among athletes and fans flocking to Rio. Small wonder, then, that Brazil immediately increased its research efforts to find the cause of the most recent outbreak. With a little help from TROX!

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# TROX technology protects researchers from the Zika virus.

The Zika virus was first discovered in 1947 in a rhesus monkey at a research station in the Zika forest in Entebbe, Uganda, and named after the area. The monkey was being used by researchers to detect the yellow fever virus. In 2015, Zika virus infections causing impairments to the fetuses of pregnant women were observed in Latin America. On 1 February 2016, the World Health Organization (WHO) declared Zika a “public health emergency of international concern”. The viruses are primarily transmitted by mosquitoes. Transmission via bodily fluids also appears to be possible.

Against the backdrop of the Olympic Games in Rio, major efforts were put into researching the virus in Brazil. In doing so, it was of course vital to protect the health of the researchers in the laboratories to the greatest extent possible. A large number of research facilities in Brazil place their trust in high-quality TROX clean room technology. TROX Brazil has developed special safety workbenches. They ensure a uniform, laminary airflow at the lab workstation and keep it free of germs and other air particles.



Clean benches



The *Aedes aegypti* mosquito transmits the Zika virus and Dengue fever.

TROX has now also made it onto TV screens with an appearance on the popular Brazilian magazine show Fantástico. In the programme, TROX technology could be seen at work in the fight against the Zika virus. The show reported from the UFRJ (Universidade Federal do Rio de Janeiro) and the IDOR (Instituto D’Or de Pesquisa e Ensino), where TROX technology provides reliable working conditions and protects researchers against the Zika virus. The facilities are used to test “mini brains technology”, which aims to investigate the effects of the Zika virus on the brains of infants.

Special laminar flow workbenches are used, which above all protect the products and tests. The clean benches are equipped with filters and run primarily with ambient air. The laminary flow that they produce protects the samples from impurities and safeguards the health of the personnel.

Intelligent system solutions from a single source.



XCUBE control LABCONTROL TROXNETCOM AIRCONTROL

To provide safety and thermal comfort in laboratories at all times, the components of an air conditioning system are interconnected. As a consequence, the intelligent air management system with its LABCONTROL controllers can capture all relevant data, evaluate it and ensure that set parameters are achieved. In laboratories involving work with dangerous viruses, for example, it is the job of the indoor air conditioning to establish a range of pressure conditions. These differences in pressure prevent the release of substances from a lab into other parts of a building and vice versa.



**Peel it, cook it or forget it.**

The topic of nutrition represents a major challenge to Olympians. Although the main Olympic canteen provides nutrition catering to the different needs and sports of the athletes during the Games, everything from start times to conventional meal times, climatic conditions or unforeseen additional appointments such as anti-doping tests complicate athletes' regular dietary rhythms and when they are able to eat. With this in mind, the nutrition advisory board of the German Olympic Sports Confederation has produced a set of guidelines, and in Rio nutritional advisors from Olympic training centres are on hand to help athletes find solutions to specific problems and issues.

The athletes are advised, wherever possible, to take their meals in the canteen, where attention is paid to high standards and hygiene. This is because, in tropical climates, bacteria can spread much faster than in more temperate conditions. Europeans can therefore catch stomach bugs and high fevers very quickly, even in restaurants. Foods such as milk, mayonnaise, puddings and creamy desserts, ice cream, salads with mayonnaise, runny eggs, raw meat and raw fish should be avoided, as they are predisposed towards the rapid growth of bacteria.

Outside of the venues, only peeled fruit and vegetables and hot, cooked-through dishes should be consumed. The Olympic shopping lists include items from well-known producers in their original packaging – either vacuum-packed or sealed (tins, jars with click fasteners or bottles with sealed ring pulls).



**Dress code.**

As well as ensuring they take the right food on board, athletes in Rio also have to make sure they wear the right clothes. Due to the warm outside temperatures, most buildings in Brazil have air conditioning. The difference between the cold climate inside and the heat outside increases the risk of catching a cold, which is why athletes also have to think about packing warm clothing to wear indoors.

