

THE UPONOR INFRA CUSTOMER MAGAZINE » ISSUE 1 / 2019

pipe world



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CONTROL OF NETWORKS**

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**LESS WEIGHT AND MORE
CAPACITY WITH WEHOLITE**

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**DURABLE STRUCTURES
FOR A WIDE VARIETY
OF APPLICATIONS**

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uponor

ProFuse RC

The new generation of pressure pipes

Advantages

- ✓ Cost-effective solution
- ✓ Fast and safe installation
- ✓ Available on coils and long pipe sections
- ✓ Excellent for installations done using No-Dig methods
- ✓ Outstanding in extreme conditions
- ✓ Easy handling and transportation

www.uponor.com

Dear reader,

As we all know, both consumers and businesses are increasingly prioritising the environment in their decision-making. Plastics have been a hot topic in the media during the past year due to the environmental challenges they pose in production, use and consumption, especially in consumer products. Whilst there are challenges to be resolved in the use of plastics, long lifetime plastic solutions provide many economic and environmental benefits. Plastics play a major role in the quality, comfort and safety of living conditions in modern societies. Their unique characteristics, such as their light weight and durability, have a positive impact on the efficient use of resources.

At Uponor, we believe we can have a strong positive influence on sustainable development. This is why we have committed ourselves to the UN Sustainable Development Goals and have prioritised four areas to focus on: Clean Water and Sanitation, Climate Action, Responsible Consumption and Production, and Decent Work and Economic Growth. These four goals represent areas where Uponor can create the highest positive impact on society through our products, services and processes.

Our new Water Monitoring Services is an example of how digitalisation and new innovative technologies can help ensure the efficient use and quality of water. The flow monitoring solution helps water utilities to identify leakages – and increase the efficient use of this precious resource.

The water quality monitoring solution notifies utilities of water quality variations in the distribution network – helping to ensure that clean water always reaches the tap. Read more about this on pages 6-7.

In addition to this story, this issue of Pipe World provides a number of good examples of how Uponor infrastructure solutions help our customers to solve the challenges they are facing and contribute to the sustainable development of our society.

I wish you all a good reading experience and a great 2019.

Sebastian Bondestam
President, Uponor Infra



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pipe world

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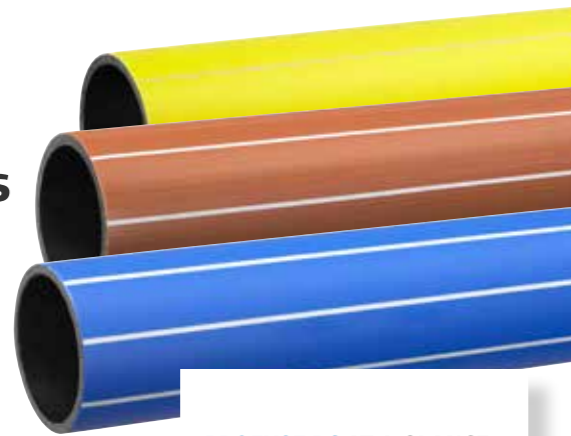
ProFuse RC – the new generation of pressure pipes

ProFuse RC – the new generation of ProFuse – is a premier pipe for gas, sewer and potable water applications.

ProFuse RC is a pressure pipe made of PE100 RC material protected with a PP protection layer. ProFuse RC is available in dimensions of 63–630mm and pressure classes PN10 and PN16. As the new name indicates (RC = Resistance to Cracks), the pipe has an improved resistance to cracking against point loads.

“ProFuse RC is a safe, lifelong solution. In ideal circumstances it can last for as long as 100 years,” says **Minna Vekkieli**, Application Manager at Uponor Infra.

ProFuse RC was launched in Finland two years ago and will be launched in our other Nordic markets in 2019. ■



PROFUSE RC AT A GLANCE

- » Cost-effective solution
- » Fast and safe installation
- » Available on coils and long pipe sections
- » Outstanding in extreme installations
- » Easy handling and transportation
- » Excellent for installations done using No-Dig methods

Uponor IQ tank system is a smart modular solution

MODULAR Uponor IQ tank systems can be used for many purposes such as stormwater retention tanks, stormwater network expansions, overflow tanks or storage tanks for fire extinguishing water. The tanks are designed for ease of use and are suitable for small properties, parking areas and commercial properties.

The system consists of pipe modules and end modules. You can design and build tanks of various sizes on site using modules. Tanks can be built in any length or mounted side by side. IQ tank modules are available in diameters of 800, 1,000 and 1,200mm. The end modules are sold as pairs, one with a spigot end and the other with a socket. ■



UPONOR IQ TANK SYSTEM AT A GLANCE

- » Easy to design, order and install
- » Tanks can be designed and built from standard parts
- » Fast deliveries to site
- » As easy to install as pipes
- » Easy to inspect and maintain, no risk of clogging

Appointments

UPONOR INFRA



POLAND

Ms **Ewa Krzemińska** has been appointed Managing Director as of 23 May 2018. Ewa has been with the company for over 10 years as a Finance Manager and played

a crucial role in establishing a common Accounting and Finance team in Poland.

