



THE FUTURE OF POOLS

THE **inBlue** HOLISTIC POOL CONCEPT

BY ULTRAQUA

A microscopic view of various bacteria and viruses, rendered in shades of blue and purple. The central focus is a large, oval-shaped bacterium with a textured surface and several long, thin flagella extending from its base. Surrounding it are numerous other microorganisms, including smaller, spherical viruses with spiky surfaces and various other bacterial shapes. The background is a dense field of these microscopic life forms, creating a complex and detailed scene.

WHY WE CLEAN & DISINFECT POOLWATER



CORE BENEFITS OF UV

UV TECHNOLOGY IS A GLOBALLY ACCEPTED SOLUTION FOR WATER DISINFECTION AND COMBINED CHLORINE REMOVAL.

The demand for cost-efficient solutions to provide high quality disinfected swimming pool water are at an all-time high and will only increase in the future. UV disinfection solves this complex challenge, being able to meet the strictest requirements regarding disinfection and combined chlorine removal.

Improved technological and design configurations have made UV a viable OPEX and CAPEX solution for swimming pools of all sizes.

Choosing to include UV as a secondary disinfection method ensures protection against chlorine resistant pathogens such as Cryptosporidium and Giardia.

The scientifically optimized Poolray systems are designed to remove potential health issues associated with combined chlorine, to ensure a better bather experience.

The ULTRAAQUA UV Poolray systems are easy to install, maintain, and thoroughly cost-optimized. The third-party approvals for performance and quality ensure complete peace of mind, employing the best available solution.

ULTRAAQUA
UV DISINFECTION SYSTEMS

**HAPPY
GUESTS**



**RESPIRATORY
SAFETY**



**SKIN
PROTECTION**



**ENHANCED
PERFORMANCE**



**ENVIRONMENT
PROTECTION**



**DPB FREE
AIR**



**DPB FREE
WATER**



**PROTECTION FROM
MICROORGANISMS**



inBlue • WHY IT MATTERS

Until recently water treatment in pools has been all about clean blue water and well-distributed chlorine.

This is not the case anymore.

We now know that chlorine by-products are dangerous for swimmers, especially children. Chlorine by-products like chloroform and tri-chloramines are linked to asthma and cancer. Authorities in most countries now strictly regulate chlorine by-product levels.

Today water treatment in pools is all about creating a chlorine by-product free swimming environment, and at the same time clean blue water with well-distributed chlorine.

InBlue is the first concept in the world rethinking water treatment in pools, creating almost by-product free water and air

- Protecting both people and the environment



ULTRAQUA



200 SYSTEMS
INSTALLED



55 ACTIVE
SITES



50.000 BATHERS
PROTECTED





inBlue & ULTRAAQUA

- **STRONG ORGANISATION**
- **WORLDWIDE SERVICE PARTNERS**
- **LEADING SCIENTIST**
- **3D CAD DESIGN INVENTOR, AUTOCAD ETC.**
- **EXPERIENCED CONSULTING ENGINEERS WITH +100 PUBLIC POOL PROJECT EXPERIENCE AROUND THE INBLUE CONCEPT AND SANDFILTER BASED POOL TECHNOLOGY**
- **HIGHLY EFFICIENT AND ENERGY SAVING ENVIRONMENTALLY FRIENDLY CONCEPT - PROVEN TECHNOLOGY**

ULTRAAQUA PRODUCTS ARE IN OPERATION ALL OVER THE WORLD.

ULTRAAQUA's design team employs dedicated engineers and scientists with research careers of the highest academic level and many years of experience in design, science and engineering of water treatment systems.

PRODUCED IN SCANDINAVIA

High quality products manufactured in Scandinavian countries.

KEEP IT SIMPLE

Our "keep it simple" design is based on a principle to reduce complexity and to increase reliability.

ROBUST DESIGN FOR HIGH RELIABILITY IN HARSH CORROSIVE ENVIRONMENTS

Components of high universal industry standard to ensure high efficiency and long lifetime. Excellent chloride, chlorine and pH resistance.

PROOF OF RELIABILITY

ULTRAAQUA InBlue systems have passed various tests for validation, data has been published.

UNIQUE CALCULATION & DESIGN TOOL

Based on our long scientific experience a computer simulation model has been developed that can be used to calculate water and air quality based on bather load, filter system, ventilation system etc.

RELIABLE COUNSELING, SERVICE & SUPPORT

Ultraaqua is a well-established Danish specialist water treatment company. Water treatment systems for public pools has always been in our genes.

ULTRAAQUA HAS DISTRIBUTORS WORLDWIDE

They are carefully selected among market leaders in order to guarantee qualified support, innovative solutions and reliability. Please contact us with information on the type of application and geographic location and we will

refer you the nearest distributor.

From Denmark our pool engineering center can support engineers worldwide working towards disinfection byproducts (DBP) free water and air. Locally our distributors and partners ensure quick and qualified service.

Lots of science has been performed to further strengthen our concept toward the most holistic complete and scientifically validated system in the world. No stone has been left untouched in our thinking towards energy efficiency, water efficiency and DBP reduction. It has been especially challenging to achieve such results without compromising corrosion pressure and recirculated air quality. Our scientifically based modelling and design tool might be the most significant result since it allows us to calculate resulting air and water quality in any application.



HOW TO GET IN CONTACT & WHERE TO BUY:

ULTRAAQUA A/S

Kaolinvej 4
9220 Aalborg Øst
Denmark

THE PHILOSOPHY BEHIND THE inBlue SOLUTION

Sandfilters, DE-filters and membranes are for sure capable of effective filtering of pool water. But they are not future systems in a fast-moving world with demand for Disinfection By Product (DBP) free water and air. Further, none of the systems is energy effective and both sand-filters and membrane filters are not water effective. In a situation with climate change and water scarcity Green Transformation is needed for the most utility demanding public building out there. Thus:

THE HOLISTIC THINKING BEHIND THE INBLUE SYSTEM THRIVES TO EFFECTUATE GREEN TRANSFORMATION WITHIN POOL WATER DIS-INFECTION TREATMENT

The thinking originated from scientific publications postulating that rise in childhood asthma could result from the increased exposure of children to chlorinated water and toxic chlorinated gasses/aerosols contaminating primarily indoor swimming pools. Two contradictory demands created increasing problems with known technologies, DBP free water and air versus water efficiency. Sand filters is known to be effective, but it is also clear the particles filtered out will dissolve stressed by hot moving water and chlorine. Less frequent backwashed to save water worsened that problem making the sand filter a chemical factory transforming solids to all kinds of unwanted dissolved chlorine by-products. Even worse with DE filters, where "bomping" just is a measure helping particles to dissolve faster so that they don't clog the filter.

