Pipe World

The Uponor Infra customer magazine › issue 1/2022

BLUE IS THE NEW GREEN

UPONOR BLUE PRODUCTS HELP REDUCE CARBON FOOTPRINT BY UP TO 70%

Uponor Blue sustainable products help forward-thinking organisations to achieve their environmental and carbon footprint reduction goals. Uponor Blue offering meets the same quality and performance requirements as the standard products. Uponor IQ Blue and Ultra Rib 2 Blue benefit from full data transparency and independently verified 3rd party certifications, like Environmental Product Declarations (EPDs) and International Sustainability & Carbon Certification (ISCC Plus). Thanks to their composition of over 50% of raw material coming from certified renewable feedstock, following the mass balance model, Uponor Blue products offer up to 70% carbon footprint reduction. With Uponor, Blue is the new green.

uponor | Moving › Forward

Dear reader,

2022 keeps bringing us unusual challenges. After the impacts of COVID-19 had been overcome, another ambiguity factor overshadowed the market in the form of inflation, creating uncertainty for the continuity of investments. In this climate, we are maintaining our focus on our customers, listening attentively to them and serving their needs well.

Like many other companies in the world, Uponor Corporation also suspended all its exports and imports to and from Russia in compliance with the guidelines set by the Finnish and the European Union authorities. To support Ukrainian families and children, Uponor has made a €100,000 donation split equally between UNICEF Finland and the Finnish Red Cross.

Despite all this uncertainty, we consider it fundamental to look ahead and think about what future we want for ourselves. Therefore, we have created a new strategy built on focusing on **People first, Sustainability and Innovation.**

People comprise our most precious asset. We have earlier talked about capital assets and a healthy balance sheet. Good owners and a strong commitment to the employees will take care of these balance sheet topics – and together we can concentrate on creating value for our customers. Our safety performance improved, with an accident frequency rate (LTIF) of 6.4 (9.1). In line with today's working environment, we have introduced a series of measures to empower our employees – wherever they are physically located – to give their best to customers. Hybrid working models are here to stay.

Sustainability is central to our strategy. Our Environmental and Social Governance (ESG) roadmap continues to develop, reflecting an even greater commitment to building a better future. Contributing to the reduction of our carbon footprint, we strengthened our Blue family of sustainable products with PEX Blue pipes – and this June, we are introducing IQ Blue, a sustainable stormwater pipe system that achieves an up to 70% reduction in CO_2.

Innovation is one of our key commitments to finding better and more sustainable solutions for our customers. During Q2, I attended two internal events, 'The Science Fair' and the 'Xperience Day', where the entire executive team could see, touch and experience first-hand all the new products and innovations our R&D teams will bring to the market in the months and years to come. We are living in challenging times, but with capable employees and a strong culture we have a bright and exciting future ahead.

Sebastian Bondestam
President, Uponor Infra

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New coding system to secure the next generation water and wastewater network

In Denmark, large parts of the water and wastewater network are due for replacement. Close collaboration between utility companies and manufacturers has resulted in a new coding system that will ensure traceability and safety when the next generation of pipes are laid in the ground.

THERE ARE AROUND 109,000 kilometres of water and wastewater pipework in Denmark. Much of the network was laid in the 1960s and is due for replacement or renovation within a few years – that is, if the pipes have not already started rupturing.

However, registration and traceability of the oldest pipes are often inadequate, and it has therefore been very hard – not to say impossible – to identify the full extent of the problem posed by old pipes bursting due to age or manufacturing defects.

Herning Vand – the water company for the city of Herning in the central Jutland peninsula – has experienced this too many times, and has thus taken the initiative to introduce a new solution. Uponor Infra and other Danish pipe manufacturers are driving this pilot project in partnership with the Danish Water and Wastewater Association DANVA and the digital trade directory Branchekataloget. The aim is to establish better traceability for utility companies and greater data security for users once the pipes are laid, both now and in the future.

Fumbling in the dark

The solution entails printing a 'data matrix', a graphic resembling a QR code, on all new pipes that are laid in the ground. The code is linked to the Branchekataloget trade directory, and as a minimum contains details of the pipe's producer, its batch number and time of production. Scanning the code gives waterworks and utility companies a quick overview of where the relevant pipes are located, enabling them to correct faults and deal with more ruptures in the pipe network far more quickly.

"Earlier, when part of our pipe network burst, we would often fumble in the dark, as we could never be sure exactly where the problem pipes were located, or how many pipes were involved," says **Didde Stenholt**, Team Leader at Herning Vand's GIS Department. She adds: "With this new system in place, we no longer need to carry out extensive excavations to expose the pipe network in order to find the information we need. We can easily get access to the data using the codes instead. It saves us a lot of work and means greater data security and far less downtime for network users."

Stricter requirements in tenders

Uponor Infra has been supplying water and wastewater pipes to the Danish market for more than 60 years and is delighted to be a part of the new coding initiative. The company also suggests that Danish waterworks and utility companies should place even higher demands in their tender material, both now and in the future.

"Adding the printed codes has necessitated a few changes in our production process, but that's a small price to pay to ensure an overview for utility companies and greater peace of mind for users. Herning Vand and several other players have already indicated that the codes will be a mandatory requirement in their tender material moving forward, and we can only support that," says **Karsten Højlund**, Product Manager at Uponor Infra. He goes on:

"We should listen to our customer's needs, and by adding further demands such as traceability, choice of materials, production methods, transport time and sustainability, the industry can seriously start to influence developments in the right direction. Overall, it will help to ensure that we, as manufacturers, are constantly working to improve our products and provide the best service possible. And that means peace of mind for everyone involved."

The first new pipes with printed data matrix codes have already been laid in the ground as part of a Herning Vand test project.

New Weholite licensee in Kenya

The Uponor Infra Technology team was in Kenya commissioning the line. From left: Johan Portman, Lassi Anttila, and Christian Glasberg.

AFTER A LONG, Covid-affected construction programme, Megapipes Solutions Limited, our new Weholite licensee in Kenya, switched on their DN3,000mm Weholite production line in May. The company is housed in a brand new 4,000m² factory, at a 20,000m² site in Oaklands, Ruiri, just outside Nairobi.

Megapipes has already secured some major projects in the Nairobi area and the team is very much looking forward to manufacturing Kenyan Weholite.

Megapipes is the sister company to a Tanzanian Weholite licensee, Plasco Ltd.