**No tap water!**

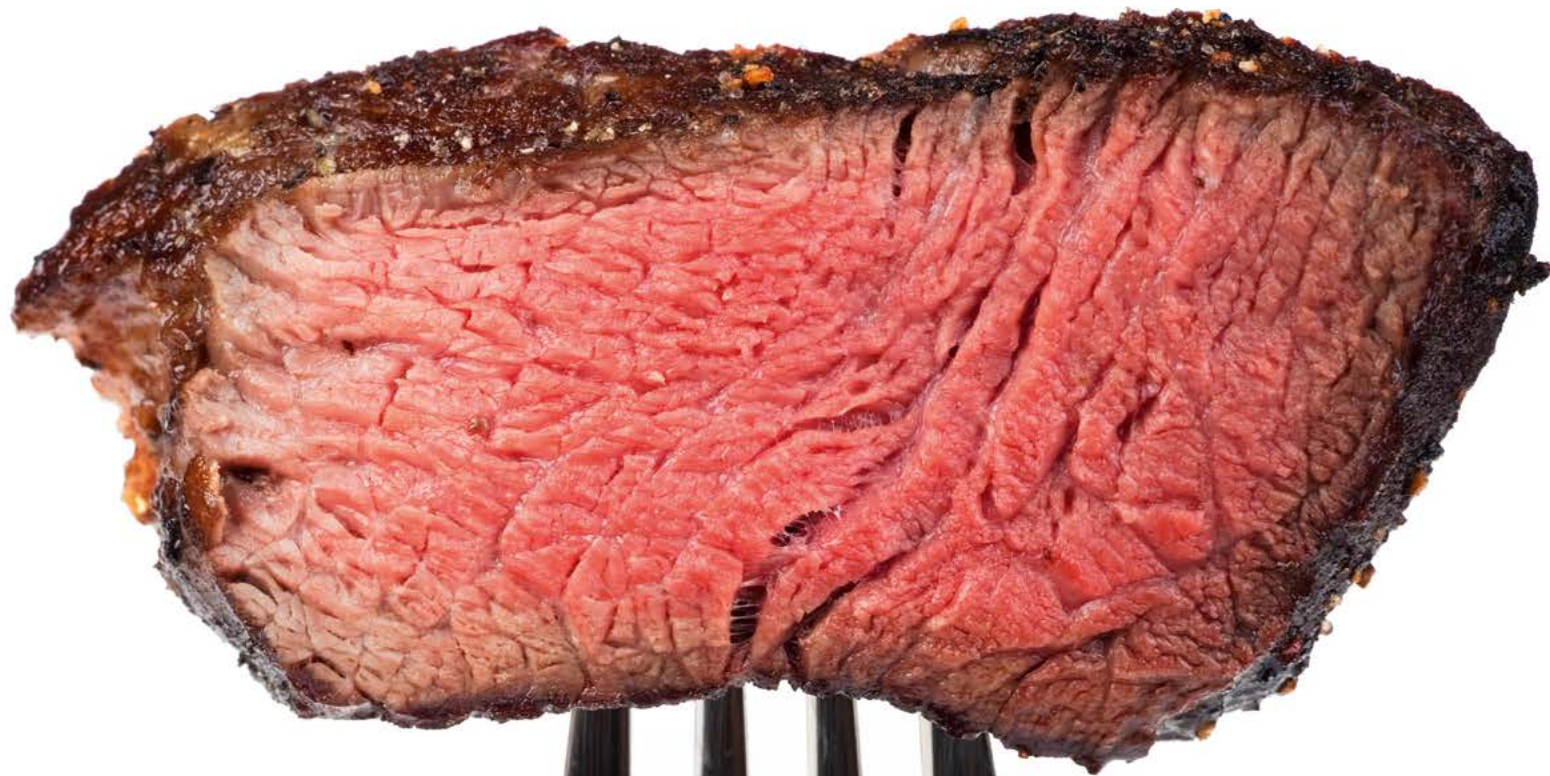
Tap water is to be used for washing. Otherwise, athletes should avoid the tap and only use industrially bottled drinks, with their original seals, even to brush their teeth and wash fruit. To be totally on the safe side, they should open the bottles themselves, even in restaurants, and ideally drink from the bottle or with a straw, as well as avoid ice cubes. During competition, enriching mineral water with three to six pinches of table salt is recommended to combat high levels of sweat. Athletes regularly check their hydration levels. If, when they get up in the morning, they have lost a considerable amount of weight after one or two days and their urine is dark and cloudy, this means they are dehydrated.

**TROX is Olympic.**

The Olympic park, which contains the main venues, was built in the heart of Rio. These are the Velodrome, Arena do Futuro, IBC – International Broadcast Centre, Arena Carioca 1, 2, 3 and the MPC – Main Press Centre. After the Olympic Games, the park will be turned into a huge education and sports complex for students and high-performance athletes. TROX do Brasil also qualified for the 2016 Olympics. The Velodrome and Arena do Futuro are equipped with TROX technology such as jet nozzles, sound attenuators, air terminal devices and grilles. In the International Broadcast Centre, which covers almost 80,000 sqm and provides space for 10,000 people, shutters, slot diffusers and grilles from TROX ensure air can enter the huge spaces and TROX fire dampers guarantee safety in the event of a fire.

# Nutrition tips for Rio.





**800 °C.**  
**The secret**  
**to the perfect**  
**steak.**

Frank Hecker loves a good steak. But one day, he finds he isn't just eating any old steak – it is THE steak. This revelation is served to him at the Peter Luger Steak House in Brooklyn, New York. And he just can't get this culinary excellence out of his head.