To solve this problem we scientifically tested all types of filter technologies back in 2003 to 2005 and found the drumfilter to be capable of removing pool particles, mainly skin cells within hours to avoid dangerous dissolved chlorinated by-products and at a water and energy efficiency second to none. Lots of science, inno-

vation and testing plus more than 100 public pool references has developed the InBlue drumfilter into a super effective pool specialized product.

To some extent chlorinated by-products originate for chlorination of sweat, urine or other dissolved substances and consequently can't be filtered out. To remove gasses, we invented the gas-stripper and scientifically tested it over the last decade into a super effective water to air de-gassing pool specialized product. Keeping chlorinated gasses like chloroform and trichloramine low has a huge impact on health and user experience of any system. Nitrogenous chlorinated by-products are removed by our pool specialized medium pressure UV system. Removing nitrogenous by-products, normally known as combined chlorine, by UV photochemical irradiation, has the huge advantage that a second disinfection barrier then is in operation protecting against chlorine resistant organisms like Cryptosporidium and Giardia.

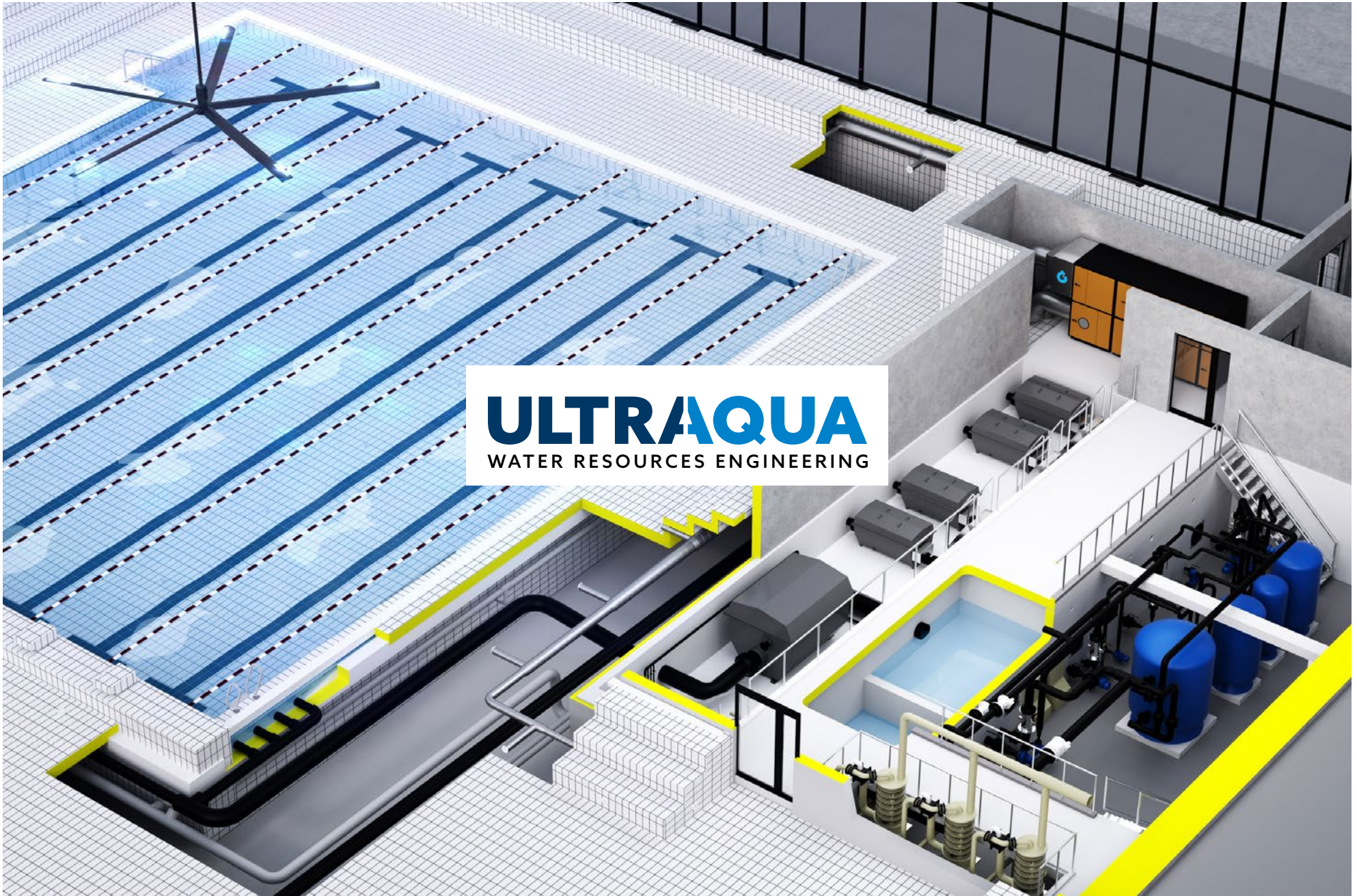
Gravitational operation principles are the main thinking when we foresee future energy efficient water treatment systems. Gravitational principles and hydraulically modelling led to innovative ad ons to our concept. The energy preserving hydraulic rotation principles in the water with specialized water inlets, the deep section low noise energy preserving gutter and the Eco-Tank where energy is saved 24/7 as long as the system is in operation with simple means.

To complete the concept lots of science and innovation has gone into advanced controls with smart sensing, demand driven operation and the water for guest concept. Even innovation and science projects working with filtering DBPs out of recirculating ventilation air has been realized. The first installations are on the way where recirculating ventilation air will be non-harmful to guest since DBP buildup is hindered.