"It is a very proud moment to finally see this business open for manufacturing and continue my vision of delivering Weholite to the whole East African region," says **Auny Rajabali**, the Chairman and owner of the two companies.

Creating a sustainably built future

UPONOR is leading the effort to produce sustainable construction materials for commercial, residential and infrastructure purposes. Sustainability is central to our mission, vision and strategy. That is why we created Uponor Blue products – to help you achieve your environmental and carbon footprint reduction goals.

Uponor's Blue offering meets the same standards, requirements and performance as the standard products. The production methods and CO_2 ratings are validated with ISCC and EPD certifications.

Uponor Blue products align with the United Nations' Sustainable Development Goals, such as climate action, clean water and sanitation, and responsible consumption and production.

By choosing an Uponor Blue product, you can be confident in making the right decision today, for the environment of tomorrow. Uponor's signature colour is blue – and Blue is our flagship product family, exemplifying our commitment to sustainability. With Uponor, Blue is the new green.

READ MORE about Uponor's sustainable products at **https://www.uponor.com/en-en/uponor-blue**

Xperience Day shares the latest innovations

INNOVATION is one of our key commitments to finding better and more sustainable solutions for our customers. In 2022, Uponor Infra launched the Xperience Day initiative, aimed at sharing with our employees the latest innovations that our Offering and R&D teams will bring to the market in the coming months and years.

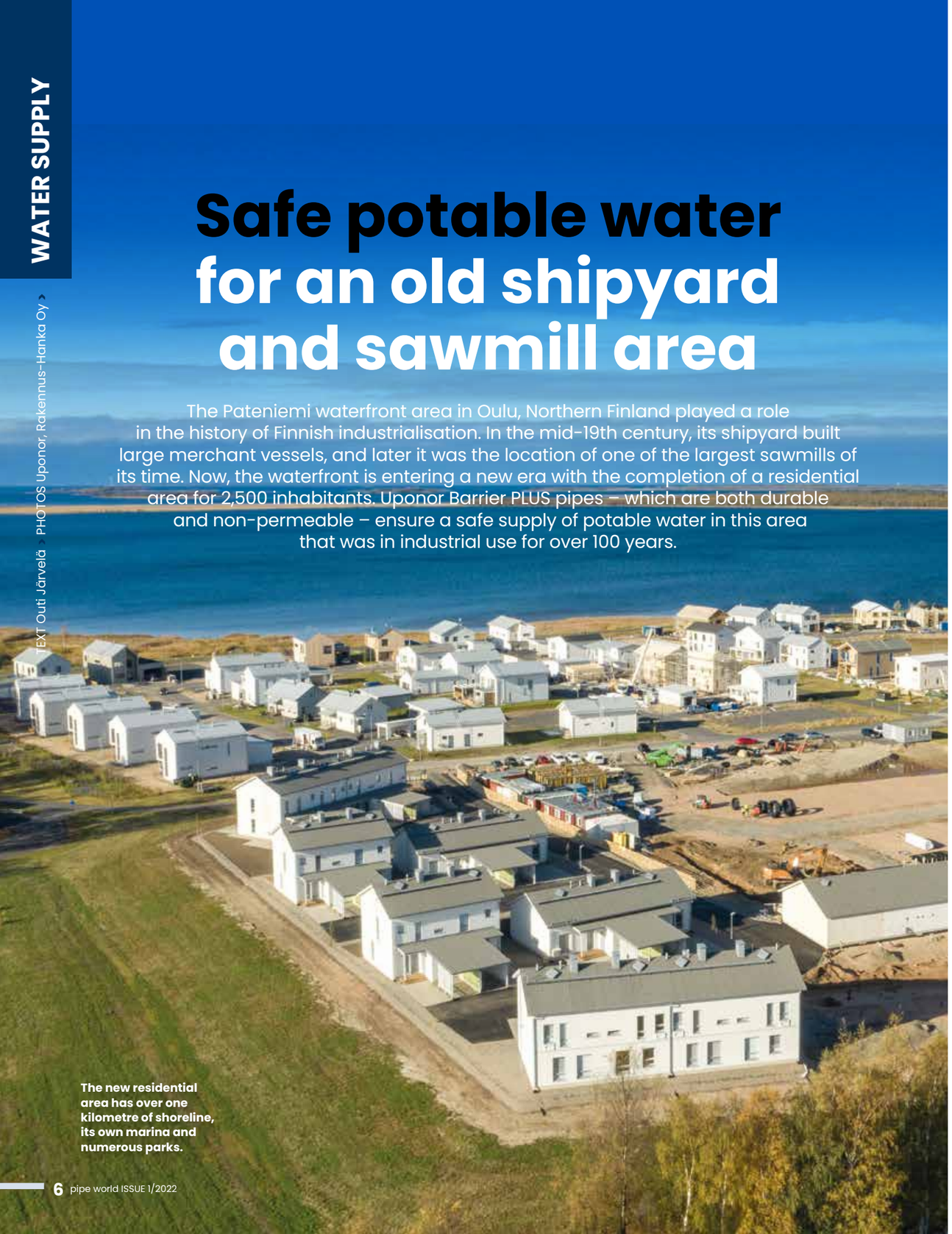
From exciting new features in existing products to a completely new offering that meets our customers' needs while complying with current industry quality standards – during the Xperience Day, the entire Uponor Infra executive team could see, touch and experience first-hand all these innovations. The day was followed by an R&D Lab open doors day, where all collaborators at the Nastola manufacturing facility in Finland were invited.

"Innovation is at the heart of everything we do, but it must always serve our primary objective: to meet and exceed our customers' needs," says **Kimmo Perälä**, R&D Manager at Uponor Infra.

TEXT Outi Järvelä › PHOTOS Uponor, Rakennus-Hanka Oy ›

Safe potable water for an old shipyard and sawmill area

The Pateniemi waterfront area in Oulu, Northern Finland played a role in the history of Finnish industrialisation. In the mid-19th century, its shipyard built large merchant vessels, and later it was the location of one of the largest sawmills of its time. Now, the waterfront is entering a new era with the completion of a residential area for 2,500 inhabitants. Uponor Barrier PLUS pipes – which are both durable and non-permeable – ensure a safe supply of potable water in this area that was in industrial use for over 100 years.



The new residential area has over one kilometre of shoreline, its own marina and numerous parks.