800 °C



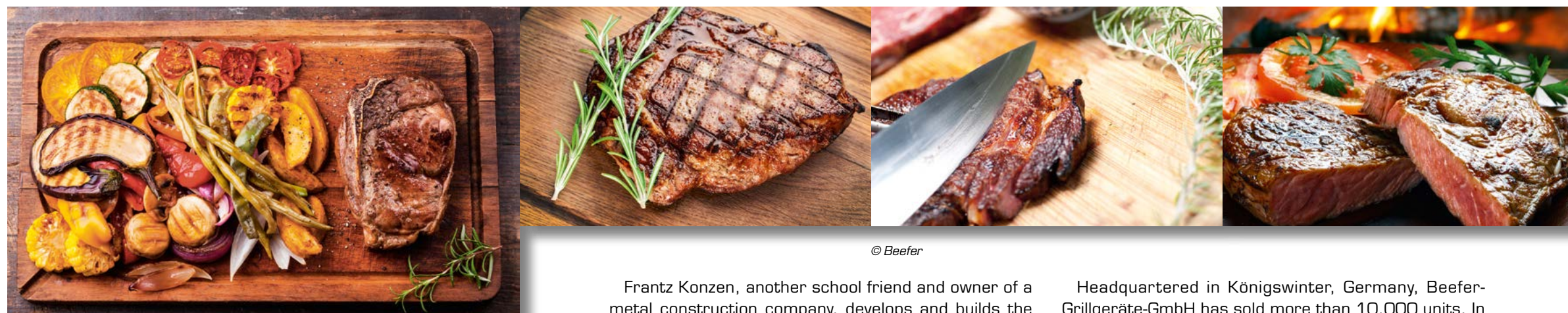
The BeefeR produces a searing top heat that ensures a deliciously caramelised crust.

© BeefeR



Frank Hecker makes enquiries, looks into the secret to the perfect steak and finds the solution: 800 °C. This is the key to the perfect steak – thanks to a deliciously caramelised surface and just the right roasting flavours, known as the Maillard reaction. A chemical process in which amino acids and sugar create a delicious bond in the form of a crust. But he can't accept that this was a one-off experience. And wouldn't it be nice for as many people as possible to share in this incomparable culinary experience? These were the thoughts that drove his idea of developing an 800 °C grill for home use.

Together with his school friend Marc Kirwald, he beavered away with a grill that could bring a powerful 800 °C to the home.



© BeefeR

Frank and Marc are developing a prototype – their vision of the perfect grill. Their delight is palpable when the first tests with bacon and rump steak result in success. With a ceramic burner plate, they produce an infernal top heat, which creates a perfect steak with a good crust after just two blasts of 45 seconds. "The less time the meat is subjected to the heat, the smaller the grey band will be afterwards in the meat," explains the inventor. According to him, the grey band between the crust and meat is comparable to braised meat and masks the actual flavour of the meat.

“Beef it or leave it!”



Frank Hecker discovered the secret to the perfect steak in a steak house in New York.

Frantz Konzen, another school friend and owner of a metal construction company, develops and builds the pre-production models and the grill's timelessly beautiful design. At 699 euros, BeefeR is well on the way to success with its motto "Beef it or leave it!". Konzen has been working exclusively for BeefeR since the start of 2016.

Frank Hecker, who also works as a TV director on a range of cookery shows, has also brought his and his friends' invention to the attention of top chef and grill enthusiast Tim Mälzer. Mälzer has become one of BeefeR's first and greatest fans – and further top chefs such as Frank Rosin and Steffen Henssler have now followed his example.

Headquartered in Königswinter, Germany, BeefeR-Grillgeräte-GmbH has sold more than 10,000 units. In May 2016, the founding trio opened a new head office with a second production line. Covering around 1000 square metres, the offices, salesrooms, warehouse and in-house production and development workshop are also joined by an attractive event location. Frank Hecker is ecstatic: "From Bad Honnef, we now want to conquer the world!"





# Sober hobbies.



The beer mat simply calls out to be collected. The record is held by an Austrian collector with over 150,000 mats. Yet the beer mat has brought about much more curious hobbies...



Even the ancient Sumerians were brewing beer over 4,000 years ago. It is brewed and drunk across the globe – from Chile to China and the Polar Circle to Patagonia.

Until the end of the 19th century, the coaster for the world's oldest alcoholic beverage was still being produced from felt in order to soak up any overflowing foam. Yet these sodden mats were also a favoured breeding ground for bacteria. In 1880, the first paper beer mats were produced and printed. Today, beer mats are made from liquid pulp board, from which the water is extracted so that it remains absorbent without warping or swelling. The small circles or squares contain small works of

art – prompting the urge to start a collection. With over 150,000 beer mat designs from all over the world, an Austrian holds the record for the largest collection. Connoisseurs regularly meet at trading meets or show their collections online.

What's more, landlords love the mats because they protect their tables, don't need to be washed and cost nothing, as they act as an advertising platform for breweries and others. However, they don't protect guests against cenosillicaphobia – the fear of an empty beer glass. This illness really does exist and has been recognised.



The Sumerians were brewing beer over 4,000 years ago.

