THE UPONOR INFRA CUSTOMER MAGAZINE » ISSUE 2/2019

pipe world

Dear reader,

The water supply and wastewater infrastructure in many regions across Europe is ageing. Despite the high quality of drinking water in the Nordic countries, the condition of the old pipe networks poses challenges. For example, in Finland most of the network was built between 1960 and 1990 and in the biggest cities parts of the network are over 100 years old. According to a recent study in Finland (ROTI 2019), 12% of the sewer network and 12% of the potable water network has deteriorated and there is an increasing need to renovate the old networks to both ensure water quality and minimise water losses.

In Finland, 68 million m³ of mains water is lost every year and a substantial part of this is due to leakages (SYKE 2018). In Sweden, the total leakage of clean drinking water is about 15% on average, corresponding to 99 million m³ (Svenskt Vatten 2019). This is not only a waste of clean drinking water – resources used to collect, treat and pump the drinking water are also wasted. Losses of water, and in particular leakages, are relevant for distribution network efficiency in all European countries. New innovations are needed to help solve these challenges. On p. 12, you can read about how our new Water Monitoring Services are helping the city of Pori in Finland to monitor its leakages.

Finland is not the only country with network challenges. In Poland, Warsaw recently suffered from a significant leakage in its sewer network into the Vistula River that flows through the city. Uponor participated in the rescue operation, building an over one kilometre long temporary pipeline in just eight days to stop the leakage into the river. On p. 22, you can read about how 50 Uponorians carried out this impressive feat. We are very proud of this.

Old pipe networks are not the only challenge that cities are facing. Urbanisation is increasing the need to repurpose old industrial sites for better uses. New methods are required to secure the long-term safety of the drinking water. Uponor was the first to launch to market a fully plastic barrier pipe for potable water networks. Read more about this unique product on p. 8.

I hope you enjoy this latest issue of Pipe World!

Sebastian Bondestam
President, Uponor Infra

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The first 100% plastic drinking water pressure pipe for contaminated soil

UPONOR Barrier PLUS is the first fully plastic pressure pipe for drinking water capable of withstanding even the toughest soil pollutants. The reason behind its resistance is a polymer barrier protection layer.

One of the challenges faced by conventional drinking water piping solutions is that contaminants can penetrate traditional PE pipes. For this reason, either cast iron or concrete piping has been typically used for drinking water transport and delivery in contamination risk areas. A further concern is that a commonly used solvent, trichloroethylene (TCE), can corrode aluminium layered barrier pipes.

Uponor Barrier PLUS is a solution that incorporates the ease and flexibility of plastic piping with the resilience and security against contaminants of cast iron pipes. The polymer barrier layer protects the water from the pollutants, making Uponor Barrier PLUS a reliable and long-lasting solution that is easy to install.

Uponor Barrier PLUS not only mitigates the risks involved in building on potentially contaminated land, but also protects the water supply from future risks, such as chemical spills or other accidents above ground. It is also a plus for the environment, as it is fully recyclable.

As cities and populations grow, there is a need to reclaim lands previously deemed unfit for universal public and private use. There is a risk, especially in former industrial sites, that the soil contains pollutants that can infiltrate ordinary pipes. The risk is not exclusive to these sites – even existing built areas may face challenges. The consequences can be particularly drastic when it comes to drinking water.

Uponor Barrier PLUS is available in diameters from 32 to 250mm in pressure classes PN10 and PN16. ■

Appointments

UPONOR INFRA

DENMARK

Bo Holm Sørensen has been appointed Sales Director for the overall sales force in Denmark as of 1 August 2019. In his new role, Bo will continue to focus on further developing Uponor Infra's position in the market. Bo has been employed by Uponor since 1996. He has played a leading role in sales throughout his career.

Weholite License to Kenya

UPONOR INFRA Oy and the owners of Plasco Ltd Tanzania have signed a Weholite Licensing Agreement to expand the manufacture of the Weholite pipe to Kenya.

In addition to Uponor Infra's own production of Weholite, there are licensees in the UK, Iceland, Oman, Malaysia, Thailand, Japan, Brazil, France, Turkey, Tanzania, Canada and now also in Kenya.

Plasco is a Tanzanian manufacturer of PE-HD and U-PVC pipes and fittings that has been a Weholite licensee since 2017. The new production facilities will be located in Nairobi, Kenya.

The Weholite product line, invented by Uponor Infra (formerly KWH Pipe) in the 1980s, consists of polyolefine pipe, fittings and fabricated assemblies. The structured-wall PE-HD Weholite pipe is available in various sizes, with inside diameters of up to 3,500mm.

The pipe is used extensively worldwide in low pressure/gravity service applications for potable water, stormwater, sewage and various other liquids. Weholite fabricated assemblies are designed for special functions, such as manholes, retention tanks and even individual family-sized sewage treatment units for non-urban regions.

Weholite products manufactured at the Nairobi factory are expected to be available by the end of 2020. ■

More info about Weholite licensing
www.weholite.com

An effective solution to take the pressure off the public stormwater network

Uponor IQ tanks provide an effective, safe and long-term solution for stormwater treatment in a new housing complex that is under construction in Aarhus, southern Denmark. Thanks to the IQ tank's modular construction, the housing complex has several options for recycling stormwater before it is drained into the public network.

IN A NEW DEVELOPMENT in the heart of Aarhus, the second-largest city in Denmark, a new housing complex is currently under construction. This interesting housing complex features both five-storey residential units and 47 smaller terraced houses.

Based on calculations made during the preconstruction development process, the consultant predicted that handling stormwater from the 47 terraced house roofs during heavy rainfall would pose challenges. Therefore, the consultant chose to install an effective stormwater solution to take the pressure off the public stormwater network.

Below the patio of each house, an Uponor IQ tank is now being installed for stormwater collection. Due to their critical location below the residents' patios and gardens, Uponor Infra recommended IQ tanks as an easy-to-install, safe, and longer-term solution.

The tanks are connected in series, so when the stormwater chamber is full and stormwater is led into the IQ tank, the water is conducted to the next tank in the series as they fill up. The IQ tanks will function as water reservoirs, where a water brake ensures that the water is retained and slowly led out into the public network.