Uponor Rain Garden protects from watercourse pollution



UPONOR RAIN GARDEN AT A GLANCE

- » Protects from watercourse pollution
- » Easy and fast installation
- » The watertight unit enables installation in sensitive areas
- » Small footprint, can be used in constrained spaces

STORMWATER is a source of significant environmental problems. Stormwater run-off in urban environments collects debris, sediment, chemicals, and other pollutants when it flows over streets and other paved surfaces. Contaminated run-off that is discharged untreated represents a risk for watercourses that receive stormwater from cities.

Uponor Rain Garden is a compact, prefabricated stormwater handling solution that takes care of surface run-off close to the source. It has three main tasks: collect, retain and purify stormwater. Adding greenery to the city, Uponor Rain Garden can replace bioswales as a natural element in the urban environment.

Uponor Rain Garden will be launched in Nordic markets during spring 2019. ■

Safe and sustainable

Uppsala is one of the oldest cities in Sweden. Today, it is also one of the fastest-growing cities in the country. Over the next few years, completely new neighbourhoods with approximately 14,000 new homes will be built in southern areas of the city. Weholite ensures safe and reliable transportation of stormwater and waste water – and safety is of utmost importance because the newly installed pipelines will run through a water protection area.



Completely new main pipelines for both stormwater and waste water are being built in new neighbourhoods in southern Uppsala.

Uppsala with its population of 170,000 is Sweden's fourth-largest city, and today faces strong pressures to grow and develop. During the next few years, approximately 7,000 new homes will be built in Rosendal, a district located a few kilometres south of the city centre. In addition, plans to build approximately the same number of homes in Ulleråker, close to Rosendal, are being drafted.

Since large parts of these districts do not have water supply or sewerage, the municipal water utility Uppsala Vatten och Avfall is building new main pipelines for both stormwater and waste water between the Rosendal, Kungsängen and Ulleråker districts.

Built to last for more than 100 years

The customer selected structured-wall Weholite for the pipes. Since the pipelines are being installed through a water

protection area, it was essential that the pipe system has been proven to be thoroughly reliable and durable. Weholite is built to last for more than 100 years. Furthermore, it is efficient and fast to install thanks to its lightweight, long pipe lengths and prefabricated, customised and ready-to-install products.

Uponor Infra has delivered 1,350 metres of Weholite pipes in dimensions of 500–1,200mm as well as 16 waste water manholes and 8 stormwater manholes for the project.

“Everything is working just fine. At our regular meetings with Uponor, it's easy to raise any questions, and we solve things together right away. Uponor Infra's products are of high quality and are delivered on time. In spite of poor soil conditions, which have complicated construction work for Uponor Infra's welders, the project is running according to plan,” says **Marcus Norlén**, Supervisor at contractor SH Bygg, Sten and Anläggning AB. ■

PROJECT FACTS

- » **Project:** Waste water and stormwater pipelines between the Rosendal and Kungsängen/Boländerna districts
- » **Country:** Sweden
- » **City:** Uppsala
- » **Construction period:** 2018–2020
- » **Products:** Weholite pipes, tailor-made waste water and stormwater manholes, and T-branches
- » **Customer:** Uppsala Vatten och Avfall
- » **Consultant:** Ramboll
- » **Distributor:** Ahlsell AB, Uppsala
- » **Contractor:** SH Bygg, Sten och Anläggning AB

If you can detect it, YOU CAN CONTROL IT!

Continuous monitoring of the potable water network helps water utilities to understand the condition and capacity of the network. A high quality water delivery is threatened by expanding cities and aging urban infrastructure, something that is making timely information even more relevant for the municipal water utilities.

This article showcases a new range of technologies that create a powerful proposition to maintain service and solve problems. In addition to enabling real-time quality and flow management, Uponor Water Monitoring Services can become a strategic tool for controlling risk and reducing the overall cost of water investments.

The challenge

Uponor Water Monitoring Services helps in resolving two key challenges for local authorities and water providers: leakage

and water quality issues. The biggest challenges caused by leakages relate to costs, sustainability, and capacity. "Leaks are by far the greatest element in non-revenue water usage. On average, Nordic municipalities have a non-revenue water rate of more than 20% of total water production. Sudden pipe bursts result in significant unplanned maintenance costs and service interruptions," says **Magnus Lundin**, Water Monitoring Services Director at Uponor Infra.

Even if the cost per cubic metre of water lost is not very high, customers are becoming sensitive to sustainability issues. "Leaking water is not just a waste of a natural resource: it also

means overuse of energy and chemicals, as well as inefficient utilisation of the water plant. When a water company cuts its leakage rate, it's a good press story," says Lundin.