# The oldest brew in the world.

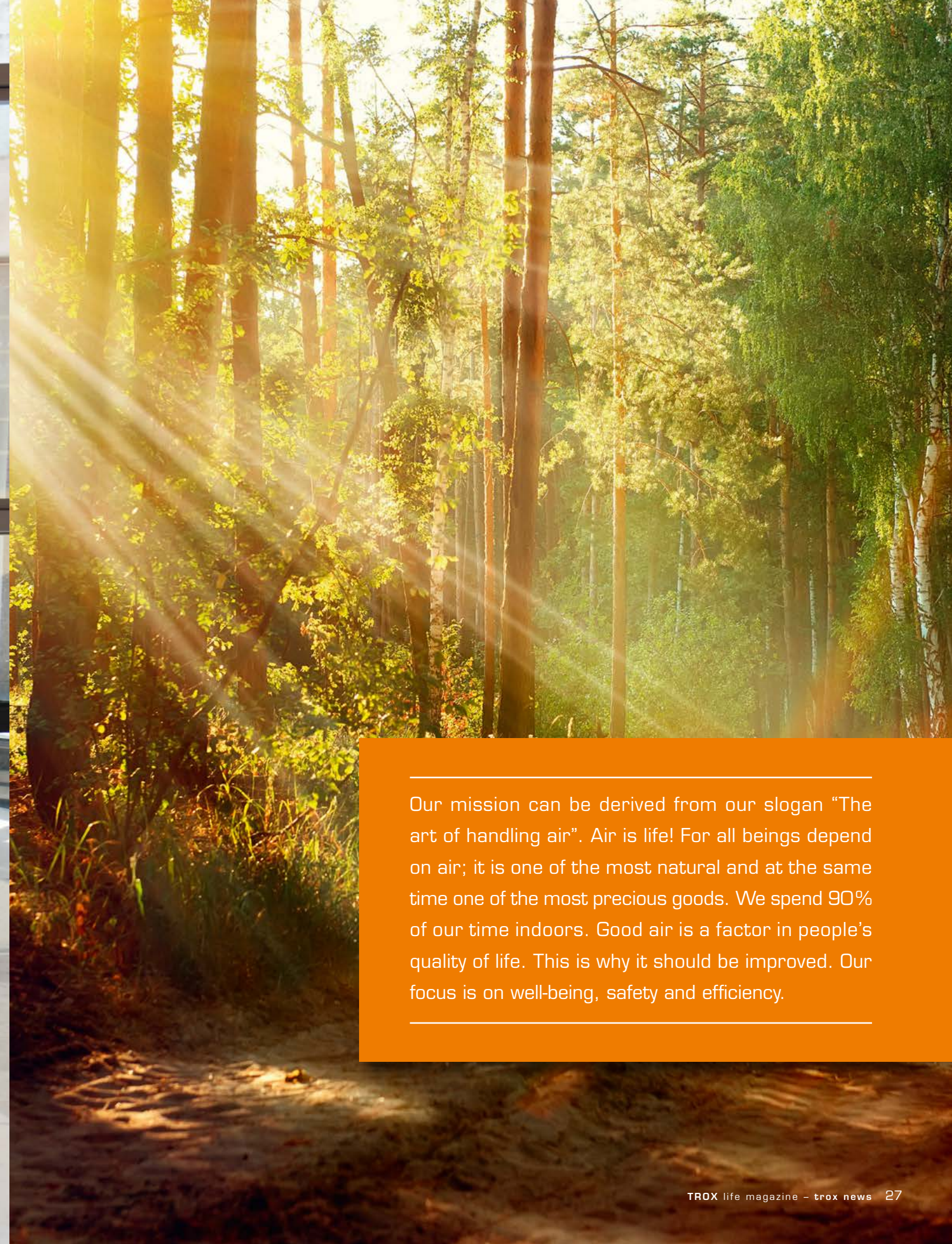


The beer mat has also found other more curious uses, such as beer mat throwing. The record proudly rests at 38.26 metres. And the highest beer mat tower was constructed in 1988 in the German city of Bocholt. 9.70 metres high and erected from 42,432 beer mats.





# X-Airficiency. Mission TROX.



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Our mission can be derived from our slogan “The art of handling air”. Air is life! For all beings depend on air; it is one of the most natural and at the same time one of the most precious goods. We spend 90% of our time indoors. Good air is a factor in people’s quality of life. This is why it should be improved. Our focus is on well-being, safety and efficiency.

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**Effective and efficient filters – of paramount importance.**

Indoor air quality depends on filter quality. A filter is an obstacle in the airflow and leads to a pressure drop. The airflow has to overcome this obstacle with the help of a fan, and this in turn has an influence on the energy costs.

Although filters incur 60 % or more in energy costs over their life cycle, filters for ventilation and air conditioning are often selected without sufficient care. This is unfortunate since the importance of filters cannot be overestimated. Inefficient filters create a considerable pressure drop which means that the amount of energy that is consumed rises rapidly. According to a rule of thumb, a pressure drop of 1 pascal causes a 1 euro increase in energy costs. This amount is bound to increase since we all know that energy costs are on the rise. Help is here, though: A new TROX online tool will help you make a decision. The filter energy costs calculator on the TROX website lets you calculate the annual energy costs for each filter, based on its energy efficiency class and on the volume flow rate; and it takes just a mouse click.



In Europe, 10% to 20% of electrical energy consumed by industrial processes are used for the operation of fans in ventilation and air conditioning systems, and one third of this energy is required to overcome the pressure drop caused by filters. It seems obvious, that the energy efficiency of filters cannot be neglected; it is in fact very important. And in clean room production facilities the percentage is even higher: One third of electrical energy is needed solely to overcome the obstacle which a filter presents to the airflow.

Well-being, efficiency and safety are at the centre of our actions. Our products should add to the well-being and comfort of people, i.e. provide indoor air of a good quality. Our production processes have to be efficient, and the resulting products have to be energy-efficient. All components have to be safe to install, safe to use and ensure safety, for example, with regard to fire protection.

At one time filters were assessed solely based on how many particles they could separate from the airflow, but not on their energy efficiency; recently, however, the energy-related assessment has received more attention. This is also reflected in the new Eurovent energy efficiency classification system.