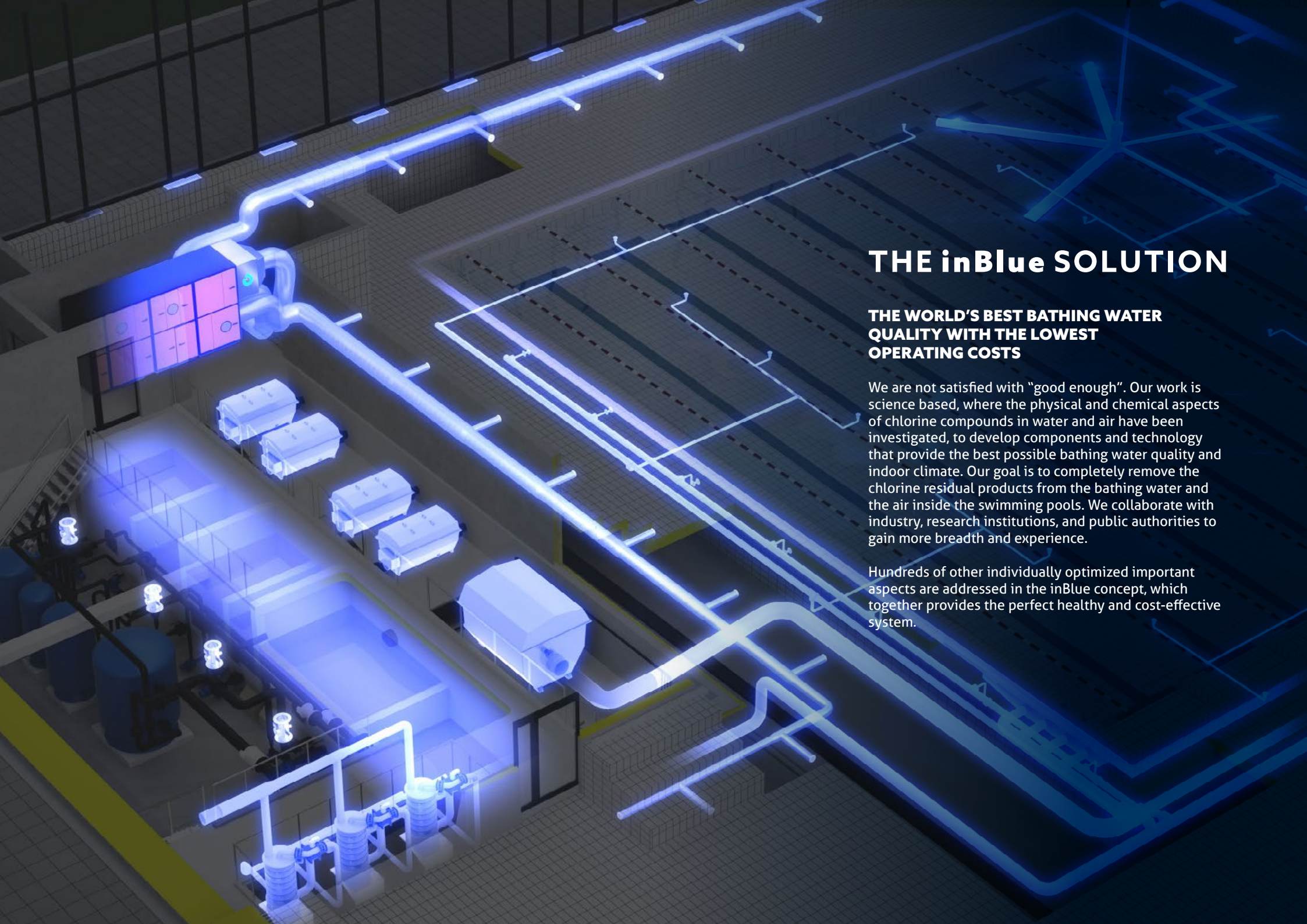
Maybe the greatest innovation is our calculation model. As Scientists and Engineers, we realized from the very start that we were more-or-less blind when designing pool water treatment systems. For 15 years we have worked scientifically on a validated physio-chemical

simulation model capable of simulating the consequence of installing any filter type for particular or dissolved substances in any system temperature and with any bather load and flow. For the customer it means that we can calculate essential water quality parameters like turbidity, DBP levels and chlorine dynamics for any pool in the design phase based on selected technologies. The InBlue consequence and fit for purpose model.





ULTRAQUA
WATER RESOURCES ENGINEERING



THE inBlue SOLUTION

THE WORLD'S BEST BATHING WATER QUALITY WITH THE LOWEST OPERATING COSTS

We are not satisfied with "good enough". Our work is science based, where the physical and chemical aspects of chlorine compounds in water and air have been investigated, to develop components and technology that provide the best possible bathing water quality and indoor climate. Our goal is to completely remove the chlorine residual products from the bathing water and the air inside the swimming pools. We collaborate with industry, research institutions, and public authorities to gain more breadth and experience.

Hundreds of other individually optimized important aspects are addressed in the inBlue concept, which together provides the perfect healthy and cost-effective system.

SIDE GUTTERS

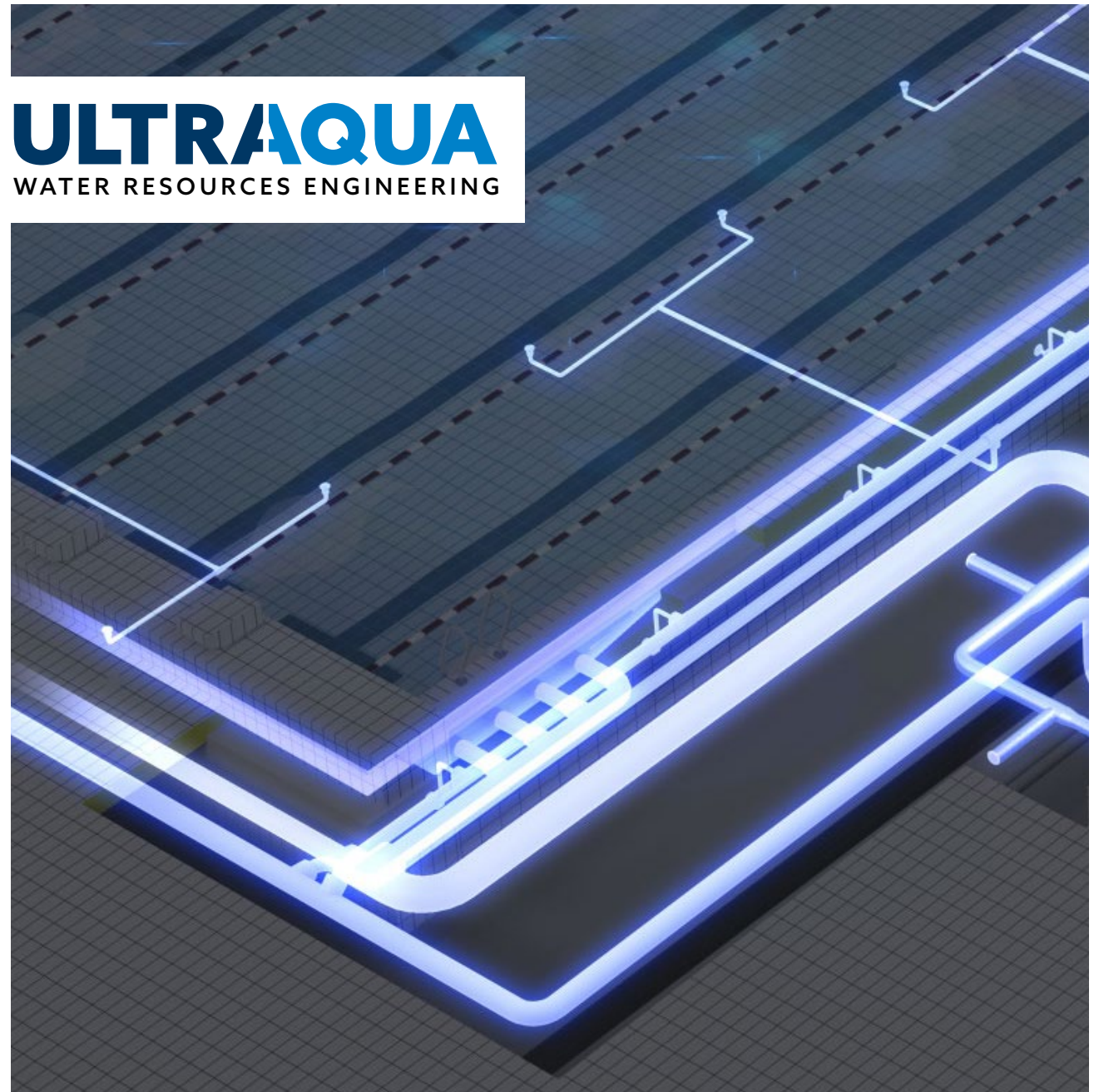
The side gutters have to be designed the right way to ensure optimum functionality. The side gutter has to be able to effectively collect skim cells over the entire pool length. It has to be with as little noise as possible and be effectively separated from the general walking areas cleaned by soap. We will dimension and design the perfect gutter for your pool project.