The new seaside district of Oulu, Veneenveistäjänranta, is being built in Pateniemi, a waterfront area of around 70 hectares that was previously the location of a shipyard and sawmill. When completed, Veneenveistäjänranta will be home to 2,500 people – a unique area with over one kilometre of shoreline, its own marina and numerous parks.

The waterfront area was in industrial use for over 100 years. Shipbuilding began in Pateniemi in 1856, when businessmen in Oulu set up a shipyard – over the years, it became one of the largest Finnish shipyards of its time. It was a major employer in the city, with more than 400 people working there at its peak. It built ships such as barques and frigates that mainly brought grain to Europe from the United States, India and Australia.

When shipbuilding waned in the 1870s, a steam-powered sawmill was established in Pateniemi. Sawmill operations continued there for over 100 years until 1990.

The area is now owned by Aalto Construction Oy, with which the City of Oulu has made an agreement on cooperation and zoning.

Brisk construction in the area

Veneenveistäjänranta is now being built up at a rapid pace. Many construction companies are hard at work in the area. The new residential area is scheduled to be fully completed by 2030.

One of the developers is the Oulu-based company Rakennus-Hanka Oy, whose houses are being built in three phases. Located a stone's throw away from the seashore, the first homes were completed in autumn 2021.

"We have two plots in this area – we'll build a total of 75 semi-detached and terraced houses on them. This autumn, we'll complete 18 residential units. The last of the houses will be finished by 2025," says **Ilpo Vakkuri**, CEO of Rakennus-Hanka.

Diffusion-protected pipes are a requirement

After the closure of the sawmill, the soil in this area was studied and remediated thoroughly over a period of many years.

Some of the soil had been contaminated by impregnating agents used at the sawmill. For example, the sawmill used chlorophenol-based KY-5 to protect sawn timber against blue stain fungi – the use of KY-5 was prohibited in the late 1980s.

After soil remediation, there were no longer any restrictions on the use of this area. However, the City of Oulu has wanted to ensure safe water supply – and has required the use of diffusion-protected pipes in the water supply network.

"Uponor is a familiar partner to us – we've been working together for over 20 years. When Uponor told us about the Barrier PLUS pipes, we decided to use them in this contract. We had no previous experience of these pipes," says Ilpo Vakkuri.

The Uponor Barrier PLUS pressure pipe system was launched three years ago. It is the first 100% plastic pressure pipe system that makes it possible to safely build potable water lines in high-risk areas and contaminated soil. The durable Barrier PLUS pipes feature a seamless and non-permeable polymer layer structure that protects potable water against hazardous substances and both taste and smell problems.

These flexible pipes are fast to install. They are suitable for both new construction and renovation, and are fully compatible with standard PE potable water pipes.

Smoothly and on schedule

Vakkuri says that the installation of Barrier PLUS pipes for the houses that are currently under construction has been almost completed. All in all, about one kilometre of pipes will be installed on Rakennus-Hanka's plots. The project uses pipes with diameters of 40–63mm.

The installation of the pipes has proven to be easy and smooth.

"We've borrowed electrical welding equipment from Uponor for installing extensions and T-branches. Uponor also provided us with guidance on pipe wrap installation and good clear instructions that made our work easy."

Barrier PLUS wraps ensure perfectly tight and secure seams. The installation of one wrap takes 10–15 minutes. Once the plastic wrap has been wound around the protective jacket of the pipe, a shrink sleeve is heated over it to seal it tight. The wraps and shrink sleeves have been pre-dimensioned for the pipes, so there is no need to measure and cut them to size at the site.

In addition to Barrier PLUS pipes, Uponor has delivered sewer pipes and wells for the yard areas as well as water and sewer pipes for the residential units.

"The installation work has gone well and on schedule. We'll continue with the installation of Barrier PLUS pipes in the autumn," says Vakkuri. ■

UPONOR BARRIER PLUS

- **Uponor Barrier PLUS is the first 100% plastic pressure pipe system that makes it possible to safely build potable water lines in high-risk areas and contaminated soil.**
- **The durable pipes feature a seamless and nonpermeable polymer layer structure that protects potable water against hazardous substances and both taste and smell problems.**
- **Barrier PLUS stands up to even the most harmful chemicals in the soil. In addition, TCE (trichloroethylene), a byproduct of solvent decomposition, cannot pass through the pipes.**
- **The pipes are easy and quick to install – and fully compatible with standard PE potable water pipes.**
- **The pipes come in sizes of 32–250mm and pressure grades of PN10 and PN16.**
- **Uponor Barrier PLUS pipes are fully recyclable.**

TEXT Ewa Krasuska › PHOTOS Uponor ›

A new lease of life for an iconic railway station

The modernisation of the Warsaw West railway station is the largest construction project currently underway in the Polish capital. Once completed, it will become Poland's largest station, with 120,000 passengers expected to pass through daily by 2030. To always ensure uninterrupted rail traffic, it is necessary to ensure adequate drainage of the railway line and other track assets. Five batteries of PE-HD retention tanks meet the strictest criteria of durability under heavy loads from rail traffic.

The Warsaw West railway station is an entry point into the city for arrivals from the west and south. It marks the beginning of a cross-city line cutting through Warsaw city centre and exiting east. Built in the 1930s as a temporary junction, it has become a permanent feature in the city's landscape and transit system. Despite growing into one of the busiest railway stations in Poland – with 60,000 passengers and 1,000 urban, suburban, and long-distance trains passing through every day – it has remained an underwhelming sight, with disparate open-air platforms connected by dark underground walking tunnels.

Now it is all about to change. Once the redevelopment is completed, Warsaw will gain a 21st century transport hub. It is part of a larger renovation project that calls for the modernisation of the entire Warsaw cross-city line. The contract for the redevelopment of the Warsaw West station was signed in July 2020 by the representatives of PKP Polish Railways and the Ministry of Infrastructure. Preparatory works began in December. The cost of the investment is around EUR 440 million, with Budimex S.A. at the helm as the general contractor.

The design of the new station includes the construction of eight new platforms as well as a footbridge running the width of the station and linking two city districts lying on opposite sides of the tracks. The footbridge will offer access to the platforms as well as the nearby suburban line. The platforms and the footbridge will be covered by a huge roof fitted with solar panels, which will certainly raise the green credentials of the station as they are set to provide 30% of its power supply. The roof will also feature skylights to let the natural light in. There will be double escalators and large glazed lifts leading to the platforms, the latter providing access to people with disabilities. The existing underground walkway will be raised and widened from 6m to 80m, making new space for ticket offices and waiting areas, as well as retail and food and beverage outlets. There are also plans for the construction of a tram station below the walkway level, the first stop on a new tram route running south to one of Warsaw's large residential districts.