Sustainable options for future solutions

The 47 stormwater tanks for the terraced housing complex in Aarhus are currently only designed for the collection and retention of stormwater. But thanks to the IQ tank's modular construction, the housing complex actually has several options for recycling the stormwater before it is drained into the public network. With a few simple adjustments, the designer can, for instance, add a filtered pump solution for purification of stormwater, meaning that secondary stormwater can be collected from the tank and used for purposes such as watering gardens and washing cars.

By recycling the stormwater using future solutions, homeowners will be able to save on expenses, while reducing the load on the public stormwater network. In that way, homeowners can contribute to efficient use of the globe's shared water resources. ■

PROJECT FACTS

- **Country:** Denmark
- **City:** Aarhus
- **Project:** IQ tanks for a stormwater solution
- **Period of construction:** August 2019–September 2019
- **Builder:** NREP and CASA A/S
- **Constructor:** Brian Eriksen
- **Products and services:** 47 IQ tanks, length 3,000mm and Ø 800, manholes, Ultra Classic pipes and fittings, and onsite service

The Weholite family meets up in Vaasa

UPONOR INFRA organised the Weholite seminar in Finland this September. At the seminar, almost all Weholite Licensees from Europe, Asia, Africa and Latin America met up in the coastal city of Vaasa.

During the two-day seminar, they attended many presentations about new products and heard about challenging and interesting projects carried out around the world.

Especially the new innovative products and structures developed with Wehopanel in recent years sparked plenty of interest and discussion. Among other projects, the seminar presented a fish farming facility delivered to FishGLOBE AS in Norway – it is the world's largest plastic structure designed for marine conditions.

The seminar also focused on a wide range of issues related to quality, raw materials and recycling. Current themes highlighted by the visiting presenters also inspired lively discussion at the seminar.

Participants were very pleased with how well planned and organised the event was. They praised it as a valuable opportunity to share ideas, thoughts and experiences and to learn new things. In addition to the excellent organisation of the event, the participants appreciated its open, relaxed, enthusiastic and energetic atmosphere. In the words of many of those who attended: it was truly a meeting of the Weholite family! ■

TEXT Outi Järvelä » PHOTOS Kari Karjalainen, Uponor »

FishGLOBE revolutionises the future of plastic structures for marine conditions

As tall as an apartment building. A diameter of 22 metres. A volume of 3,500 cubic metres. FishGLOBE V5, a fish farming facility built and delivered to FishGLOBE AS in Stavanger in southwestern Norway, is the world's largest PE plastic structure designed for marine conditions. The first fish – 250,000 young salmon, or smolts – were transferred into this futuristic-looking facility in November.

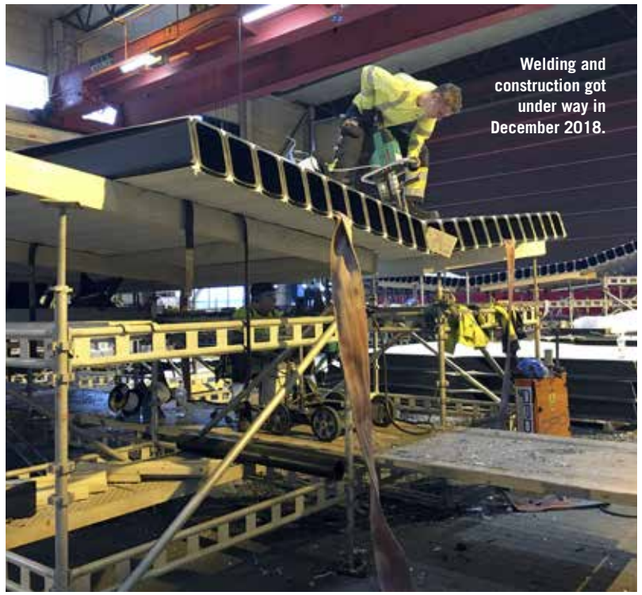
The Norwegian company FishGLOBE AS has spent many years on the development of a floating fish farming facility with an enclosed structure. After the first demo version as well as the V2 and V3 prototypes, which measured 10 and 70m³ respectively, the company started designing the V5 about three years ago. In terms of size, it was a great leap forward – this facility is intended for full-scale production and has 3,500m³ of space for fish, with a height of 18 metres and diameter of 22 metres.

FishGLOBE wanted to build it using PE100 plastic – but it had to be strong enough to withstand the harsh conditions of the Norwegian Sea and support the massive size of the structure, which weighs 200,000 kilos.

Many were sceptical about the project. **Arne Berg**, the founder of FishGLOBE AS, who headed up product development, says that none of the engineers he consulted initially believed that the facility could be manufactured using PE plastic.

But his plans soon gained momentum. When Uponor Infra heard about the project, the company contacted FishGLOBE – its extremely strong Wehopanels and Weholite pipes, made from layered PE profile, would be the perfect solution. FishGLOBE was soon also convinced that they'd found the right choice.

The facility was lifted into the sea in July 2019.



Welding and construction got under way in December 2018.

Plastic has numerous advantages in marine conditions

The highly durable Wehopanels and Weholite 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. In recent years, many innovative new products and structures have been developed using Wehopanel.

"This project is the only one of its kind in the world. No PE plastic structure of this size has ever before been designed and built for use in marine conditions," says **Kari Karjalainen**, Export Manager at Uponor Infra.

Karjalainen says that the project has been very interesting and challenging.

"The design, manufacturing and construction processes have all been extremely demanding. We got the opportunity to really make the most of our expertise and decades of experience in plastic construction."

Karjalainen says that a Wehopanel profile was customised for FishGLOBE, as no panels this strong and large had been produced before.

"The calculation results ran to hundreds of pages, to ensure the durability of the structure in marine conditions with rough waves and currents."

Karjalainen believes that FishGLOBE will revolutionise not only marine fish farming, but also the future of other plastic structures designed for marine conditions.

"Success in the project opens the door to new opportunities to build a variety of large-scale plastic applications for marine conditions. Plastic has undeniable advantages – it's a durable material with a lifespan of over a hundred years. Thanks to its flexibility, it doesn't develop cracks that lead to breakage – and there is no risk of corrosion, either."

A fully automated facility

At its Vaasa plant, Uponor Infra manufactured robot-welded Wehopanels measuring as much as 3 x 8 metres from 250 x 200 x 20mm profiles for use as the functional shell and internal structures of the globe. A Weholite pipe with an internal diameter of three metres was made to serve as its central pipe.