3D HYDRAULIC RETURN

Water returning to the pool after treatment fulfills two purposes in the inBlue system. First and most important, it has to accelerate water to obtain the perfect rotating current maximizing shear on the pool floor, where particles are collected and figuratively shoveled direct up and into the gutter. For each pool, depending on cross-section dimensions and flow, it has to be custom designed to achieve its task with almost no head loss. Secondly, chlorine has to be well distributed as with traditional bottom returns.

CENTER LANE TURBULENT ZONE

At the center lane water collide coming from both sides. Water is upwelling spreading again on the surface that is effectively swiped in one quick movement. Skin cells will at first be located on the pool surface until they start settling towards the pool floor. So no matter if skin cells and other particles are on the pool floor or on the surface, they will be quickly transported to filtration. Sand and other heavy dirt that can't be transported by the current has to be mechanically removed by hand or by an automatic pool cleaner from the center lane. The current is not strong enough to affect competition swimmers.



BALANCE TANKS

All pool operators know that balance tanks has to be cleaned regularly. Skin cells will settle and dissolve constantly in traditional balance tanks. After a while so much is going on inside the balance tank that a thick slimy layer influence water quality to an extent that requires action. System is then closed, tank opened and cleaned.



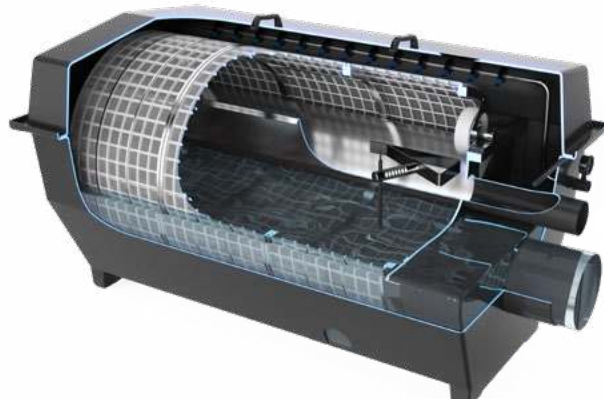
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DRUM FILTER

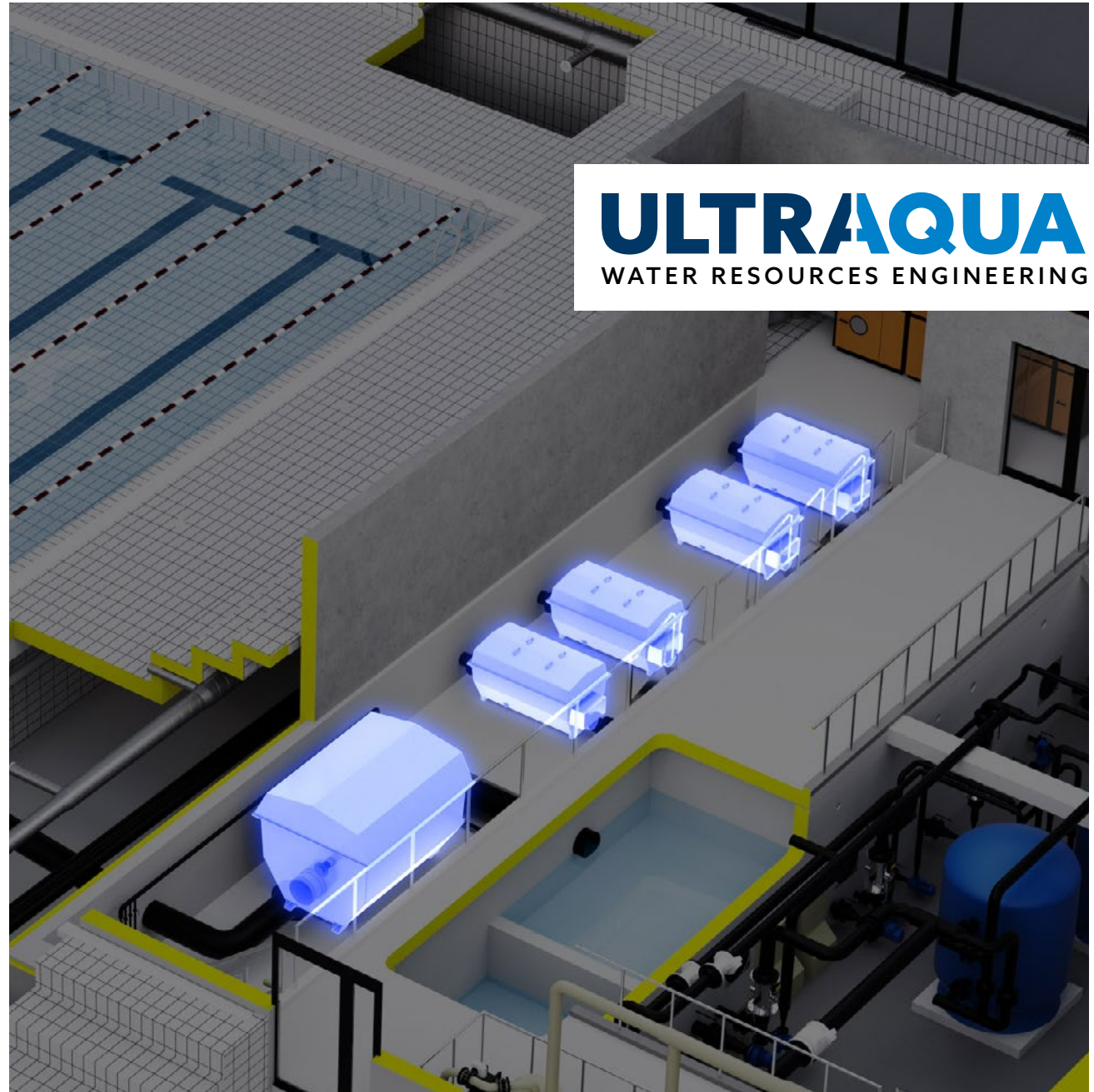
The drum filter is installed directly after the gutter to catch skin cells and other particles before the balance tank, pumps, and other handling that causes dissolving. It is not using any energy under filtration, only during flush.