Once work is completed, Warsaw West will become the largest traffic hub in Poland, comprising the train station and both bus and tram stations. The new tram line will improve passenger access to the station while underground transfers between long-distance platforms, suburban platforms and bus stops will make for quicker and more comfortable transit.

Drainage system ensures uninterrupted traffic

Adequate drainage of the railway line and other track assets is necessary to always ensure uninterrupted rail traffic. This requires considerable expertise and experience on the part of the general contractor and subcontractors. The technology must meet the strictest criteria of durability under heavy loads from rail traffic. The task of installing the rainwater and drainage system including retention tanks and pumping stations was entrusted to Meliorant Tadeusz Zając and Co., which relied on Uponor Infra to deliver the retention tanks for the project.

Uponor has over 60 years' experience in the manufacturing of gravity and pressure pipe systems. The company's PE-HD piping is used all over the world to build sewage and stormwater systems, water mains, industrial pipelines, marine outfalls, and high-capacity batteries of retention tanks. PE-HD pipes have high chemical resistance to both external factors and transported media, which is a huge benefit in stormwater systems. They are also resistant to corrosion and have a low roughness coefficient of k=0.01, which prevents encrustation and provides for easier self-cleaning of the pipeline. Weho retention tanks are a popular choice for infrastructural projects as they are able to withstand traffic loads and stray currents, which factored in the decision to choose them for the redevelopment of the Warsaw West station. Thanks to extrusion welding, the finished tanks have a monolithic structure and homogenous joints, guaranteeing 100% tightness and a life expectancy of over 100 years.

Installation under active train traffic

In total, Uponor has supplied five batteries of Weho tanks of DN1,800–2,600mm with integrated flow regulators. The total capacity of the batteries is almost 1,400m^3. The first battery was delivered to the construction site in February 2021. The last shipment – a SN8 DN2,600mm battery of 380m^3 capacity – was delivered in December 2021.

Paulina Siwiec, the Work Manager for Meliorant, says that collaboration with Uponor Infra went smoothly in terms of both deliveries and installation. The work schedule was revised and updated on an ongoing basis depending on progress on site. The demand for consecutive batteries was communicated to Uponor ahead of time. Once the technical drawings were approved, elements of the tanks were prepared for shipment at Uponor's manufacturing plant in Kleszczów and transported to the construction site in 12m to 14m sections. Once on site, the tank elements were lowered into a trench secured with a Berliner wall and onto prepared substrate. Uponor's service team assembled the tanks by means of extrusion welding. The tanks were then adjusted to their final position and connected to the rest of the system. After they had passed leak-proof tests, the trench was backfilled with native soil.

Sebastian Dembkiewicz, the Regional Sales Coordinator overseeing the project on behalf of Uponor, emphasises the benefits of using lightweight and flexible PE-HD tanks in the challenging conditions of a busy city centre, between railway tracks and, most importantly, under active rail traffic. Paulina Siwiec confirms that their modular structure and low weight are big advantages of Uponor's tanks. They provide for easier handling and facilitate last-minute adjustments depending on developments on site. If needed, the tanks can be customised in the factory to meet the precise requirements of a project. No significant modifications were necessary during installation in Warsaw, only small adjustments due to uninventoried elements of underground infrastructure and collisions with existing pipelines.

Building for future generations

Multiple studies and expert reports confirm that Uponor Infra's PE-HD pipelines boast a service life of over 100 years. "Uponor is proud to provide solutions that will serve not only our contemporaries but also future generations," Sebastian Dembkiewicz says.

Ireneusz Merchel, Chairman of the Board at PKP Polish Railways, recently expressed a similar sentiment. Speaking in an interview, he affirmed PKP's commitment to overhauling Warsaw's entire cross-city line to make it last not mere decades but 50 to 100 years. It's an important voice in the discussion of the future of engineering construction, especially in the context of the depletion of resources and climate change.

Let's build for future generations! ■

Efficiently treated wastewater

The village of Överklinten in the coastal area of Västerbotten, northern Sweden, needed a new solution when the existing ground-based wastewater system was condemned. An Uponor Infra WehoPuts treatment plant was chosen. Because Överklinten is located upstream of groundwater wells, and the site near a local factory makes for stringent requirements regarding treatment, mechanical separation and the biological and chemical process have also been supplemented with a phosphorus trap to capture any excess phosphorus and UV-C radiation, which prevent bacterial growth.

TEXT Uponor › PHOTOS Uponor ›

The little village of Överklinten, just northwest of Robertsfors Municipality, is located in the Rickleå river valley in the coastal area of Västerbotten, northern Sweden. The village's landscape is markedly agricultural, and it is located on the mountain Storklinten, with the beautiful lake Hemsjön to the west of the village. For those interested in fishing, Rickleån offers fine fly fishing for sea trout.

When the existing ground-based wastewater system was condemned, there was an investigation as to an appropriate way of serving the 41 properties in the village, namely a preschool, a business, a hotel, two summer cabins and 36 permanent residences. An Uponor Infra WehoPuts treatment plant was chosen.

"We already had a WehoPuts 200 in the municipality, so we knew the treatment plant worked well and was quick and easy to install. The first WehoPuts plant was installed in around 2005, and is still working excellently," says **Örjan Persson**, Robertsfors Municipality's operations manager.