"The panels were also sawn to their correct dimensions before transport to Norway."

Its six water feed pipes, which also serve as the support structures of the facility, are 1,100mm pressure pipes. The water feed pipes supply the facility with seawater – which is then treated and discharged back into the sea through the central pipe.

FishGLOBE is a closed and fully automated fish farming system. Technical equipment and an integrated feeding unit are installed in the upper section of the facility. FishGLOBE also differs from other closed systems in that the upper section is also enclosed. This ensures that waves cannot introduce salmon lice and other parasites into the habitat – the fish can thus live their first year in safe conditions.

In the FishGLOBE, young salmon – smolts – are grown from a size of 100 grams to one kilo, after which they are moved to the next facility.

A massive welding and construction project

The panels and pipes were delivered to Stathelle in southwestern Norway in December 2018. Welding and construction then got under way.

"The construction project was a massive undertaking. In addition to Uponor Infra's own team, the Norwegian subcontractor ØPD AS worked on it," says Kari Karjalainen.

The facility was lifted into the sea in July 2019 and towed to its final location in Lysefjord, near Stavanger in southwestern Norway. The final welding work, completion of the technical equipment and facility testing were then carried out.

The facility was anchored to the seabed with 12 anchor points made of PE plastic that have been designed to withstand more than 25 tonnes of force.

A much larger FishGLOBE is already being designed

The customer, RyFish, introduced the first fish into the facility in November. They are expected to grow to a size of one kilo by April 2020.

"Two FishGLOBE facilities of the same size are planned to be delivered to Lysefjord in 2020. The design work has already begun and the manufacture of profiles and panels can get under way in Vaasa as soon as everything is finalised."

The development of FishGLOBE will not end here. The much larger FishGLOBE V6 is already being designed.

"It will have a volume of 31,000m³, with capacity for 2,000 tonnes of fish. Its diameter will be 44 metres and its height 30 metres. The system will weigh 1,000 tonnes," says Karjalainen. ■

Watch a video about FishGLOBE:
https://www.youtube.com/watch?v=XxzfNCGpnRs

TEXT Timi Petersen » PHOTOS Uponor »

Safeguarding the drinking water in urban areas is critical

As cities and populations grow, there is a need to reclaim lands previously deemed unfit for universal public and private use. However, there is a risk, especially in former industrial sites, that the soil contains toxins that can infiltrate ordinary pipes. The consequences can be particularly drastic when it comes to drinking water. It is obvious that new solutions are needed to ensure the reliability and long-term security of drinking water supply.

As urbanisation continues to accelerate globally, communities are faced with a new challenge. Cities are expanding beyond their traditional limits and need to look into repurposing sites previously utilised as industrial areas to accommodate their growing population.

All over the world former manufacturing and stock areas, shipyards, harbours, fuelling facilities, and industrial complexes are being relocated from the centres of cities into more convenient and less population-critical areas and the land is being reclaimed for urban development.

This raises a new challenge for urban planning and municipal building. Much of the land base at such sites has been contaminated over decades of industrial operation by the chemicals and processes used in the area.

In Denmark, the Danish regions have the responsibility for managing the risks posed by soil pollution. According to a systematic mapping, more than 37,000 contaminated and possibly contaminated land areas exist in Denmark. More than half of them can be problematic for either human health, drinking water or the environment (Danske Regioner, 2019).

Uponor Barrier PLUS is the first fully plastic pressure pipe for drinking water capable of withstanding even the toughest soil.

Conventional solutions are no longer enough

Soil in all urban areas contains contaminants; this is the consequence of normal urban activity. However, in some areas, pollutants are exceptionally prevalent and toxic. Due to their properties they can permeate regular plastic piping, as well as cast and ductile iron pipes through the gaskets.

The risk of penetration of chemical soil pollution into drinking water in the distribution network has been discussed and investigated. A mapping was published in a report by Svenskt Vatten (2012). When certain types of plastic pipes without a barrier layer and sealing rings in iron pipe systems are exposed to high concentrations of petroleum pollution, the plastic swells and becomes more permeable (Svenskt Vatten, 2012).

The conventional solution has been to use plastic pipes layered with aluminium. This method has had its own drawbacks – the greatest of these is that hydrocarbon compounds that have entered the soil through the use of chlorinated organic solvents, such as trichloroethylene (TCE), can corrode the aluminium layer over time.

A review shows that chlorinated solvents represent 41% of environmentally hazardous substances in the soil that may seep into the aquatic environment (Danske Regioner, 2019). Aluminium-reinforced pipes are not recyclable, which is a requirement on more and more sites.

Zero tolerance for risk taking

The safety and security of inhabitants is obviously of paramount importance. In particular, purity of the drinking water provided for the area needs to be assured. Some hydrocarbons when entering the drinking water give an unpleasant odour and taste, while some can have more adverse consequences.

On top of safeguarding the drinking water supply against contaminants already in the soil, the gravity of the risks involved makes it critical to anticipate possible accidental spills in the future as well. Zero tolerance for risk taking

PERMEABILITY OF CONTAMINANTS	PE100 PRESSURE PIPE	UPONOR BARRIER PLUS PIPE
CHLORINATED ALIPHATIC HYDROCARBONS		
1,1-DICHLOROETHYLENE	-	X
1,2-DICHLOROETHANE [1,2-DCA]	-	X
CIS-1,2-DICHLOROETHYLENE	-	X
DICHLOROMETHANE [DCM]	-	X
TETRACHLOROETHYLENE	-	X
TETRACHLOROETHYLENE [PCE]	-	X
TRANS-1,2-DICHLOROETHYLENE	-	X
TRICHLOROETHYLENE [TCE]	-	X
VINYL CHLORIDE	-	X
AROMATIC HYDROCARBONS		
BENZENE	-	X
BENZO(A)PYRENE	-	X
ETHYLBENZENE	-	X
P-DICHLOROBENZENE	-	X
TOLUENE	-	X
XYLENE	-	X
ISO OCTANE	-	X

X=no permeation

Hydrocarbon compounds are common contamination sources in soil. Some of them are converted from, for example, petroleum-derived chemicals such as gasoline, kerosene or bitumen, while others have been used as solvents.

is the norm in today's society and the expected standard in all infrastructure construction.