As cities grow, or businesses use more water, municipalities must either find money to build new infrastructure or cut down on leakage or get more value from their existing capacity. Managing leaks can extend the life of existing infrastructure by several years. Turning to water quality, the biggest challenges concern maintaining high quality water delivery while keeping costs under control.

"On average, every other day a Nordic municipality instructs its inhabitants to boil their water, due to water quality issues," says Lundin.

Water quality is a key part of an acceptable water service. It's what customers notice, it's expensive to put right, and it can lead to legal action. Laboratory tests are expensive to conduct and do not provide a real-time view on water quality in the network.

The solution

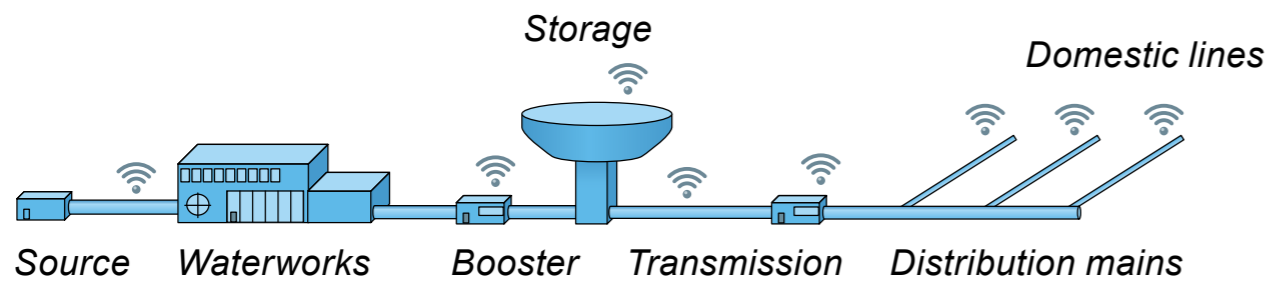
Uponor's Water Monitoring Services comprises two connected water monitoring systems. The Flow Monitoring Service triggers an alarm when unexpected flow thresholds are crossed. By assessing connected sensors, water professionals can identify the area where a leakage has happened and understand the spread of abnormal flows, and so resolve issues more quickly. As well as resolving leaks, this understanding enables professionals to prioritise longer-term renovations appropriately and realistically, ensuring that money is spent where it is genuinely most needed. These benefits also come with rapid installation: the flow monitoring

equipment can be installed without disturbing the operational flow. "The cost and time required to install one measurement point is significantly lower compared to traditional technologies. In addition, the solution is available on a 'pay as you go' basis, eliminating the need to make any upfront capital investments. So it's easy and low-cost to get started," Lundin says. The Quality Monitoring Service uses camera technology to detect and analyse particles in potable water flows.

"This qualitative system, unique to Uponor, allows us to detect water contamination by insoluble microscopic particles automatically in different scenarios, for example in-leak of storm water, sewage water or stagnation," says Lundin. "By analysing water flows in standard situations the sensors can map the 'fingerprint' of normal flow at multiple touchpoints; thanks to this, anomalies can be rapidly highlighted. It's real-time and web-based – field teams can even access data on their mobiles."

Know the network – like never before

Uponor Water Monitoring Services gives insight and advanced notice of problems in the drinking water distribution network. A host of new technologies, particularly ones that harness connectivity and the Internet of Things (IoT), allow water companies and local councils to keep an eye on water networks with a view to spotting problems before they escalate into crises. "In the real-world, we can't prevent issues – but with technology we can mitigate them and reduce the overall cost. Therefore, it's great that municipalities are now showing interest, we have many exciting deliveries to customers who will implement our new technologies," says Lundin. ■



Cool SOLUTION

The new CEL II plant in Sihanoukville province will be the most efficient steam power plant in Cambodia once completed. The plant will provide cost-competitive electricity to people in Cambodia, which is experiencing rapid growth in power demand due to household electrification.

For the plant's cooling water intake pipe, structured-wall Weholite pipe was chosen – and once again, the advantages of Weholite were the key in minimising the time on site.

Sihanoukville is a province with a rapidly growing population in southern Cambodia. It has been gradually demanding more installed capacity to supply electricity to not only its citizens, but also the whole country.

Cambodia, with a population of 16 million, faced an electricity shortage before the construction of CEL II was approved – in 2016, 19% of its villages had yet to be electrified. The country's gross electricity consumption in the same year was estimated to be 7,033GW/h, with domestic production accounting for 77.96% of it. The country's energy mix comprises 46.8% hydropower and 43.6% coal-fired thermal power.

In March 2017, the Government of Cambodia ordered – through the Malaysian owned Cambodia Energy II Co.Ltd. – a 150MW extension of the existing CEL I 100MW plant in Sihanoukville. Toshiba Plant System & Services Corporation (TPSC) serves as the EPC contractor and the Finnish engineering and consulting company Pöyry came on board to provide engineering services to the owner.

Ideal solution for marine applications

TPSC trusted all the onshore civil works and the plant's cooling water intake pipeline to Thailand-based Nawarat Patanakarn Co.Ltd.