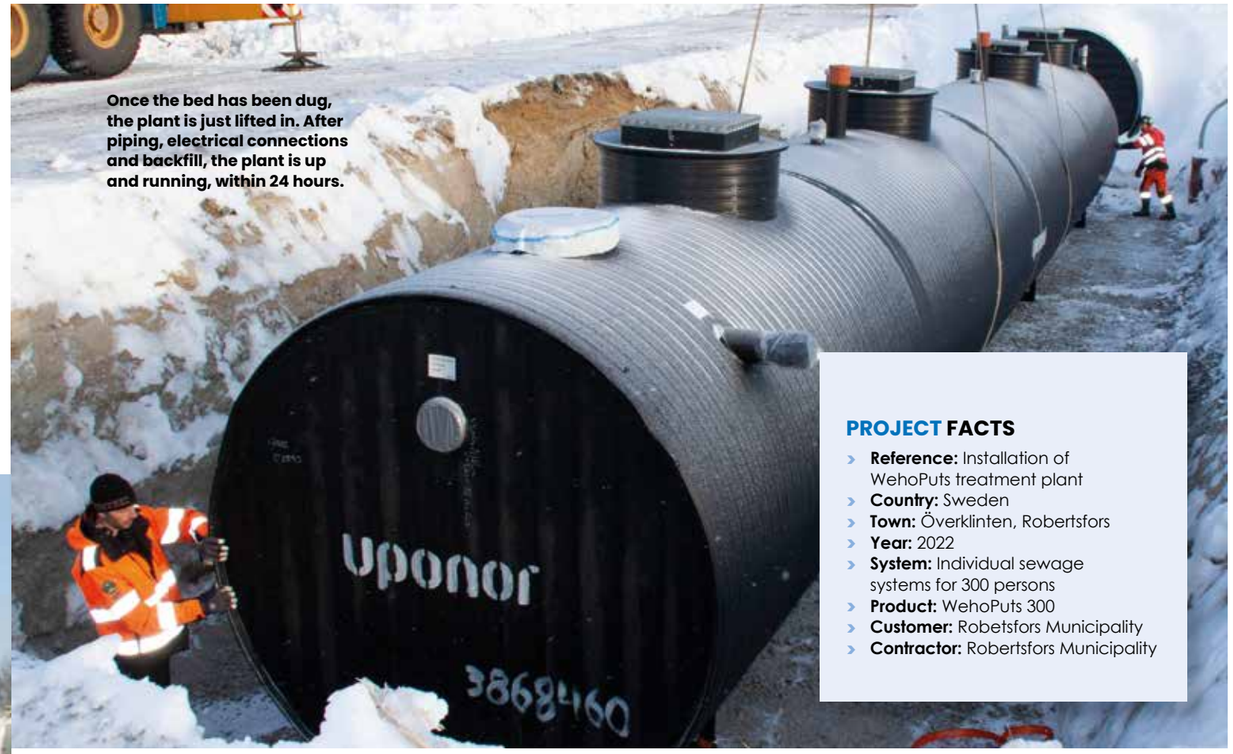
A durable solution for decades

Biochemically operating WehoPuts treatment plants are made of corrosion resistant Weholite PE plastic pipes that ensure them an extremely strong structure and a long service life.

WehoPuts is a modular solution which is easy to expand later by adding more processing tank units. The treatment plant can also be customised according to the site and wishes of the customer.

One of the big advantages of the treatment plant is that it is delivered by lorry, ready to install. Once the bed has been dug, you just have to lift the plant in, make piping and electrical connections and backfill. This can all be done in a day, and within 24 hours the plant is up and running. Inspection and maintenance of the plant are also quick and straightforward.

With automatic processing, the system is simple and easy to use. The treatment process is carried out in accordance with the batch principle and ensures that all wastewater is treated in the same way. This also ensures the optimisation of treatment and energy and chemical consumption.



Once the bed has been dug, the plant is just lifted in. After piping, electrical connections and backfill, the plant is up and running, within 24 hours.

PROJECT FACTS

- **Reference:** Installation of WehoPuts treatment plant
- **Country:** Sweden
- **Town:** Överklinten, Robertsfors
- **Year:** 2022
- **System:** Individual sewage systems for 300 persons
- **Product:** WehoPuts 300
- **Customer:** Robetsfors Municipality
- **Contractor:** Robertsfors Municipality

Like all Uponor´s products, WehoPuts tanks can be recycled at the end of their life.

Treatment results above and beyond the requirements

The Swedish Environmental Protection Agency's requirement is that 50% of the nitrogen and 90% of the phosphorus and organic matter in the wastewater be precipitated. The WehoPuts meets that requirement. But given that Överklinten has a surface-water source downstream of the pellet factory, Robertsfors Municipality wanted to achieve an even higher degree of treatment.

"The plant achieves the high level of environmental and health protection, but in Överklinten we have supplemented the mechanical separation and the biological and chemical process with a phosphorus trap, to capture any excess phosphorus and UV-C radiation, which prevent bacterial growth," says **Jörgen Eggesten**, Uponor Infra's area seller.

The plant in Överklinten was commissioned in March 2022, and residents are now looking forward to well treated wastewater and minimal maintenance.

"The collaboration with Uponor Infra has been excellent. Jörgen Eggesten has checked in with us during the process and has got back to us really quickly when we've had questions," Örjan Persson concludes. ■

WehoPuts 200–1200
VILLAGE-SCALE WASTEWATER TREATMENT PLANTS

- **Bio-chemical household wastewater treatment plants designed for multiple housing and small settlements. In addition, workplaces, schools, and summer residences can be connected to the treatment facility**
- **System includes one or more ground-installed horizontal tanks and process equipment**
- **Prefabricated, ready-to-install units**
- **Quick to install, no additional structures or building work needed**
- **The modular system is easy to expand according to the customer's needs**
- **Remote monitoring system**
- **Durable and tight construction**
- **The numbers in the WehoPuts product number indicate the capacity of the system based on the use of a person (Personal use 150l/per person/day). Also commonly called "PE"**

TEXT Ewa Krasuska > PHOTO Uponor >

Once on site, the pipes are welded by Uponor´s service team.

Built to last

A key traffic route in the Upper Silesia Industrial Region in southern Poland, a mining area, will be protected by a Weholite stormwater system to ensure decades of problem-free operation. Thanks to the use of PE-HD pipes and retention tanks, the investment has strong sustainability credentials.

The new North-South (N-S) route will connect two of the Upper Silesia Industrial Region's most important roads: the A4 motorway and the Cross Regional Highway (DTS), which run parallel to one another on opposite ends of the city of Ruda Śląska. The A4 is a major Polish motorway – and part of the European east-west corridor – but it's the DTS that plays a key role in the region's transport system. With more than 20 junctions, it offers direct access to many cities and villages of the Upper Silesian Metropolis, a conurbation of 41 municipalities and home to 2.3 million people.

It's a comprehensive project that includes the construction of a new road, a series of access roads along with footpaths and bike lanes, as well as the remodelling of existing overpasses, bridges, underground walkways and culverts. There will also be a two-storied flyover and a turbo roundabout.