The ease of plastic with uncompromised protection

The ease, efficiency and long lifecycle provided by plastic piping has made it the most popular choice for most modern piping needs. It is a critical factor in assuring economic feasibility and a convenient installation process in successful building projects. As a result, Uponor's customers approached the company with a request to create a solution that combines the convenience of plastic piping while providing an additional level of safety for the drinking water supply.

Years of extensive research, development and relentless testing led to the launch of Uponor Barrier PLUS. A multi-layered fully plastic pipe, it combines the ease and convenience of plastic with uncompromised protection from any traces of pollutants in the land base, including the relatively prevalent, highly toxic and corrosive solvent trichloroethylene (TCE). And it is completely recyclable.

MORE THAN 37,000 CONTAMINATED AND POSSIBLY CONTAMINATED LAND AREAS EXIST IN DENMARK.

From novelty to a standard solution

Municipalities and authorities are taking a proactive stand to assure the safety of drinking water. Legislation has been put in place to enforce the use of solutions that negate these risks. In Denmark, for example, requirements have been passed into law, whereby all sites, regardless of their prior use, need to have a drinking water solution that takes into account the possible pollutants in the soil.

As cities and authorities are becoming more and more aware of the problems associated with such repurpose building, they are also realising that they can install Uponor Barrier PLUS -type of piping in urban, heavily trafficked sites to ensure the integrity of the drinking water supply if new spills occur in the area.

As more authorities grow aware of the issue at hand and risk-aversity increases, the application of reliable, easy to handle and cost-efficient Barrier PLUS will no longer be a novelty, but standard solution. Barrier PLUS helps avoid unnecessary risks, while ensuring the reliability and long-term security of drinking water solutions. ■

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Strong, safe and flexible

Skaraborgsvatten in the south of Sweden has replaced its old intake pipeline made of wood with a new one made of polyethylene. The new system was not only easy and fast to install – it is also impact resistant and capable of withstanding high levels of mechanical stress.

Skaraborgsvatten, which this year is celebrating its 60th anniversary, is jointly owned by the cities of Skövde, Falköping and Skara, in southern Sweden. Combined, they supply water to a local population of approximately 100,000 people. Their cooperative retrieves raw water from Lake Vättern, which is then pumped through a 10km-long pipeline to supply clean potable water to surrounding municipalities. Every day, close to 24,000m^3 of drinking water is supplied.

A complete, easy-to-install solution

The old intake pipeline to take water from Lake Vättern was made of wood. Its age and the fact that it had started to leak meant that it had to be replaced. However, in order to supply Skaraborgsvatten with premium quality cold water, the new intake pipeline had to be installed at a greater depth, further out into the lake. For this purpose, Skaraborgsvatten decided to contact Uponor Infra.

Uponor Infra Project Services was able to provide a turnkey solution.

Uponor's solution consisted of a solid wall pipeline made of polyethylene. This type of pipeline can take local settlements, and is long-lasting, easy to install, impact resistant, and capable of withstanding high levels of mechanical stress. The scope of Project Services included detailed design with all related calculations, material supply, welding of the pipeline and assembly of concrete collars as well as dredging, submersion, backfilling, pressure testing and commissioning of the new intake pipeline with related components.

Easy installation of the pipeline was an important factor, since varying weather conditions are often a challenge for marine projects. In this case, the changeable weather conditions on Lake Vättern, Sweden's second largest lake, were something of which Skaraborgsvatten was quite aware.

Material deliveries, all of which were finalised this year, consisted of 1,550 metres of pressure water supply pipes with a dimension of DN1,100 and pressure rating of SDR17, and 430 concrete collars specially designed for this project and installation circumstances. ■

PROJECT FACTS

- **Reference:** Skaraborgsvatten
- **Country:** Sweden
- **Construction type:** New construction
- **Year:** 2019
- **System:** Potable water/pressure pipe
- **Product:** Intake and transmission line: 1,550 metres of pressure water pipe DN1,100mm SDR17
- **Customer:** Skaraborgsvatten
- **Contractor:** Uponor Infra Project Services

Uponor Infra supplied 1,550 metres of pressure water pipes, and concrete collars specially designed for the project.

The drilling saddles make it possible to install the sensors in pressurised pipes.

TEXT Outi Järvelä » PHOTOS Marja Seppälä »

Flow measurement reveals leaks in the water supply network

The Water Monitoring Services developed by Uponor Infra enable real-time monitoring of water supply networks – deviations in the network can then be detected and located quickly. Pori, a coastal city in southern Finland, started monitoring an area on the periphery of its water supply network where leaks had caused problems over the years.

Porin Vesi, the municipal water utility, is responsible for the procurement, treatment and distribution of water to almost 85,000 inhabitants. The company's water supply network measures about 850 kilometres.

As in many other Finnish cities, the network is ageing and leaks have not been avoided. The city's financial plan for 2019-2021 seeks to reduce the amount of water leaking from the water supply network to no more than 15 per cent and the number of water pipe leaks to under 50 per year.

Pori spends about EUR 2 million each year on renovating its water supply and sewerage network.

"Last year, we renovated about 11 kilometres of the network. Pori is an old city and the oldest sections of its water supply network date back to the 1930s," says **Jouko Halminen**, Water Supply Manager at Porin Vesi.

Information straight from the pipes

Porin Vesi has earlier measured water flow only at its waterworks. "We met Uponor representatives at the Finnish Water Utilities Association event last year, and they told us about the Water Monitoring Services. We thought it sounded very promising, so we decided to try the flow monitoring solution,"says Halminen.

Uponor Water Monitoring flow meters were installed in the pipes early this year, now enhancing network maintenance.

"We wanted to monitor the Meri-Pori area more closely, as it has had leakage problems over the years. Meri-Pori is an independent section of our network and one of the city's three pressure zones. In addition to flow meters installed in the pipes, separate measurement points were set up in the pumping station and water tower in this area. All these measurement points are now displayed in the Uponor Water Monitoring user interface."

Meri-Pori is an extensive area in the western part of the city, on the coast of the Bothnian Sea. It is a peninsula with close to 9,000 inhabitants and the well-known Yyteri sand beach. The area also has plenty of industry, including wind farms and Finland's largest coal power plant.