# The art of handling air.

**LCC Energy Filter**  
The new TROX energy costs calculator for filters lets you find out quickly and easily what energy costs various filters incur over time. Energy costs offer the largest savings potential – up to 60% depending on the filter (energy efficiency classes according to Eurovent 4/21).

You can go to the **energy costs calculator** for filters by scanning the QR code or by using the link: [www.trox.de/en/lcc](http://www.trox.de/en/lcc)







The new LCC filter tool is one possibility to make cost savings visible; in addition, differential pressure transducers in X-CUBE air handling units signal a pressure drop and hence indicate whether a filter has to be replaced.

Healthy air, treated and supplied to rooms in the most energy-efficient way, is both a challenge and a goal for TROX. This is why the TROX strategy remains focused on the highest quality with effective and energy-efficient products.

All TROX filter elements for European markets are produced in Goch, near the Dutch border, while filter elements for other markets are produced in the TROX factories in Brazil and South Africa.

Both, our products with the well-known "Made in Germany" quality mark and our quality control, which is based on international standards, meet the highest requirements. Our filters are characterised by a low pressure drop and long filter life, and they help to reduce operating costs.

In the highly sensitive areas of health care, electronics, pharmaceuticals, and food and beverage, high-efficiency filter systems are in high demand. TROX focuses on energy-efficient filters and high-efficiency particulate filters (HEPA/ULPA); this includes the development, production and sale of bespoke filter units and filter elements for the ventilation and air conditioning in highly sensitive areas.

# Healthy air.



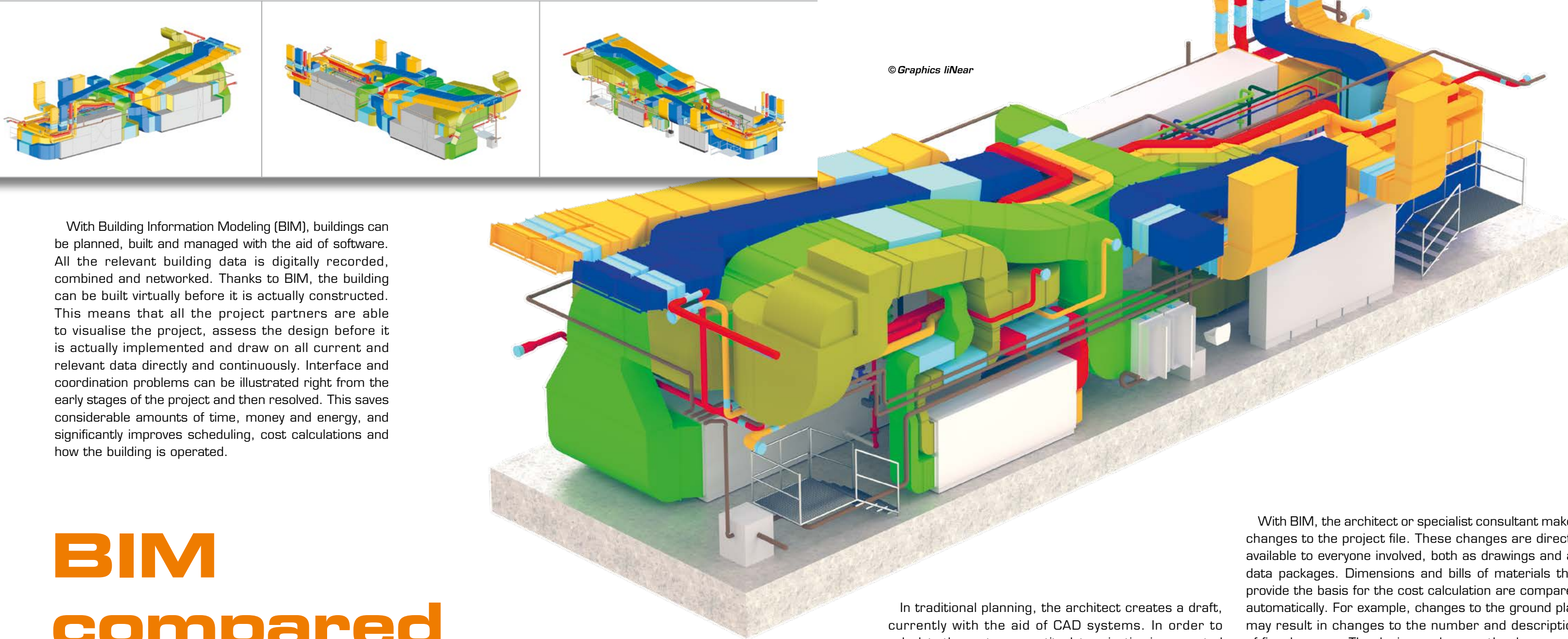


# SimsalaBIM. Computer-aided interdisciplinary planning of building projects.



**Definition of the US National BIM Standards Committee (NBIMS).** Building Information Modeling (BIM) is digital representation of physical and functional characteristics of a facility. A BIM is a shared knowledge resource for information about a facility forming a reliable basis for decisions during its lifecycle; defined as existing from earliest conception to demolition.