The choice for the cooling water intake pipe was structured-wall Weholite PE-HD pipe. Thanks to its lightweight, long pipe lengths, prefabricated products and unique opportunities for ballasting, Weholite enables very quick and efficient installation at the construction site. Weholite is ideal for marine projects for a number of reasons, as it eliminates the need for heavy concrete collars to ballast the strings, which can often be risky

WEHOLITE PIPES CAN EASILY BE WELDED TOGETHER ON SITE, HELPING TO MEET THE HIGH PRIORITY TIME SCHEDULE GOALS.

during submersion. Furthermore, PE-HD pipe does not corrode, which is a crucial factor when pipes are installed in salt water and marine applications.

Saving time on construction site

Although this was Nawarat's first marine project, it exceeded all expectations – partly thanks to Uponor Infra, which provided technical support and supervision during all the welding work and marine activities.

Uponor Infra Project Services started the preparations for the project immediately after signing the contract and the welding works on site started in mid-May 2018.

In total 510 metres of DN/ID2,000 SN4

Weholite pipes were delivered from the Wiik factory in Thailand to the site at Stung Hav to be welded in three sections ranging from 165 to 180 metres. Weholite pipes can easily be welded together on site, which played an important role in helping Nawarat minimise the required facilities and meet its high priority time schedule goals, especially since there was a lack of working space to store and weld the pipes.

Thanks to the close cooperation between Nawarat and the Uponor Infra Project Services team, all the welding works were completed successfully in spite of the challenging weather conditions during the installation – the rainy season in Cambodia lasts from May to October, which usually means heavy rains and powerful winds every day.

The last string was launched on 14 August 2018. It was sunk to a depth of 11 metres on the seabed to be connected to the intake head.

The most efficient supercritical steam coal fired power plant in Cambodia will be completed in December 2019 and it will supply electricity for the next 30 years. ■

Weholite is ideal for marine installations, as it eliminates the need for heavy concrete collars to ballast the strings.



Less weight, more capacity

When a new stormwater tank had to be built in Vejle municipality, southern Denmark, the underlying soft-bed terrain posed critical challenges. Lightweight Weholite offered a solution that relieved the load by as much as 95% compared to a concrete-based solution. No draining is required, either, which further simplifies the solution.

Climate changes have led to an increase in precipitation, placing common sewage systems under heavy pressure. To tackle this problem, Vejle Spildevand A/S, a municipal wastewater utility in Vejle municipality in southern Denmark, sought to minimise the number of overflows from the common sewer to terrain and recipients by establishing overflow structures.

Initially, the new stormwater tank was designed as a five-string manifold in DN/ID2,000 concrete pipes.

Uponor Infra was able to offer an alternative solution: lightweight Weholite PE-HD pipes.

Since the challenges posed by the underlying soft-bed terrain was a critical factor, Uponor Infra proposed building the solution with polyethylene instead of concrete. This solution allowed the client to reduce the load on the tank from 820 tonnes to only 45 tonnes and thereby minimise the risk of harming underground structures. No draining is required, either, which further simplified the solution.

Increasing capacity by 20 percent

Uponor Infra's solution included the supply of the pipes as well as drawings, calculations of stability and welding services.