"This area is on the periphery of the network. Leaks and other exceptional situations easily lead to problems, as there are few backup water pipelines," says Jouko Halminen.

Managing leaks in time

The Water Monitoring Services developed by Uponor Infra enable real-time monitoring of water supply networks. Deviations in the network can then be detected and located quickly. Water Monitoring Services keep track of flow and water quality, and detect leaks.

Water Monitoring Services designed for flow monitoring and leak detection measure water flow, volume, direction, pressure and temperature. Thanks to real-time information, even small silent leaks can be detected in time, preventing large pipe bursts.

"It has been estimated that in Finland, as in many other countries, about 17 per cent of clean water is what we call non-revenue water – water that is lost before it reaches the customer. Leaks are the main reason behind this. Leaking water costs cities and municipalities hundreds of thousands of euros per year. Sudden leaks also cause substantial maintenance costs and interruptions in supply," says Sales Manager **Jussi Niemelä** from Uponor Infra.

Niemelä points out that water leakage is not just a waste of natural resources: it also leads to extra consumption of energy and chemicals and inefficient utilisation of waterworks.

Installation works do not interrupt water distribution

The pipes in which the Water Monitoring measuring devices were installed are all from different decades – the newest is 10 years old, while the oldest dates to the 1970s.

"The pipe sizes also vary. The smallest has a diameter of 160mm, the largest 400mm," says Jouko Halminen.

Porin Vesi installed the chambers and drilling saddles supplied by Uponor on its own. Uponor then installed the Water Monitoring measuring devices in them. Water distribution did not have to be interrupted due to installation – the drilling saddles made it possible to install the sensors in pressurised pipes.

Sensors installed in the pipes now measure the volume and direction of flow and transmit the data over the mobile network to Uponor Infra's cloud-based monitoring system. This system analyses the data. If the flow limits set in the system are exceeded, the measurement point sends an alert to mobile phones and computers.

The data can also be fed into the waterworks automation system if necessary, but Pori monitors the flow data over a browser-based service provided by Uponor.

"At the moment, we don't track the data in real time. The data is updated in the system at six-hour intervals. In addition, we have set the flow limits in the system so that we don't get an alert for minor deviations," says Halminen.

He says that the system has enhanced awareness of flow and water consumption in the area.

"The system has worked very well. Now we know more accurately what is going on in the network. We can react rapidly to any leaks."

According to Uponor's Jussi Niemelä, it's great that water utilities are interested in the service.

"Leak management can extend the useful life of existing infrastructure by several years and help allocate funds for renovations more accurately," he says. ■

UPONOR WATER MONITORING SERVICES

- **Flow monitoring and leak detection**
  - Real-time monitoring service that tracks water flow, volume, direction, pressure and temperature.
  - Even small silent leaks can be detected and located in time, preventing pipe bursts.
  - Real-time alerts in exceptional situations.
  - Sensor installation without interrupting water distribution.
- **Water quality monitoring**
  - Real-time monitoring service that analyses the size, shape and quantity of particles and microbes in water.
  - A highly sensitive detection system that detects even small changes quickly, enabling the network owner to immediately take the necessary steps.
  - Real-time alerts in exceptional situations.
  - Historical records collected by the system can be used in event investigation.

TEXT Matti Välimäki » PHOTOS Uponor »

The massive Weholite pipes arrived at the end of September from Uponor's licensed manufacturer in Thailand.

EASE OF INSTALLATION IS KEY

Weholite pipes are light and easy to install. They really come into their own in a project in the harbour of Auckland, the largest city in New Zealand – the extension of an old stormwater line using massive pipes with an internal diameter of 3–3.5 metres. In this busy harbour area, it is not possible to carry out large-scale excavation work. The soil of the region and strong tides pose their own challenges.

At the end of September, the cargo ship TS Delta arrived in Auckland, the largest city in New Zealand, carrying massive Weholite pipes with a diameter of 3–3.5 metres.

The pipes were transported from Thailand for use in a project to extend the old stormwater line of the Auckland Wynyard Wharf terminal further from the harbour.

"In March 2021, Auckland will host the America's Cup, a major sailing event. A pipe that discharges the city's stormwater into the sea is located in the event area. The discharge site is now being moved half a kilometre further away," says **Ulf Berg**, Export Manager at Uponor Infra Project Services.

At the same time, the harbour area is being spruced up for the event. For instance, old oil tanks will be demolished and the area will be asphalted.

Easy installation is particularly important in demanding projects

Auckland has the country's largest cargo harbour. It is quite a challenging site for installation works.

"The harbour area is busy. This means that it's not possible to set aside a large area for the installation work or to dig a long excavation. For this reason, the line will be built in short segments with 15-metre pipe sections."

"Furthermore, there's no space to weld pipes on site. The pipes will be lowered into the trench and connected with concrete weights, after which the pipe profiles will be filled with water."

Strong tides in the area pose an additional challenge.

"The work must be done at low tide. At high tide, the water rises almost to the edges of the excavation."

The soil in this area is also challenging – many support structures have to be built in the excavation while work is ongoing.

Berg says that the easy installation of Weholite gives a significant advantage in demanding projects.

"Although the pipes are massive in size, they are light and easy to handle. It would be very difficult to install concrete, glass fibre or steel pipes in this project, due to the soil conditions and time limitations."

Support during the entire installation

The Weholite pipes were produced by Uponor Infra's licensed manufacturer in Thailand, which has supplied Weholite pipes to many other projects in its home market and countries such as the Philippines, Vietnam and Cambodia.

"An expert from Uponor's Vaasa factory was on hand to ensure that they were produced exactly to specifications. In the case of pipes of this size, you have to be very careful about the dimensions, weights, tolerances and ring stiffness."

Uponor is supplying the pipe materials for the project, including special parts and reducers, complete with installation drawings and instructions. The company also provides support during the entirety of the installation work.

"Everything has gone well. The ship stopped for cargo in Australia and New Guinea so the trip took a little bit longer than expected. However, the project will be completed on schedule."

Weholite has plenty of applications – around the world

Berg says that Weholite has many attractive applications in Australia, New Zealand and Asia.

"Many power plants are currently being built in the developing countries of Asia. Weholite is highly suitable for use as water intake and discharge pipelines at power plants, chemical refineries, treatment plants, etc."