In order to ensure the new road and engineering structures are protected from water damage, the route is being equipped with a bespoke drainage system comprising five batteries of PE-HD retention tanks DN2,000mm and DN2,400mm with a total capacity of 1,000m³, Weholite pipes SN8 DN300–600mm as well as no less than a hundred manholes and chambers supplied by Uponor Infra. Uponor has also delivered 1.35km of pressure pipe DN1,370mm for the construction of a brand-new water main, which will replace an old steel pipe DN1,200mm running in close proximity of the new route.

A task in a mining area

One of the biggest challenges is that the N-S route is located in an area affected by mining damage. Upper Silesia is Poland's coal basin – and significant portions of the land are adversely impacted by coal mining activity. **Bartosz Staszica**, the Contract Manager for Drogopol S.A., the general contractor for the project, points out that estimated subsidence in the area can reach up to three metres. This puts great pressure on both the contractors and the technology.

Uponor Infra has extensive experience in supplying gravity and pressure pipe systems for installations in difficult terrain, including areas affected by heavy industry, floodplains or seismic zones. The company's broad offering of individual products and systems, including turnkey solutions, is rooted in the high quality, versatility and reliability of Uponor's PE-HD technology. The benefits of PE-HD pipes, tanks and fittings include resistance to abrasion, corrosion, high resistance to chemicals as well as a low roughness coefficient (k=0.01), which prevents encrustation and enables self-cleaning of the pipeline. Due to their homogenous joints and monolithic surface, achieved in the process of butt welding (pressure systems) or extrusion welding (gravity systems), the PE-HD systems transmit axial forces. This makes them exceptionally robust and durable with a life expectancy of over 100 years. Add flexibility and low weight into the mix, and you get a product that is quick and easy to install while at the same time being long-lasting and able to withstand dynamic ground movements.

Ready, set, install

The contractor of the N-S investment was on a tight schedule – and challenging winter weather conditions ramped up the challenge. Uponor made the first deliveries of pipes, fittings and tank elements to the construction site at the beginning of 2021. Pressure pipes were delivered in 12.5-metre sections, while tank elements were prefabricated into 15-metre modules and fitted with manhole chimneys, ladders and inlets at Uponor's production facility in Kleszczów. The option of prefabricating larger elements together with fittings is another benefit of using PE-HD solutions, as it saves both time and transport costs. Once on site, the elements are welded by Uponor's service team, who can carry out the job in virtually any weather conditions.

The highlight of the project was the installation of a single 400-metre section of the new pressure pipeline DN1,370mm in an open trench as an one-hour operation. This was possible due to the pipe's natural flexibility and bend radius, which allow for the safe handling of long pipe sections as well as adjusting them to the trench's profile. In total, Uponor has made 103 deliveries for the N-S route project, with the last shipments planned for mid-2022.

Sustainable means lasting

Commitment to progress and innovation with the aim of achieving a sustainable living environment for future generations has been at the heart of Uponor's philosophy for years. The long-appreciated benefits of PE-HD technology – such as high resistance to chemicals, easy and quick installation, a 100-year life span and maintenance-free operation – translate into strong sustainability credentials. Energy-effective and lasting PE-HD solutions implemented in infrastructure projects such as the N-S route near Ruda Śląska ensure we've taken good care of both people and the environment.

TEXT Uponor Infra > PHOTO Uponor Infra >

Large Copenhagen project requires special solutions

The Danish utility company HOFOR and Uponor are collaborating to establish a new pipeline between the Strandvænget and Østbanegade underground stations in Copenhagen, the capital of Denmark. The project requires very specific solutions due to the convoluted structure of the Copenhagen underground.

The pipeline will serve as a reserve for the Lynette pipeline, which is a vital main wastewater pipeline that ensures the transport of wastewater from large parts of Frederiksberg, Gentofte and Copenhagen to the Lynetten treatment plant on the island of Refshaleøen.

The Lynetten treatment plant was established in 1978. Like all such facilities, it must be maintained and inspected. In these situations, you want a pipe which in the future can transport wastewater safely while the Lynette pipeline is closed.

"The huge network of pipes in Copenhagen and the dense structure of the underground means that we considered a number of different solutions before we found the right one. As the space available for the pipeline is tight, and there are many turns, new challenges arose along the way, and therefore we in collaboration with Uponor have prepared a plan that we're now implementing," says **Frederik Mogensen**, wastewater specialist at HOFOR, Hovedstadsområdets Forsyningsselskab.

Special solutions for curved underground structures

In a convoluted solution, the pipeline winds through an existing district heating channel where the tunnel crosses under the coastal railway tracks. The tunnel contains district heating pipes from the Svanemølle district heating plant, which supplies the city with district heating. Two of the larger district heating lines were no longer in use – removing them has created space for the new pipeline.

The pipe specialists from Uponor work with HOFOR to lay the pipelines in the ground. The task has required extra consideration and a special focus on the choice of pipes.

"This project has been somewhat different from the kinds of tasks we usually work on. There have been some underground challenges – there are some very sharp angles and very limited space in the hallways where the pipes need to be installed. It really requires finesse and special solutions, and we've had to think carefully which types of pipes can best be used to meet the specific handling requirements under these limited-access conditions," says Project Manager **Jan Lunding** from Uponor Infra.

A total of 800 metres of cables will be laid – 500 metres Ø1,000mm and 2x300 metres Ø710mm cable laid on top of each other. The two parallel Ø710mm lines have been chosen for the section with the narrow tunnel, as they are easier to lead through. Together, the two smaller pipes easily meet the capacity requirements set for the Ø1,000mm pipe sections.

The pipes have been transported down the tunnel in shorter lengths.

Important experience

In addition to the choice of pipes, the partners have also had to come up with alternative solutions for the actual work of laying the pipes. Therefore, the pipes have been transported down the tunnel in shorter lengths.

"In some places, we've brought down pipes of just four metres. Uponor has provided a welding machine that can be led down to the pipes to weld them together directly on site. We've had to utilise a really special work process," says Frederik Mogensen.

"For Uponor, too, this has been an unusual task to work on – but being part of the project has given us vital experience. The work on Strandvænget is different from our usual projects in Denmark, but it's extremely interesting to be part of a project like this. We're gaining significant experience that we can use in our work on a national level," says Jan Lunding. ■

TEXT Uponor › PHOTOS Uponor ›

Fish farming with the smallest possible footprint

Andfjord Salmon AS, a Norwegian fish farming company, has the ambition to create a sustainable, environmentally and fish-friendly onshore facility – with the smallest possible footprint. This patented facility combines the best from both traditional ocean net-pens and land-based salmon farming. The intake and outfall lines are built with highly durable Weholite PE pipes and panels with a 100-year life span.