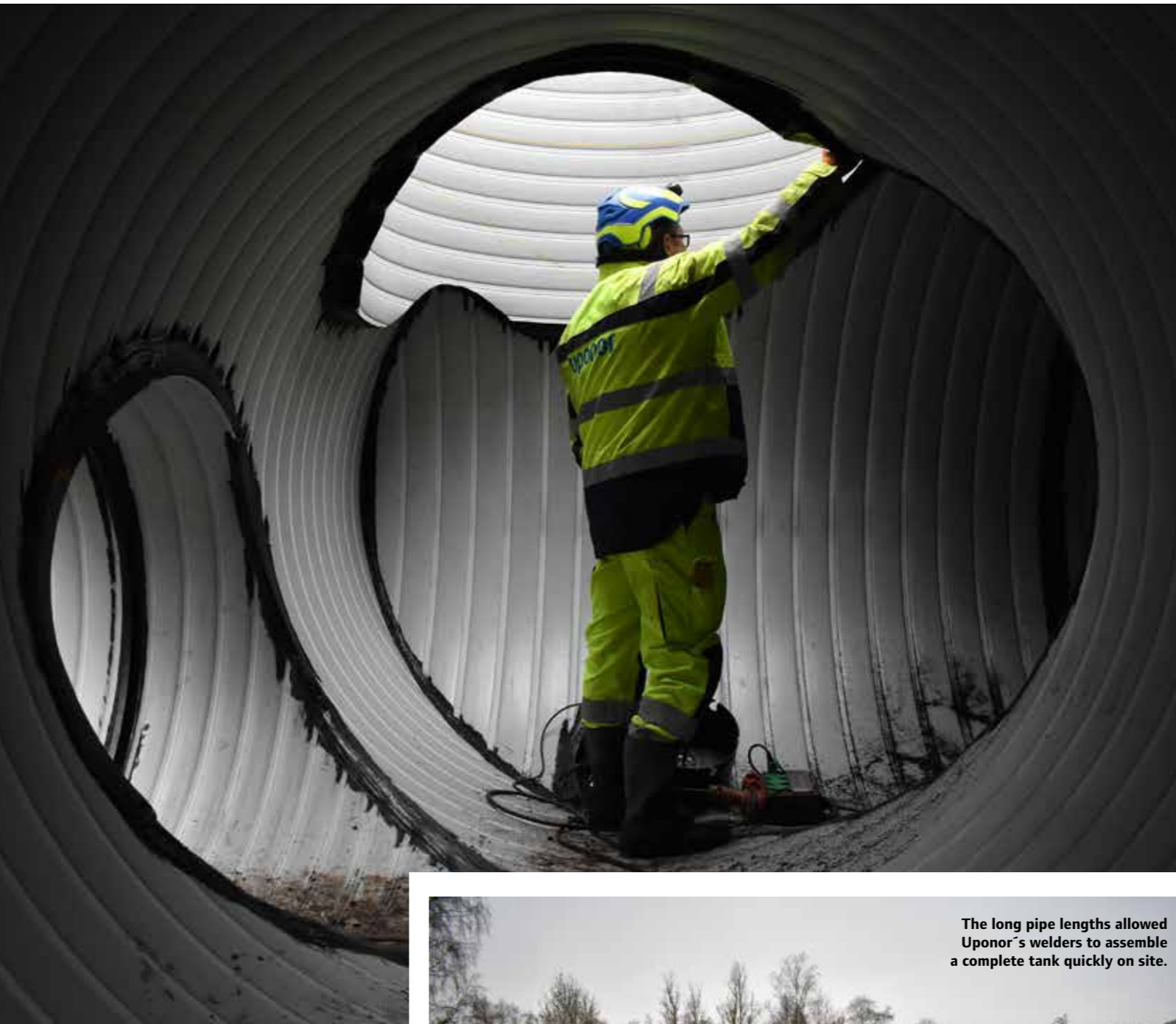
The proposal also included an option for one or two extra strings on the manifold. Since this option was not significantly more expensive in Weholite than with concrete, the developer chose to establish a tank designed as a manifold with six strings. Thanks to this, capacity could be increased by 20%.

The tank consists of 210 metres of DN/ID2,000 SN4 Weholite pipes with inspection chambers and manholes. Uponor Infra also

supplied 95 metres of DN/ID1,200 SN4 Weholite sewer pipes and an OD/ID 2,500/2,000 SN4 tailor-made Weholite overflow chamber.

The tank was delivered as one manifold, with 6x12.5 metres and 6x20 metres of Weholite pipes. The long pipe lengths allowed Uponor's welders to assemble a complete tank quickly and efficiently on site. The tank was installed just before the end of 2018, and the remaining installation of the overflow pipe and the tailor-made chamber was completed in the beginning of 2019.

Since the tank is located quite high, the original design was to use a DN/ID1,200 over-



The long pipe lengths allowed Uponor's welders to assemble a complete tank quickly on site.

PROJECT FACTS

- » **Customer:** Vejle Spildevand A/S
- » **Consultant:** EnviDan
- » **Contractor:** Hans Frisesdahl A/S
- » **Supplier:** Uponor Infra A/S
- » **Application:** Stormwater system
- » **Completed:** 2019
- » **Project:** The establishment of a stormwater tank
- » **System:** Customised products / Uponor Infra 360° Project Services
- » **Product:** Weholite PE-HD, DN/ID2,000 SN4, DN/ID1,200 SN4, DN/ID2,500 SN4, DN/ID700 SN8

flow pipeline. However, this would have resulted in the need to elevate a longitudinal road in order not to squeeze the pipes. Uponor solved this challenge by recommending the installation of three parallel DN/ID700 Weholite pipes at this section. Transporting water through three smaller strings and pipes instead of one large pipe made it possible to avoid raising the area around the road.

Smooth and flexible cooperation

Anders Brændgaard, Project Manager at contractor Hans Frisesdahl A/S, was already familiar with Uponor's solutions from an earlier project in Brørup.

"I have only good experiences with Uponor. In particular, I would emphasise the combination of smooth collaboration and a flexible onsite welding team," Brændgaard says.

"Our project team also visited Uponor's factory in Middelfart to see the manifold before the delivery. Our experience of Uponor's production equipment has further enhanced our impression of Uponor as a professional partner."

The entire project, which also involves the construction of an open tank, is expected to be completed in mid-March 2019. ■

Old water pipe gets a **new lease of life**

Kymen Vesi, a water supply company in Southern Finland, renovates several kilometres of its old water and sewerage network every year. In late autumn 2018, it was time for the company to modernise a cast iron water pipe in Kotka, a port and industrial town. This pipe had been installed more than 50 years ago and needed to be changed. Durable ProFuse RC pipe ensured safe renovation with a dependable outcome.