"Weholite pipes and tanks are also excellently suited for desalination plants that produce drinking water from seawater. There are many desalination plants in this region."

A global network ensures smooth deliveries

In addition to its own plants in Europe, Uponor Infra has licensed manufacturers in Europe, Asia, Africa and Latin America.

"Thanks to our extensive partner network, we can easily deliver anywhere in the world," says Berg.

"We provide end-to-end service for our customers' projects – we design, we supply the materials and if necessary we also handle installation. For instance, the installation of pipes on the seabed requires specialist expertise and equipment." ■

TEXT Uponor » PHOTOS TAURON Polska Energia S.A. »

Ensuring a failure-free water supply

At the end of the year, a new power unit with a capacity of 910MW will be ready in the Jaworzno Power Plant in southern Poland. One of the key elements influencing the efficient operation of the new power unit is the pipeline that supplies water to both the cooling system and the flue gas desulphurisation plant. Any failure within this system could result in the shutdown of power generation. To ensure its failure-free operation, polyethylene pipe was selected for the raw water pipeline.

When planning the raw water pipeline, the investor, Tauron Wytwarzanie S.A., assumed that it would consist of GRP pipes.

However, Uponor Infra was able to provide an alternative solution that would better meet the the customer's needs in view of the fact that the pipeline was to be built in areas where mining damage has occurred and, consequently, in places where the use of separable connections would be very risky.

The system's failure-free operation was crucial, as stopping the operation of a power plant due to failure would result in financial losses of as much as several million PLN – hundreds of thousands of euros – each time.

Uponor Infra could also provide five-year references on the failure-free operation of its products in similar conditions and provided a warranty for the entire system, both for the material and welds. Thanks to this, Uponor Infra was chosen as a pipe supplier for the project.

Why choose polyethylene pipes?

The construction of buildings and infrastructure facilities in areas where mining damage occurs is particularly demanding and involves increased risk. Therefore, in order to avoid potential failures, the pipeline for the new power unit in Jaworzno was constructed using PE pipes with increased strength parameters. The main advantage of PE pipes is their flexibility, which allows for significant elongation without structural failure. This ensures continuity of operation especially in areas threatened by landslides or tremors. Furthermore, PE pipes are welded, creating a homogeneous pipeline – it does not have gasket connections that could become unsealed due to severe mining damage.

PE PIPE SYSTEMS ARE BECOMING AN INCREASINGLY POPULAR CHOICE DUE TO THEIR RELIABILITY.

Flexibility and careful planning

The new block in Jaworzno will receive water from the Dziećkowice reservoir. The water pipeline is approximately 9km long, of which approximately 6km is laid in an open trench and approximately 3km is constructed using the trenchless technique, relining.

In total, 201 WehoPipe DN910 pipes with a length of 15m each and 386 WehoPipe DN980 pipes, also each 15m long, were produced at the Uponor Infra factory in Kleszczów for the construction of the raw water pipeline.

Due to the high pace of pipe-laying, production was carried out in two parallel lines in order not to cause supply stoppages and therefore not to hold up the works – this required Uponor Infra to ensure a high degree of flexibility and careful planning of the production and delivery schedule.

Deliveries of pipes and fittings took place in the period from October 2017 to September 2018. This required the mobilisation of more than 170 transports. Every delivery had to be carried out according to the procedures of the construction site. Due to the need to unload and arrange for the storage of the materials, the site had to be notified in advance of each delivery.

Providing real operational safety

In 2018, an average of 2,200 people worked each day on the construction site of the 910 MW unit in Jaworzno.

During peak workload, three operators at the Uponor Infra manufacturing unit in Kleszczów worked simultaneously on the DN910 and DN980 pipes using three welding machines. The pipe welding work was carried out from December 2017 to September 2018.

PROJECT FACTS

- **Project:** Raw water supply system for the construction of a 910MW power unit in the Jaworzno II Power Plant
- **Total pipeline length:** Approximately 9km
- **Products:** Pressure pipes: PE100 PN16, SDR11 DN980, PE100 PN10, SDR17 DN910, and fittings
- **Construction technology:** Open trench, relining
- **Manufacturer and supplier of pipes and fittings:** Uponor Infra Sp. z o.o.
- **Additional services:** Technical consultations at the design stage, change from GRP to PE technology, pipe welding and supervision of welding work carried out by the contractor
- **Contractor:** Uniserv S.A.
- **Investor:** Tauron Wytwarzanie S.A. Jaworzno III Power Plant

Although the Jaworzno power unit has not been commissioned yet, the raw water pipeline is already in operation. In such difficult working conditions, the proposed construction technology proved to be the only one that provided real operational safety for this water supply system.

Electricity for several million people

Since last year, individual technological systems have been handed over for commissioning in Jaworzno. Plant and system tests have been carried out since autumn. The high efficiency unit will reduce CO_2 emissions by 30% and emissions of other gases by more than 50%. It will produce up to 6.5TWh of energy per year for as many as 2.5 million households. The total cost of construction will reach about PLN 6 billion (EUR 1.4 billion) and the unit is expected to be in operation for at least 30 years.

Reliability is the key issue

The project in Jaworzno is not the first of its kind undertaken by Uponor Infra in Poland. Previously, Uponor Infra has been involved in the construction of power units at the Bełchatów and Kozienice power plants. It also participated in the modernisation of a cooling water system and circulation system for Zakłady Azotowe Puławy (Azoty Group) and in the renovation of industrial and cooling water pipelines for Synthos S.A. Other projects implemented for the industry have included the supply of pipelines for the transportation of flotation waste and process water to the Żelazny Most tailings pond owned by the KGHM Polska Miedź Group. Prototype projects, such as a floating intake for KGHM, have also been carried out.

Uponor Infra is planning further large contracts in the industrial sector this year – due to its advantages, the PE pipe system is becoming an increasingly popular choice among investors, for whom reliability is the key issue. ■

TEXT Kirsi Riipinen » PHOTOS Olli Häkämies »

An easy and reliable stormwater solution

Uponor IQ infiltration pipes were installed for the first time in Finland in the loading and parking area of Volvo Truck Center's central warehouse – they provide a simple, cost-effective and reliable stormwater solution. Stormwater from a wide area can now be safely infiltrated and attenuated on site before being channelled into a stormwater basin.