A flush takes around 10 seconds, the interval between flushes is automatic based on bather load, i.e. the water level rise inside the drum due to clogging. The filter operates on gravity with head around 0,3meter. The drum filters are available in various sizes which allows for optimal adaptation to custom filtration requirements.

A gravity operated drum filter uses a factor 10 to 100 less energy than conventional sand or DE filters. Since only a fraction of the water needs to be filtered by sand or DE filters, the overall energy consumption decreases drastically. Most of the water simply can be pumped directly back to the pool from the balance tank. Sand or DE filters, which are traditionally used in pools, operate with a pressure drop when backwashed from 1 to 3 meters plus a typical differential pressure of 2 to 10 meters. The inBlue drum filter on the other hand operates with a pressure drop when backwashed from only 0.1 to 0.2 meters plus a typical differential pressure of 0.2 to 0.3 meters.



Product brochure available at:
<https://ultraaqua.egnyte.com/dl/QeQqkZnOSI>



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THM GAS STRIPPER - INVENTED BY inBlue & ULTRAAQUA.

The variation of Gaseous THMs and chloramines over one day typically follows a pattern, reaching a maximum concentration just before opening.

Based on bather load, system data and installed water treatment technology, we can predict concentration dynamics of THM and trichloramine in each pool, offering optimal control of unwanted gaseous chlorine byproducts in pools.

By eliminating much of the chlorinated by-products, the ULTRAAQUA GAS-Stripper minimizes the risk of respiratory discomfort for bathers. In addition, water and ventilation air exchange can be reduced thereby also reducing the amount of energy required to operate the entire recreational facility.



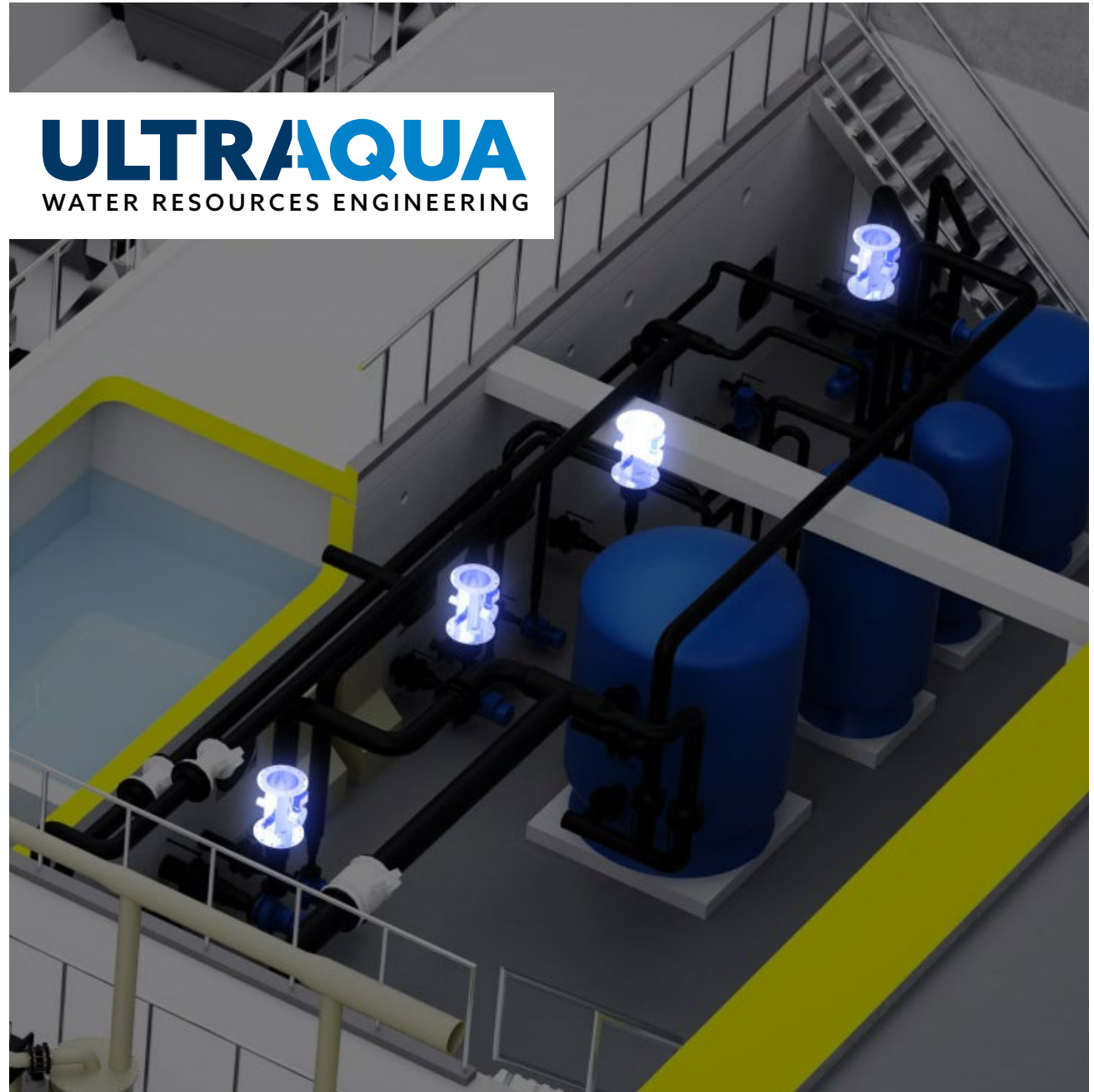
Product brochure available at:
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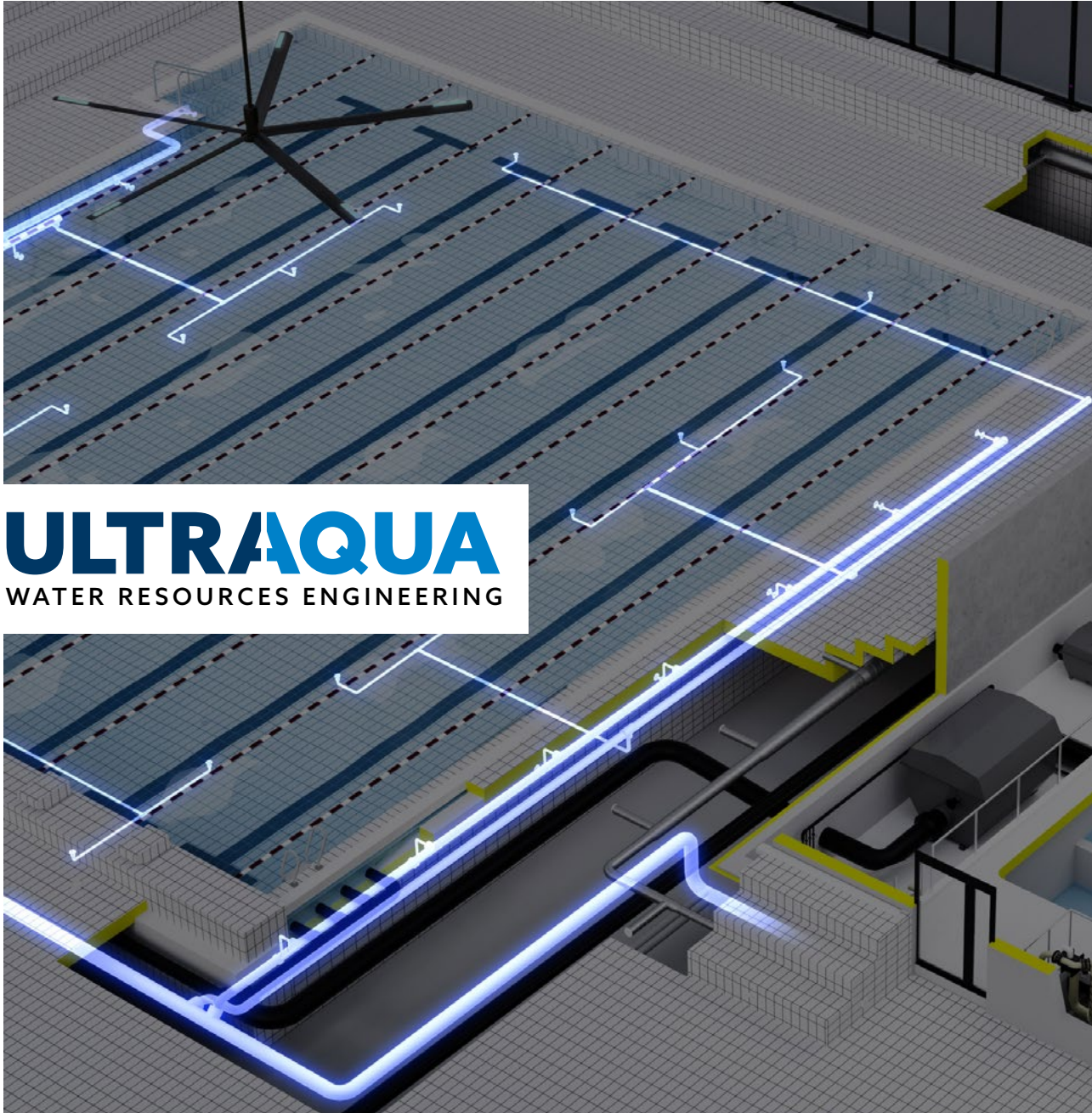
UV SYSTEM