Andfjord Salmon's fish farming facility is located on Andøya, the northernmost island in the Arctic Archipelago of Vestrålen and Lofoten in northern Norway. Established in 2014 by **Roy Bernt Pettersen**, the company is built on innovation in sustainable salmon farming. Its vision is to build a future-oriented facility based on sustainable development of the aquaculture industry.

Uponor's work at the site started in 2020.

The facility's patented design is based on a seawater flow-through system, combining the best from both traditional ocean net-pens and land-based salmon farming. It is a closed land-based facility that has been lowered to sea level on land. The plant has 100% flow, with continuous renewal of fresh seawater – it thus differs from traditional land-based facilities, which are based on recycling with purification of water.

"In the pools, the salmon have plenty of space and pure, oxygen-rich water. This ensures optimal growth conditions for salmon," says **Martin Rasmussen** from Andfjord Salmon.

The optimal temperature from the Gulf Stream

The most significant advantage of Andfjord Salmon's facility is the infinite supply of nutritious, clean and oxygen-rich seawater, with optimal and stable temperatures in the Arctic. Just off the coast of Andøya island, the Gulf Stream flows north. At no other point on this extremely long coastline does the life-giving current reach closer to land than at this island. The fresh seawater in the fjords off Andøya maintains the perfect temperature for Atlantic salmon, which positively thrives in these waters. That's the reason why Andøya's location makes it uniquely suited to salmon farming.

Andfjord Salmon does not need to heat or cool the water. The optimal temperature from the Gulf Stream, between 7 and 12 degrees Celsius, ensures that salmon are content and grow continuously, year-round.

Water from the Gulf Stream passes through the pools up to 15 times per day. Seawater is pumped from 160 or 30 metres, depending on whether it is winter or summer season.

"We collect the water at a great depth, far below the levels where salmon lice and hazardous algae thrive. This is a huge advantage, as one of biggest challenges in the fish farming industry is the treatment of sea lice," says Rasmussen.

Since the onshore pools also lie below sea level, Andfjord Salmon's flow-through technology consumes a minimal amount of energy and the operating costs are relatively low, too.

Also, minimising the environmental impact is essential. Valuable biological residue is collected, and can then be utilised in a circular way to produce bioenergy and electricity as well as agricultural fertilisers.

A highly durable solution

Uponor has supplied the complete intake and outfall pipeline systems for the onshore pool. The pipelines are built with Weholite PE pipes in ID1,800mm and ID2,200mm and the special components with Weholite panels. The highly durable panels are used, for example, for the intake screen, which is installed at 40 metres depth. Weholite panels and pipes developed by Uponor Infra can be dimensioned and equipped individually for countless applications, such as tanks, foundation slabs, support structures, underground pumping station chambers, and floating or submerged marine structures.

Uponor's collaboration with Andfjord Salmon started in early 2018 when the facility in Andøya was under planning. Work at the site started in 2020 and now the last part of phase 1 at the plant is completed.

"We have had many project meetings with the consulting company Norconsult and the other suppliers to find the optimal solutions for the facility. Uponor has long experience in industrial solutions. We have supplied intake and outfall pipelines to customers around the world, but this was our first solution for a land-based fish farm," says **Christian Vestman** from Uponor Project Services and **Geir-Are Berg** from Uponor Infra AS. ■

TEXT Outi Järvelä › PHOTOS Uponor, Syke ›

Climate change poses challenges to water supply

Heavy rainfall, floods, storms, heatwaves, and droughts – the changing climate poses ever-greater challenges to water supply, too. Finnish water utilities rely on high-quality water supply technology. The largest utilities in particular are well-versed in how to ensure water safety. That said, the Finnish water utilities sector is highly fragmented – and there are great differences in how well prepared small and large utilities are against climate change, says **Jyrki Laitinen**, PhD, Head of Unit of Sustainable Water Services at the Finnish Environment Institute, in our expert interview.

A study published by the Finnish Climate Change Panel in 2019 revealed that only part of Finland's water utilities had drafted contingency plans for disruptions – and even those rarely took climate change into consideration. One utility in three had not assessed weather and climate risks at all.

"I'm sure that the largest water utilities have already given much thought to the risks of climate change. However, the Finnish water utilities sector is very fragmented. Small utilities in particular – and there are many of them – have a shortage of both resources and experts. Accordingly, there are major differences in how well prepared small and large utilities are," says Jyrki Laitinen, Head of Unit of Sustainable Water Services at the Finnish Environment Institute SYKE.

He points out that climate expertise is a relatively new skillset.

"Furthermore, utilities haven't necessarily felt that climate change poses a threat to their own operations. That said, Finns are well-informed about climate change."


Jyrki Laitinen

Heavy rains put networks under strain

Extreme weather phenomena can cause problems with water quality and adequacy for water utilities – and even service outages.

Long rainy periods, heavy rainfall and flooding pose greater risks to water quality. Abundant rain increases nutrient and microbial runoff into raw water, and floods contribute to the absorption of pollutants into groundwater. On the other hand, mild winters cause groundwater pollution even in winter.

"Dry weather can also increase pollutants in water, and long periods of drought reduce water resources. To date, Finland has not suffered from water shortages. However, after long periods with no rain, people in some groundwater areas of Southern Finland have been urged to save water. In future, we might face these kinds of situations more and more frequently."

As a result of urbanisation, there is constant growth in impermeable built-up surfaces. Heavy rainfall puts sewer network capacity under heavy strain. Overflows can cause significant harm to the environment and hygiene.

"The networks have a large repair deficit – this doesn't improve the situation. Furthermore, water utilities might not necessarily know what condition the networks are in. This means that it's difficult to predict when capacity will be exceeded," says Laitinen.

Waterborne epidemics on the rise?

From 1998–2018, there were about 100 waterborne epidemics in Finland, of which 75 per cent involved the contamination of raw water. The largest of these epidemics caused thousands to fall ill and the costs of sickness absences ran into millions of euros.

It is forecast that extreme weather phenomena will lead to more waterborne epidemics. In particular, these risks are posed by surface runoff into groundwater due to heavy rainfall, floods and snow meltwater – and increasingly often by ageing water supply networks as well.