The renovated pipeline was located along the road leading to Finland's largest port, which meant that strict traffic arrangements posed a particular challenge.

Kymen Vesi Oy is responsible for water intake, treatment and distribution in Kotka and nearby areas, such as its neighbouring municipality Pyhtää. The total length of the company's water and sewerage network in this region is about 800km.

"As in the the Finnish networks generally, we have plenty of pipes in need of renovation," says **Iiro Lempinen**, Network Engineer for Kymen Vesi.

The water pipeline was on Mussalontie, the road leading to the Port of Kotka. Before its renovation in autumn 2018, it was already in poor condition. Installed in 1963, this cast iron pipe had already caused some problems.

The pipe has a diameter of 200mm. It was now renovated along a length of about 1.5km with the insertion of 180mm Uponor ProFuse RC pipe.

Lempinen says that Kymen Vesi uses ProFuse RC pipe in almost all of its similar renovation works.

An excellent choice for no-dig installation

The carrier pipes are made of PE100 RC, which is highly resistant to point loading stress without fracturing.

The pipe features a protective outer layer of polypropylene around the carrier pipe. This tight shell protects it against scratches, dents and oxidation during storage, transport and installation.

ProFuse RC is particularly suitable for no-dig renovation methods.

"It's an excellent choice for forced lining,

horizontal drilling and long lining, that is, methods in which pipe is installed underground or inside an old pipe. In such cases, there's always the risk that a depression or the like in the ground will subject the pipe to unusually high stress," says **Kimmo Sjöman**, Sales Manager at Uponor.

"In addition, the slick surface of the protective layer does not cause extra friction, which facilitates installation."

Detailed installation instructions

Uponor handled the renovation as an end-to-end contract that also included earthmoving.

"The earthmoving was performed by our trusted partner Maanrakennus ja Kuljetus Vanhala Oy," says Sjöman.

Kymen Vesi acquired the necessary permits for the contract, such as excavation and land use permits. The work was carried out on a road, which posed challenges to the project. A permit had to be acquired for this, too.

"The Centre for Economic Development, Transport and the Environment has issued guidelines for such renovations. For example, they provided detailed instructions for traffic arrangements and excavations," says Iiro Lempinen.

"Working on the road also affected on-site safety arrangements," says Kimmo Sjöman.

"Mussalontie leads to Finland's largest general port, so it's easy to understand why traffic arrangements had to be handled so strictly"

"It's unusual for lanes on this road to be closed off," says Lempinen.



The old 200mm pipe was renovated along a length of about 1.5km with the insertion of 180mm ProFuse RC pipe.

He is pleased that the Centre for Economic Development, Transport and the Environment understood the necessity of the renovation. Initially, the Centre had granted far too little time for the completion of the renovation, but then met the contractors halfway.

Before work began, Uponor determined the locations of cables and pipes in the area.

As excavation progressed and the old pipes were uncovered, the line due to be renovated was depressurised and cleaned.

"After that, we could insert the new pipe inside the old one. The sections were connected one at a time during excavation," Sjöman says.

When pipe insertion was completed, the line was pressure tested and disinfected. After water sample analysis, the line was reopened.

Water supply functioned normally during the renovation works. Iiro Lempinen says that

temporary surface lines had to be connected to just one residential building.

"We'd prepared for the eventuality that the pressure would be too low, but this didn't happen"

The contract took a couple of months in all.

"The project progressed exactly as it should. We stayed on both schedule and budget," says the pleased Iiro Lempinen.

"There were no big surprises. However, in some places, the internal diameter of the old 200mm pipe was smaller than indicated, which meant we had to do some extra excavation. We had to think on our feet," says Sjöman.

Iiro Lempinen would like to especially thank the installer who headed up the work, Uponor's **Mikko Kallioinen**.

"I've worked with him on many other projects that have always gone well. He's a top professional whom I can't praise enough." ■



The protective layer of ProFuse RC is polypropylene, which provides excellent protection during installation.

UPONOR ProFuse RC ENHANCES SAFETY

- » ProFuse RC pressure pipe improves safety and reliability, especially when using no-dig installation methods.
- » The carrier pipes of ProFuse RC are made of PE100 RC, which is highly resistant to point loading stress.
- » The easy-to-peel protective layer of the pipe is polypropylene, which is tougher and more durable than polyethylene, providing excellent protection during storage, transport and installation.

BETTER IDEAS BEAT BIGGER PIPES

Until now most stormwater management systems have been based on a quantity-management approach, rather than quality. The issue has been seen in terms of the amount of water the system needs to handle, rather than the nature of the water. This must change, says Application Manager Ari Sillanpää from Uponor Infra.