The ULTRAAQUA UV medium-pressure (MP) series is optimized for disinfection and chloramine reduction in pools. The system series provides negligible combined chlorine levels while providing excellent protection against Crypto and Guardia. The cost-effective PoolRay or the advanced MultiRay combines high-grade steel qualities like Duplex and stainless 316L for excellent resistance against chlorides. An estimated 80% of the energy used is converted to heat, which boosts general water heating.



Product brochure available at:
<https://ultraaqua.egnyte.com/dl/P81jOCTp80>



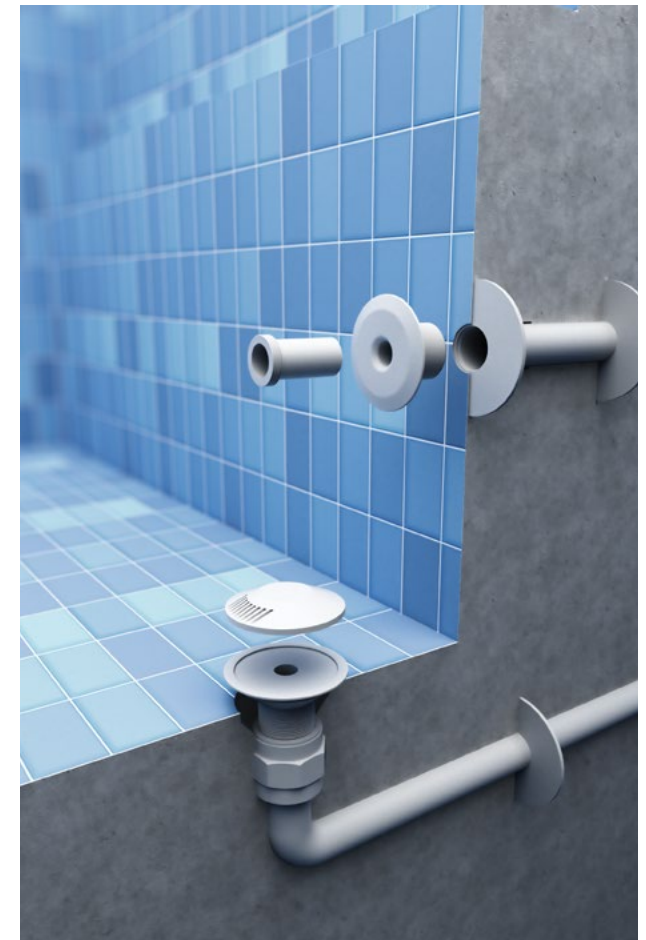


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HYDRAULICS

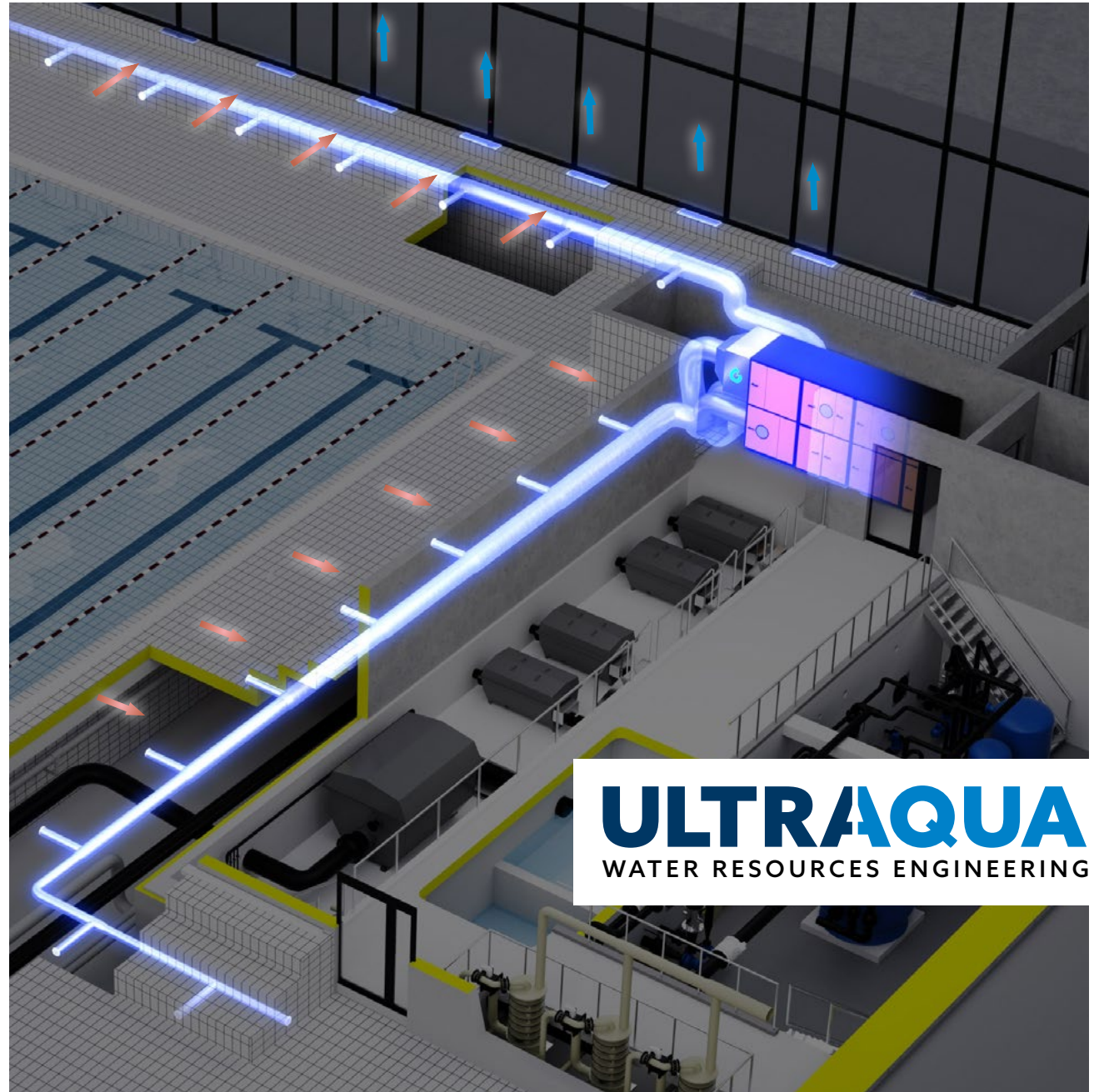
Water is a dynamic and complicated force to be reckoned with. Our team of hydraulic engineers and scientists save clients time and money through modeling analysis to predict how water will behave, which allows us to design an efficient system that works as intended. Through many years of science, engineering and practical experience we developed the unique InBlue series of inlets to support our preferred hydraulic design.