"There have been incidents in which pipes in a poor condition have broken, letting hazardous microbes or even wastewater into the potable water network."

"Real-time monitoring of water quality would come in useful in these situations – it would ensure that warnings are issued as early as possible, and measures are taken quickly. Continuous monitoring hasn't become common yet – for many utilities, this is a cost issue, of course. That said, real-time monitoring would be justified in critical sections of the water distribution network, and in those points that would yield the most representative data to facilitate modelling the entire network," says Laitinen.

He points out that stepping up digitalisation in general is one of the key means of preparing for climate change.

Taking climate risks into consideration in investments

In the near future, water utilities will have to make large-scale investments to address the growing repair deficit of the networks. It is estimated that about 6 per cent of Finland's water supply networks and 12 per cent of sewer networks are in very poor condition.

Preparing for climate change will require many utilities to invest in increasing the efficiency of their purification processes and water treatment or upgrading their backup power.

"Finland has traditionally sought to keep water fees low. If investments can't be paid with the water fees collected, they won't be implemented. It would be a good idea to look at this issue from a longer-term perspective so that we can afford to make investments – including those in the climate. In other words, water fees should be set high enough to cover both investments and operating costs," says Laitinen.

Getting contingency plans in shape

In addition to accounting for weather and climate risks in their contingency plans, Laitinen encourages water utilities to also adopt the World Health Organisation WHO's Water Safety Plan. Both the Water Safety Plan and the Sanitation Safety Plan can be adopted by all water utilities in Finland free of charge.

"They are comprehensive tools for risk assessment throughout the supply chain and also facilitate the specification of measures to mitigate risks."

Laitinen says that it's ever more important to take care of personnel's expertise.

"The smallest utilities have limited resources. However, expertise, experiences and good practices can be shared through cooperation, such as by assembling a network of utilities with regular meetings. You don't have to wrestle with these issues alone," says Laitinen. ■

IMPACTS OF CLIMATE CHANGE ON WATER SUPPLY

- Increase in rainfall causes nutrient and microbial runoff into raw water
- Heavy rainfall burdens wastewater plants
- Floods contribute to the absorption of pollutants into groundwater
- Storms and thunderstorms cause power outages and problems with water supply
- Mild winters cause groundwater pollution in the winter, too
- Droughts can increase pollutants in water and lead to scarce water resources
- Global warming increases microbial growth in water systems
- Warmer surface waters increase growth of Cyanobacteria

Source: Finnish Climate Change Panel, 2019. Climate Change and Water Supply – Preparedness and Health Impacts

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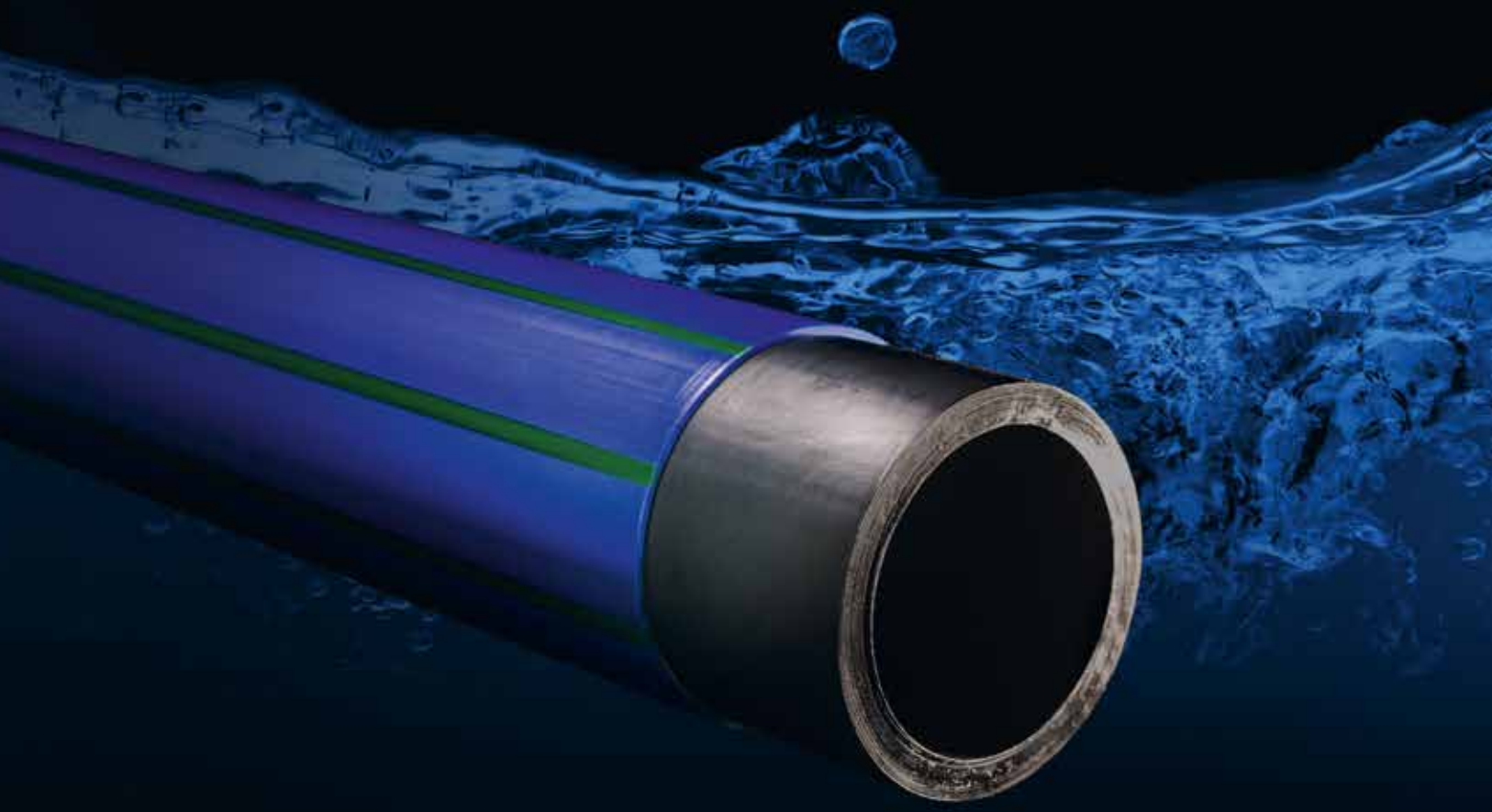

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