With Building Information Modeling (BIM), buildings can be planned, built and managed with the aid of software. All the relevant building data is digitally recorded, combined and networked. Thanks to BIM, the building can be built virtually before it is actually constructed. This means that all the project partners are able to visualise the project, assess the design before it is actually implemented and draw on all current and relevant data directly and continuously. Interface and coordination problems can be illustrated right from the early stages of the project and then resolved. This saves considerable amounts of time, money and energy, and significantly improves scheduling, cost calculations and how the building is operated.

# BIM compared with conventional planning.

In traditional planning, the architect creates a draft, currently with the aid of CAD systems. In order to calculate the costs, a quantity determination is generated based on the drawings, and submitted to specialist engineers, fire safety experts and authorities.

If a modification is made to the planning, the drawings have to be changed and the quantity determination adjusted. Everyone involved receives updated drawings and has to adjust these with their specialist consultants – meaning considerable coordination effort and work.

With BIM, the architect or specialist consultant makes changes to the project file. These changes are directly available to everyone involved, both as drawings and as data packages. Dimensions and bills of materials that provide the basis for the cost calculation are compared automatically. For example, changes to the ground plan may result in changes to the number and description of fire dampers. The designer changes the dampers in the virtual building model. The bill of materials is then modified automatically and when it is linked accordingly, the direct effect on the costs becomes visible.

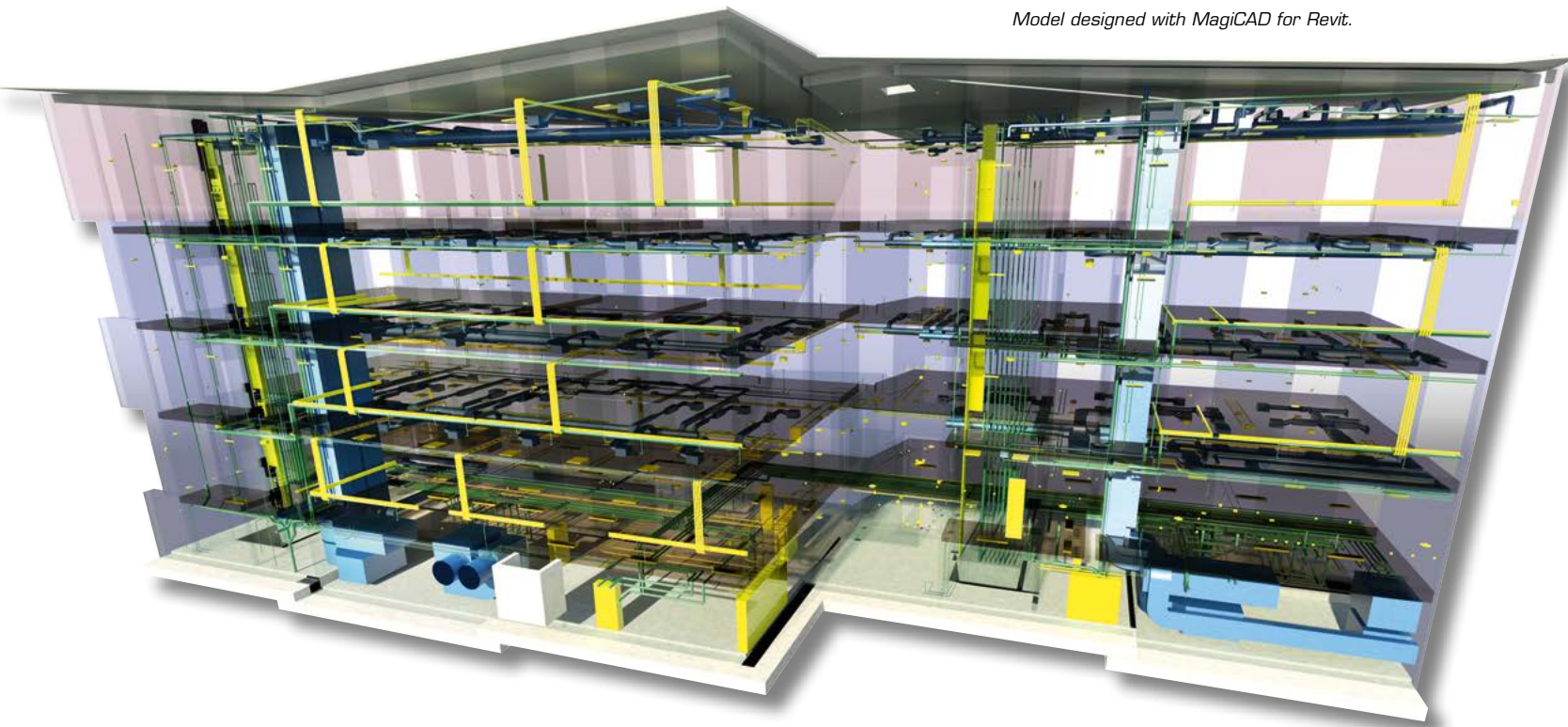
BIM makes it possible to simulate the entire lifecycle of an object before construction starts. Schedules and costs can be calculated much more precisely than with traditional planning or design procedures.



When it comes to the need for BIM data, the wide range of software packages on offer and the lack of an international standard mean there is a lot of uncertainty with regard to data formats, levels of detail or instances of information. To benefit from the advantages of BIM and use it efficiently, the quality of the source data is essential for design and calculation. This is why TROX provides VDI 3805 compliant product data. The VDI 3805 guideline is the basis on which ISO 16757 is currently being established as the international standard for the description of product data.