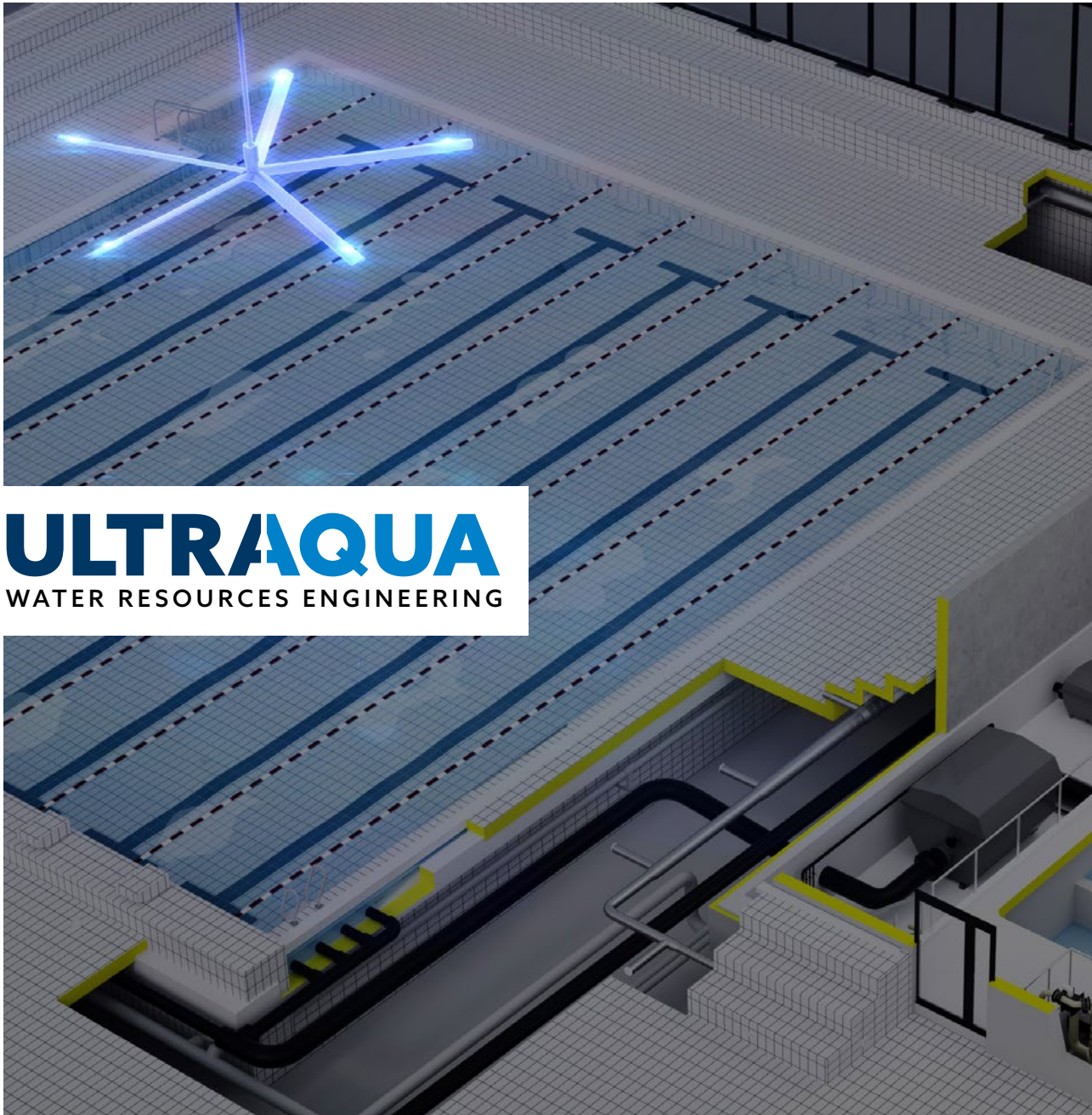
UV VENTILATION

Scientific research has shown that increasing air change with UV disinfected "germ-free" air makes a huge difference. Because ventilation systems move air and some infectious diseases travel by air, Central AHU systems and in-room air recirculation units play a vital role in managing infectious disease transmission.

UV air systems cannot be the primary means of infectious disease control. Ventilation system likely will not have much effect on close range transmission by the large droplets that people expel even when speaking but especially when coughing or sneezing. On the other hand, increasing outdoor air or "UV disinfected germ-free air" provides dilution that is a clear benefit. UV systems can help reduce the concentration of virus particles in the indoor environment by reducing the number of small particles (aerosols) that can harbor viral material.



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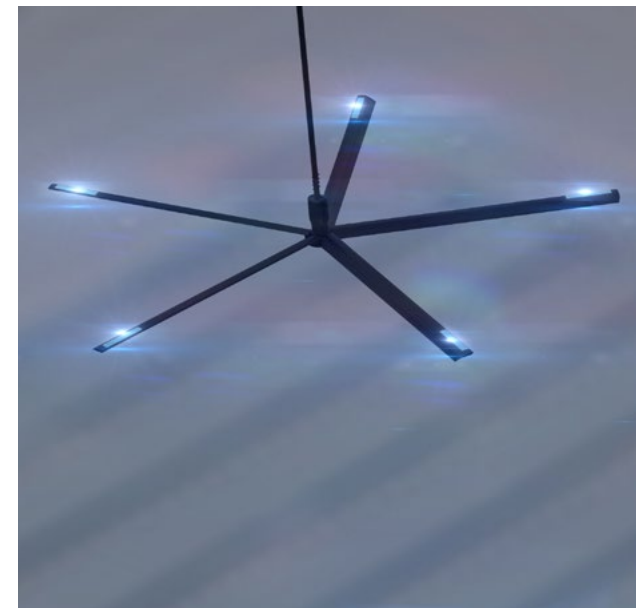


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FRESH AIR

Air intake most often is designed to ensuring condensation free windows and/or thermal comfort for bathing guests. In the inBlue system they also are part of pool surface ventilation, removing heavy by-products from the surface. At inBlue we work with ventilation firms to ensure the best solution in each case. Often roof propeller ventilators is the best approach or as on this drawing pumping in fresh air horizontally from both sides of the pool. Even more than one fresh air intake approach has proves right. Building design highly influence best ventilation approach.





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ULTRAQUA & inBlue



CASES WORLDWIDE

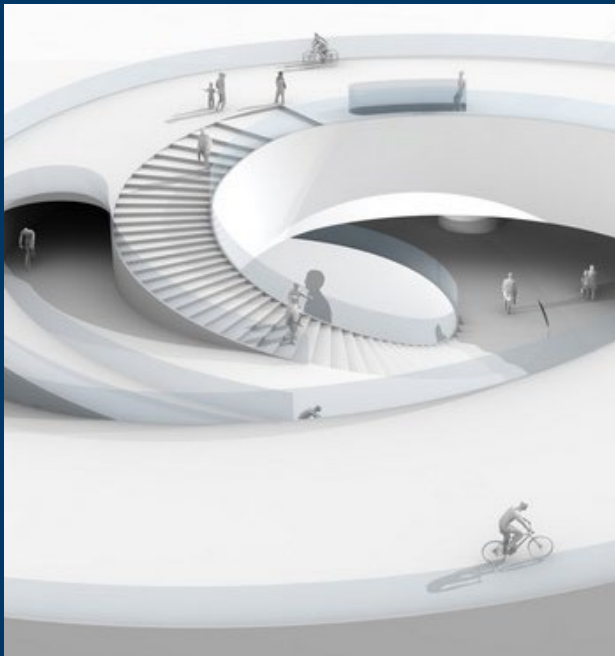
DANISH PAVILION, WORLD EXPO SHANGHAI

Architecture by Bjarke Ingels Group, BIG

The real statue of The Little Mermaid transported to China to promote Denmark at the world EXPO.