The traditional assumption has been that rainwater is largely clean, and so can be left untreated. While this was true in the past, today it is not. Thanks to our increasingly urbanised environments, stormwater run-off has become the single greatest polluter of waterways – and for this reason treatment of stormwater run-off must now be given urgent consideration.

Managing the chemical cocktail

While rainwater is comparatively clean when it falls, as soon as it comes into contact with the human environment it quickly becomes polluted. In addition to particles of paint and bleached metals from roofs and buildings, a major rainwater pollution source is roads and

vehicles. Heavy metals and other toxins, plus litter and microplastics mainly in the form of rubber particles from tyres, are collected and transported by the surface run-off, resulting in a chemical cocktail that is then often transported directly into our waterways.

Increasingly sealed surfaces

Impermeable surfaces predictably have a high run-off coefficient, meaning that most of the precipitation falling onto man-made environments will become surface run-off. In turn, while these surfaces and the conventional systems designed to transport them can often handle large flows, a huge amount of water can be transported to key points in a very short time –resulting in flash floods. Additionally, these impermeable surfaces affect groundwater

levels negatively as very little rain actually enters the ground.

Rough weather forecast

What's more, studies show that both the intensity and frequency of heavy rain are set to increase substantially. Compared with rainfall averages between 1971-2000, rainfall may increase 7-8% by 2040 and by a total of 12-20% by the end of the century. Likewise, according to one Finnish study, heavy rain intensity in Finland is set to increase by 10-25%.

In the past, the practical response by municipalities and major landowners was to build a large enough pipe to carry any surface water away, with the objective of safely dispersing it – usually into waterways, or then into the ground via broad, shallow ditches.

STORMWATER RUN-OFF HAS BECOME THE SINGLE GREATEST POLLUTER OF WATERWAYS.

local treatment of stormwater run-off in more practical and informed ways.

Local problems need local solutions

The unappealing alternative is for municipalities and businesses to deal with water from neighbouring areas – water which they can neither predict nor manage, and which will be commingled with other debris. Conversely, they may face additional statutory pressure mandating effective stormwater management policies from central government agencies. Either way, these are unpredictable and thus potentially expensive outcomes.

Instead, a localised solution which accounts for water quality as well as quantity in run-off can optimise the effectiveness and cost of water run-off management, in ways that are responsive to local circumstances. Dealing with oils and plastics nationally is painfully expensive and also yields a far lower return on recycling. On the other hand, locally managed attenuation and treatment systems allow for sediments, pollutants and debris to be contained and dealt with before they enter the network and are dispersed. They can also then be safely handled and, ideally, usefully recycled.

Uponor offers experience plus innovation

Uponor has a 60-year history of designing and fabricating large-scale pipe solutions, and stormwater management is a typical application. In fact, our quantity-management offering is second-to-none and is well known on the market. But as modern problems require modern solutions which incorporate both quantity- and quality-focused management approaches, we have worked to make local treatment and attenuation of stormwater a viable proposition.

Our systems have always been standardised, modular and easy-to-assemble – in part to keep expensive on-site labour/assembly costs at a minimum without compromising quality. Today, we are applying these same techniques to systems designed for local attenuation, infiltration and treatment on-site, or as close to on-site as possible.

To this end, we have added a range of attenuation tanks, chambers and treatment systems to our modular offering. As always, in addition to our modular systems, we can prefabricate and construct custom deployments off-site, and because of the increased complexity of these systems, the value of that prefabrication is increased. We can deliver even complex processing and pumping systems straight into attenuation beds and trenches, allowing for optimal cost-management.

Holistic, locally responsive solutions are the key

Without local management, networks can become overloaded and cause flooding – and costs which are at best unpredictable. Even worse, without adequate processing, the existing water management ecosystem cannot last forever. But with municipalities dealing with aging civil infrastructure, long maintenance backlogs, and projected lifecycles which just don't add up, the financial pressure is both real and becoming greater.

A holistically planned solution can bridge these gaps. It can be the key to dealing with run-off economically while offering both qualitative and quantitative remediation – with minimised build costs that support a total cost of ownership which meets municipal and citizen expectations.

While the “big pipe out” solution was adequate in past decades, it's clearly no longer a complete approach, and doing nothing about it – or simply waiting until forced to act by governments and regulators – is economically unsound. We invite you to talk with us – the experts at Uponor – about how we can help you design stormwater systems that are fit for your future. ■

Uponor Infra will deliver, among other things, around 18km of Weholite pipes, 7km of WehoTripla pipes, nearly 300 manholes, and special fittings, tees, bends, and flanges.

A clever choice for AN ANTI-FLOODING SOLUTION

September 2018 saw the launch of the project for a nearly 26 kilometres long stormwater drainage system in Rzeszów in southeastern Poland. The project, scheduled for delivery by May 2020, helps finally solve flooding problems plaguing the residents of this region of Poland.