Model designed with MagiCAD for Revit.



# BIM

In many countries, BIM is already mandatory for public sector projects. The fact that BIM allows time frames and costs to be assessed at an early stage is for more and more building owners reason enough to also make BIM mandatory for the awarding of contracts, particularly for large projects. The Statoil office building in Fornebu, Norway, in which 3200 TROX active chilled beams are installed, was completed in just 20 months thanks to BIM.

Yet multiple and diverse software environments and the lack of international standards still pose a challenge to designers and HVAC contractors. Help is here, though: The TROX Easy Product Finder design programme provides extensive product data for components and systems. This includes information on geometry, weight and material, but also product-specific data such as differential pressure, volume flow rate and sound power level. What is more, both our website and the building services design software of leading providers allow you to access many TROX products.

Visit [www.troxtechnik.com](http://www.troxtechnik.com) to find extensive information on the topic of BIM.





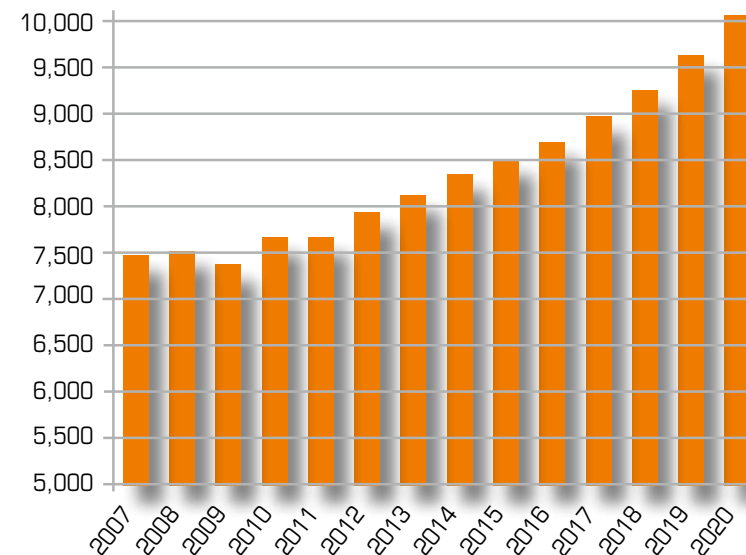
# The construction industry is on the up worldwide.

The construction industry is on the up. The strong economy is supporting investment activity while also increasing private demand. The latter in turn ensures increased investment in production facilities and expansion of capacity, not least also in the food and beverage industry.

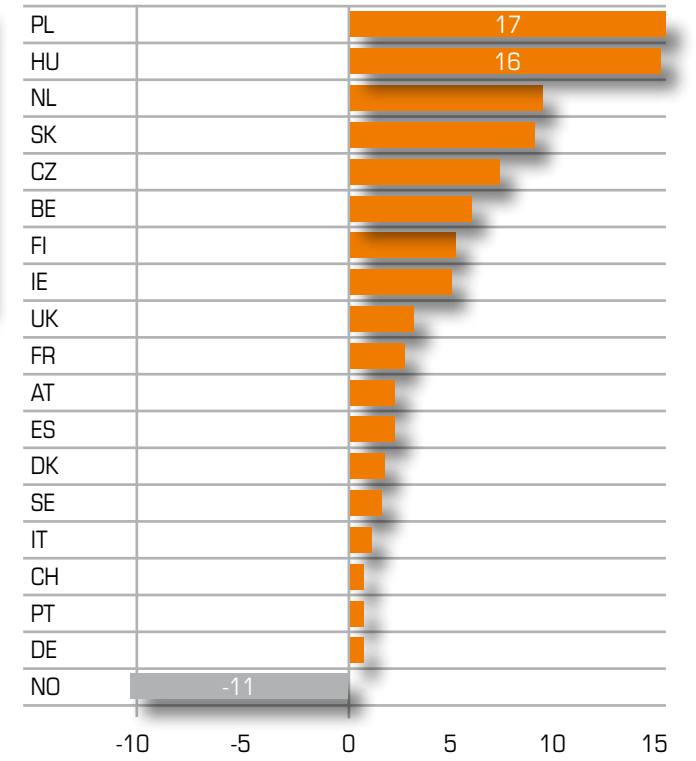
Production facilities take on an important role within the non-residential construction segment. At 16 %, they represented the third-strongest segment in 2015 after commercial projects (20 %) and office buildings (17 %) according to Euroconstruct. The forecasts for the industrial sector are optimistic. In the Euroconstruct 19 countries, growth of 4.3 % is anticipated for 2016, with 2.3 % for 2017 and 1 % for the year after that. At 17.4 %, Poland records the greatest surge in growth, followed by Hungary (15.8 %) and the Netherlands (9 %). Only Norway is set to record a decline – and a significant one at that.

Worldwide, the construction industry achieved a volume of 8.5 trillion US dollars in 2015 according to a timetric study. In 2010, the figure was at just 7.5 trillion.

Global construction volume in billions of US \$



Construction activity in industry: average annual growth rates for 2016–2018 in %



According to forecasts, construction activity is set for constant growth up to 2020 – achieving average annual growth of 3.4 % and volumes of 10 trillion US dollars. Five years ago, the growth rate was just 2.4 %.