The Volvo Truck Center's central warehouse is located in Vantaa, close to Helsinki, the capital of Finland. Its new loading and parking area was asphalted, which called for a solution to effectively and reliably channel stormwater runoff from the area. On this area, water accumulates on about 8,300m^2 of asphalt and roof surfaces, and on about 1,000m^2 of lawn.

Uponor's new IQ infiltration pipes were selected as the solution to infiltrate and attenuate stormwater on site before it is channelled into the stormwater basin at the edge of the area.

"If these pipes hadn't been available on the market, we would have had to order them as tailor-made," says the customer, **Tapio Kalliola**, Vice President of EKE-Rakennus Oy.

The designer of the site's stormwater solution, **Matti Mäntysalo** from GeoUnion Oy, says that he first considered using stormwater pipes that would be perforated before installation.

"However, I heard about the new IQ infiltration pipes and contacted Uponor right away," says Mäntysalo.

Uponor IQ infiltration pipes had not been previously used in Finland, but had already been installed at numerous sites in Sweden.

"After a discussion with Uponor, I was convinced that IQ infiltration pipes would be an excellent fit for the property."

Effective attenuation and infiltration

IQ infiltration pipes are light, durable and easy to install. Thanks to the ready-made holes in them, water is infiltrated steadily through the sides and bottom. Due to their large useful capacity, these pipes infiltrate and attenuate stormwater effectively.

Mäntysalo says that perforating similar pipes on site is more challenging, and generates unwanted waste.

"It requires quite a bit of work to determine how punching holes in the pipe will impact its load bearing capacity. Stormwater solutions are often required in parking and traffic areas with constant heavy traffic load. This poses particular challenges for design."

Lightweight pipes are easy to lift into the excavation.

Tomi Lempinen (to the left), Uponor, Tapio Kalliola, EKE-Rakennus, and Tommi Heikkinen and Markku Hurskainen, Hyvinkään Tieluiska are satisfied with the fast and easy installation.

"The load bearing capacity of IQ pipes was clear to us right from the start. It's easier to design the system when we know what load the pipes will withstand and how much backfill we need on top of the pipes."

Many factors must be taken into consideration in the design of stormwater solutions. What is the surface area of the roofs on the property? For instance, is the plot surfaced with asphalt or lawn? From how large of an area must stormwater be infiltrated or channelled? In which kind of soil conditions will the stormwater solution be installed?

"The soil also posed a challenge in the Volvo loading and parking area, as one end is on bedrock, the other on soft soil," says Mäntysalo.

Light and easy to install

Hyvinkään Tieluiska Oy handled the installation works in Vantaa. A total of 50 metres of IQ 1,200mm infiltration pipes were installed at the site.

Kimmo Nyman, Supervisor at Hyvinkään Tieluiska, praises the pipes for their light weight, which made them easy to install. The work went smoothly: the pipes were lifted one at a time by the excavator and transferred to the trench, which was located close to the centre of the plot.

"It was also convenient that we didn't have to excavate the entire trench at once, unlike in the case of most stormwater solutions."

No geotextile is required around the pipes, and this also speeds up and simplifies the work.

Hyvinkään Tieluiska had a three-person team on the site.

"We could have even done the job with two guys. We spent a total of two days on installation, including the excavation work," says Nyman.

UPONOR
IQ INFILTRATION
PIPE SYSTEM

- Perforated infiltration pipe system suitable for handling both small and large amounts of stormwater. Thanks to their open structure, the pipes have a large useful capacity, ensuring effective attenuation and infiltration.
- Applications include parking areas, retail plots, roads and crossings, as well as industrial areas.
- Light, durable and safe system that is simple to design, quick to install and easy to maintain.
- The required number of pipes can be installed end-to-end or next to each other. IQ infiltration pipes can also be connected to a pre-existing stormwater line.
- Geotextile is only required on the edges of the excavation to separate soil layers. Only the bottom of the excavation under the pipe is levelled.
- IQ infiltration pipes are available in diameters of 600 and 1,200mm. A 315-mm pipe can be used as an inspection pipe.

Stormwater management is increasingly important

Both Kalliola from EKE-Rakennus and Mäntysalo from GeoUnion intend to use IQ infiltration pipes in the future too, thanks to their ease of installation.

"The pipes are easy to install. The holes punched in the pipes result in steady water infiltration, and they are not easily clogged."

Mäntysalo says that even more attention must be paid to stormwater management due to climate changes.

"Our municipal building inspection authorities have already started demanding the installation of stormwater solutions on detached house plots, too." ■

TEXT Uponor » PHOTOS Uponor »

INNOVATIVE, RELIABLE – AND INSTALLED IN 11 DAYS

Completely in line with the customer's needs – that was exactly what a solution designed with Wehopanel guaranteed when an old pump station in Vellinge municipality, southern Sweden needed to be renovated and modernised.

The municipality of Vellinge is located in the expansive Öresund Region, a cross-border cooperative region that encompasses Skåne in southern Sweden and East Denmark. It boasts a beautiful landscape and a large, diverse labour market. Industry is thriving and there is also a vibrant cultural and social scene.

The municipal water and wastewater systems were built in the 1960s–70s. Inspections and inventories of the systems are carried out on a continuous basis. The municipality is currently working on the development of an infrastructure renewal plan that targets minimum annual improvements of 0.6% over the next two decades.

The infrastructure renewal plan gives, among other things, top priority to qualities such as sustainable products with a long life span. Another important factor when hiring the services of varying companies is the level of competence.

"These days, long-term experience of an industry is not as important as a high level of competence. You might have the best products to offer, but if you don't have the competence, it will all fall to pieces in the end," says **Max Persson**, Director of Water Resources at the municipality of Vellinge.

Renovation and modernisation needed

Vellinge has several wastewater pumping stations. Domestic wastewater is discharged into the pumping stations, from where it is then pumped up one level into the wastewater pipeline system and onto the next pumping station, until it reaches its final destination – the Klagshamn wastewater treatment plant.