The 175 kilogram (385-pound) four-foot-tall bronze statue by Edvard Eriksen was inspired by a character created by Hans Christian Andersen in an 1837 fairy tale. It has been one of Denmark's main tourist attractions since 1913. At the world expo in Blue Water Treatment Technologies was chosen by the Danish government and Bjarke Ingels Group for the harbour pool in which the mermaid was exhibited.

The public was allowed access to the pool.



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THE REEF RESORT

Thematized hotel Aquapark

Scandic The Reef offers a 1500 sqm large Caribbean water world where children and adults can enjoy themselves with slides, waterfall, outdoor pool and enjoy the lovely tropical heat.

More than 135.000 guests visit the hotel each year. The Caribbean-inspired landscape with palm trees and singing birds has been built around a mountain. Water is deep blue, clean and beautiful.

A perfectly safe reef bathing environment. The resort is also pleased with the improved operating economy compared to a former system with significantly lower water and energy consumption.

ULTRAQUA
WATER RESOURCES ENGINEERING

HYLLIE AQUAPARK

New large scale water park in Malmö Hyllie. 7 water treatment systems.

inBlue Sweden is during 2013 and 2014 constructing one of the largest water parks in Scandinavia. All inBlue's new and innovative technologies will be working in the Hyllie basement.

The Hyllie water park will be state-of-the-art with a remarkably chlorine by-product free indoor environment.

At the same time, operating cost savings will set new standards. Hyllie Aquapark will be the most energy and water efficient system in the world. Hyllie Aquapark is located near the first exit entering Sweden from Copenhagen making it an attractive excursion also for Danes.



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SJÖBO SIMANLÄGGNING

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