The largest share of construction volume is set to remain in the Asia-Pacific region. Emerging economies such as India (5.6 % annual growth) are expected to increase their share from 43.9 % to 51.9 %. Western Europe, however, is still slightly below the levels seen before the financial crisis.

**2015**  
**8.5 trillion**  
**US dollars**  
**worldwide**

Sources: EUROCONSTRUCT (81st Conference), timetric Global Construction Outlook 2020



# Purity bottled.

The Hotel Adlon in Berlin serves the most expensive mineral water on earth. “One hundred and twenty euros,” says the waiter when he presents the bill with a look on his face as if butter wouldn’t melt.



# A sip of water for 5 euros.

The figure even puts champagne in the shade. A whole 124 euros is the price to fork out for a Japanese mineral water called Rokko No Oishii Mizu from the mountain range of the same name. Just a few sips of this Nippon water sees a good few euros flow out of your wallet. This precious Rokko No Oishii Mizu water is regarded as a kind of fountain of youth, as a number of centenarians live in the mountainous region. In Japan itself, however, the beverage costs less than one euro a litre. You can sample the expensive refreshment at Berlin's Hotel Adlon.

The Nippon sparkling water is closely followed by Bling h<sub>2</sub>O, which goes for 123 euros. This luxury water has its source close to Dandridge in the USA and was voted the best mineral water in the world.

Its appearance also drives up the price: a bottle comes with real Swarovski crystals.

You can opt for a slightly cheaper alternative. The French luxury water Püro retails at 64 euros; however, it is difficult to get your hands on outside France.

OGO. The oxygen-rich Dutch water is said to be energising and can be acquired for just 35 euros.

Yet the purest of the waters that have made the grade is Cape Grim, a Tasmanian rain water. Apparently, it is purer than mineral or spring water. At 31 euros, that's a saving of four euros compared to the Dutch water.



The Konisaajo source is hidden in the Arctic wilderness. This is where the soft water known as Veen springs from. Price point: 31 euros. The following list details other waters in order of price:

- Claude Juice, the purest Tasmanian raindrop, 9,750 in number. Price point: 26 euros.

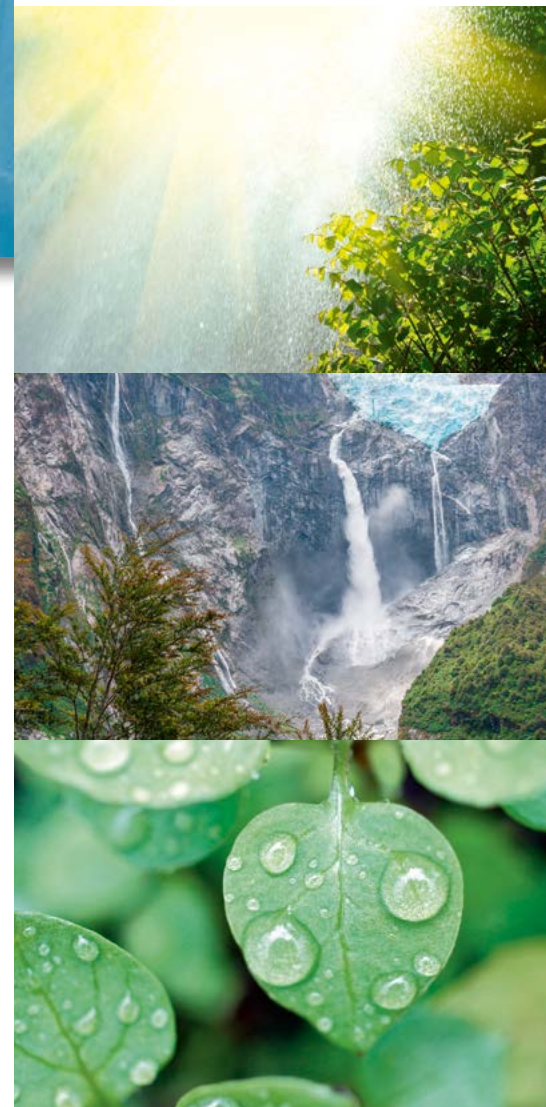
- 10 Thousand BC: 25 euro glacier water from the Ice Age.
- Cape Karoo for just 23 euros, an award-winning water from South Africa with positive pH level and balanced mineral content.

However, if the price can cloud the waters somewhat, there are a few more affordable top luxury waters:

- Voss, the purest Norwegian designer water for 5 euros, in luxury bottles created by Calvin Klein.
- Below, alkaline luxury water with few salts, emanates from a depth of 200 m on the Banks Peninsula in New Zealand right in the middle of the only extinct volcanic formation on the island. One litre goes for around 12 euros.
- Fiji South Sea water from the volcanic highland and a protected ecosystem. The rain, purified by trade winds, is filtered in the volcanic rock where it collects important minerals such as silicic acid. Available for 2.79 at Gourmondo, but only for half a litre.

Crazy, isn't it? It's also reminiscent of a dispute that is said to have taken place in a bar in the Scottish highlands. Two senior whisky connoisseurs were arguing about which drop of water would be the best to refine their beloved beverage: water that flowed from east to west or that flowed from west to east.

*\* Prices extrapolated for one litre, vary depending on hotel and filling quantity*



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