EnviDan AB, a consultancy company, was commissioned to carry out inspections and status assessments on seven pumping stations. Though new municipal pumping stations have been added over the years, an inspection showed some to be in need of renovation and modernisation due to the heavy impact on the concrete structure during several decades, including the replacement of existing pumping pits and pumps. Three pumping stations are currently prioritised for renovation work, one of which is located in Höllviken. Höllviken pumping station, which is made of concrete, has started to deteriorate due to age and the long-term effects caused by hydrogen sulphide in the untreated wastewater.

Completely in line with the needs and requirements of the customer

Following the inspections and status assessments, EnviDan AB made a proposal for the renovation of pumping station SK01 in Höllviken, one of the three prioritised stations.

The renovation of pumping station SK01 required a multi-strategy solution which took into consideration the high groundwater table, and, due to the crumbling concrete, a self-supporting and hydrogen sulphide-resistant construction design. As pumping station SK01 is used for transporting wastewater from Falsterbo, Skanör, Ljunghusen and Höllviken to Klagshamn wastewater treatment plant, it was very important to keep the installation period as short as possible. The incoming sewage was pumped through a temporary system while the renovation was in progress.

The idea was to design a self-supporting and dense construction of polyethylene that could be lifted into the existing wastewater pump basin.

"Uponor Infra Project Services presented us with a design solution using Wehopanel – completely in line with the customer's needs and requirements. When filled with concrete, PE hollow profiles not only become floating-resistant and leak-proof but also highly resistant to aggressive liquids and subsidence in the ground. As this design solution involved a much shorter installation time, we decided to opt for the innovative, reliable and sustainable solution from Uponor Infra Project Services," explains **Anders Densfelt** from EnviDan.

Light, highly durable and easy-to-install Wehopanel structures can be dimensioned and equipped for various purposes, such as tanks, foundation slabs, support structures and pumping station buildings. Wehopanels are also excellent for renovation.

The collaborative project between the municipality of Vellinge, EnviDan AB, AF Bygg Syd and Uponor Infra Project Services resulted in an innovative new way of using Wehopanels to renovate pumping stations.

Quick installation

The prefabricated Wehopanel solution offered a quick and easy installation, which took only 11 days.

The construction work was carried out by AF Bygg Syd, a construction company whose core business is focused on new production and renovation of water and wastewater treatment plants as well as pumping stations in the south of Sweden.

"This was a very exciting pilot project for us, as we have previously only installed traditional pipeline systems from Uponor," says **Mattias Hedvall**, Water and Wastewater Project Manager. ■

PROJECT FACTS

- **Reference:** Renovation of pumping station SK01
- **Country:** Sweden
- **Location:** Höllviken
- **Construction type:** Renovation
- **Year:** 2019
- **System:** Weholite
- **Product:** Wehopanel structure pumping station. H = 6 metres, W = 5.6 metres, L = 8.7 metres
- **Customer:** Municipality of Vellinge
- **Consultant:** EnviDan AB, Malmö
- **Contractor:** AF Bygg Syd and Gata & Väg Väst AB
- **Subcontractor:** Uponor Infra Project Services

The project resulted in an innovative new way of using Wehopanels to renovate pumping stations.

TEXT Uponor ›› PHOTOS Uponor ››

A 250-metre section of the 2,200-metre pipeline was laid on a pontoon bridge.

Fighting against an ecological disaster in a world-record time

Rapid action was critical when a sewage collector broke in Warsaw, Poland, causing a massive waste spill into the Vistula River. Uponor Infra's crew worked 24 hours a day in order to stop the pollution of the river. A temporary pipeline was produced, delivered and connected in just eight days.

At the end of August this year in Warsaw, a major failure occurred in the system transferring sewage to Czajka, one of the largest wastewater treatment plants in Poland. Both lines of the GRP wastewater collector, located under the bed of the Vistula River, were damaged. As a result, around 3,000 litres of sewage spilled into the river every second.

The situation in the capital city was being followed everywhere in Poland, since the sewage discharge also affected all the cities located on the Vistula River north of the city. The Vistula River crosses Poland and eventually reaches the Baltic Sea in the north, which also caused concern in other countries around the Baltic Sea.

An emergency pipeline ready in eight days

Due to the malfunction, it was decided to perform a controlled discharge of the waste into the Vistula River, as well as build temporary pipelines. The temporary installation was operated and supervised by the Polish Army and the State Water Management Company, Wody Polskie.

Rapid action was critical. As a rule, such projects are carried out over a period of months, but Uponor Infra was able to produce, deliver and connect the pipes required for temporary pipelines in eight days. According to **Wojciech Skowyrski**, Chief Engineer of Construction at the State Water Management Company, this was a world record.

Uponor Infra supplied two 1,100m sections of 1,000mm PE pipes to the construction site. An approximately 250-metre section of the total length of 2,200 metres was laid on a pontoon bridge, which the Polish Army had built on the river.

Uponor Infra joined the pipes using butt welding.

Once the pipes had been delivered to the construction site, Uponor Infra joined them using butt welding, which ensured the strength of the structure along its entire length and, most importantly, of the joints. The welding of 146 joints took six and a half days.

Working hard 24 hours a day

The pace of the work was staggering. Uponor Infra's crew worked 24 hours a day in order to stop the pollution of the river. Six operational teams were sent to the construction site. A total of around 50 employees were involved in the project, including personnel from the technical, production, prefabrication, logistics, sales and marketing departments. In spite of the fast pace, all work was carried out under proper supervision and in accordance with health and safety rules.

After 12 days of controlled discharge into the Vistula River, sewage from seven districts of left-bank Warsaw flowed to the Czajka plant again, and no more waste ran into the river.

Reliable PE pipes

Once again, it was proven that PE pipes are a perfect solution for even the most difficult operating conditions thanks to their high quality, strength parameters, flexibility and fast installation. Resistant to abrasion, corrosion and exposure to certain chemicals, they provide a durable and reliable solution for applications such as process pipelines at chemical plants or cooling-water pipelines at power plants. ■

Uponor Barrier PLUS

Plus performance. Plus possibilites.

The first fully plastic pressure pipe for drinking water capable of withstanding even the toughest pollutants is called Uponor Barrier PLUS. The reason behind its resistance is a polymer barrier protection layer. It combines the ease and flexibility of plastic piping with resilience and security against contaminants, including TCE.

- ✓ The first 100% plastic infra barrier pipe
- ✓ Safeguards drinking water from toxic chemicals
- ✓ 50+ years of service life

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