In 2005, Rzeszów covered a surface area of 54km², and had a population of around 154,000. At that time, this capital of the Podkarpacie Province was the smallest among the regional centres of administration in Poland, and had the highest population density per square km. Shortage of space, even for housing development, was a serious problem at that time. Hence, it was decided to incorporate several nearby villages into Rzeszów. One of these was Budzów, integrated into Rzeszów on January 2010.

No more flooding or water stagnation

The Budzów District partially coincides with the floodplain of the River Wisłok. Before it was integrated into Rzeszów, most of the local landscape was dominated by a mosaic of meadows, pastures and woods, so rainwater quickly soaked into the ground. The problems began when residential buildings expanded into this terrain and the subsequent progressive development created impermeable surfaces which critically limited or reduced to zero the natural water retention capacity. This, in turn, led to flooding or water stagnation.

The smart system which is now under construction will facilitate the drainage and management of any storm or melt waters running through the residential estates. This complete stormwater drainage system is planned to be constructed over an area of 632 ha. Pipelines will be laid along fifteen streets. The system will also accommodate the needs of privately owned lands, making it possible both to dewater the roads and to remove excess water from the river catchment area.

A total of 24 retention tanks will be built, including eight channel tanks with a total capacity of 7,500m³, and six lateral tanks with a total capacity of 1,700m³. Water will be drained via these tanks into the Rivers Wisłok and Strug. The tanks will be provided with a smart retention management system to allow the ongoing monitoring of water levels, and there will be storm- and melt water treatment installations upstream from the pipes' outlets. Additionally, the drainage ditches will be extended, provided with partial covering, and regulated, as part of the project, including the reinforcement of their slopes and bottoms.

High-speed work and extensive deliveries

In September 2018 Stage I construction works were initiated in Budzów for the nearly 26-km-long stormwater drainage system. The investment value of the works in this stage is PLN 69 million (EUR 16 million), with the total project cost being estimated at PLN 96 million (EUR 22 million).

To ensure that this large-scale project is successfully implemented, Uponor Infra will deliver to Rzeszów around 18km of Weholite PE SN8 pipe with diameters in the range DN/ID500–DN/ID2,400, and more than 7km of WehoTripla PP SN8 pipes with diameters DN/OD200–DN/OD400. The company will also supply, among other things, nearly 300 man-holes, including those with base units, and eccentric manholes with damping baffles with diameters DN/ID1,000–DN/ID2,200, and sand trap manholes. Additionally, it will also be necessary to install large-volume sand trap manholes and flow distribution chambers with diameters in the range DN/ID2,200–DN/ID3,000, and special fittings, tees, bends or flanges, and other components which are vital for such an extensive stormwater drainage system.

With projects of this scale, the focus should be on coordinating the production and deliveries to support the high speed of the projects.

"Supplies are delivered on 'as needed basis'," says **Piotr Dańczuk** from Uponor Infra. "How does this work in practice? Whatever the gene-

ral schedule of project, Uponor is in constant contact with the contractors, and we try to confirm what mix of products will be needed ahead of time. As soon as this is confirmed, we start the production and preparation of new deliveries right away. On average, there are two to three full-load deliveries every week. Different procedures are used for large-sized elements. Their delivery must be agreed with the transport service provider at least seven days in advance, so that any necessary permits can be obtained. Such deliveries are made at night, when there is less road traffic. The construction site, however, must be prepared for unloading large-sized components, which requires the use of heavy machinery, mostly cranes."

Reliability and long service life

The products supplied to Rzeszów for use in the stormwater drainage system are made of polyethylene, which means they have a long service life, are resistant to corrosion, overgrowing, and abrasion. Most important from the contractors' point of view, they are easy and quick to install, even in winter conditions.

"These are reliable and long-life products. They can be safely used for up to 100 years," affirms **Piotr Dańczuk**.

"What is also highly important is that the system can be customised to individual structures, providing complex and compatible solutions. The system is also characterised by high static strength, which makes it possible to use these components where water and soil conditions are difficult – as is the case with the floodplain of the River Wisłok. Moreover, as a result of the extrusion welding used, the joints are highly uniform and capable of transferring any loads imposed on the pipeline, including axial loads," he adds.

"This is of particular importance, because the system is guaranteed to remain watertight throughout its whole service life, and as such requires no maintenance or additional sealing of joints."

The project in the Budzów District will continue until May 2020. This highly effective anti-flooding solution will allow making use of new sites for housing and business services. ■

PROJECT FACTS

- » **Investor:** The Rzeszów Municipality
- » **Period of construction:** September 2018–May 2020
- » **Products:** Weholite and WehoTripla pipes, DN/OD200–DN/ID2,400
- » **Planning and design office:** The Bureau of Municipal Engineering in Rzeszów
- » **Contractors:** PRID Krosno (Contractor for Stages 1–3) Bogdan Duplaga Instalatorstwo (Contractor for Stages 4–5)

Cold from the deeps of Lake Kallavesi



The district cooling plant under construction in Kuopio in Central Finland will be one of Finland's largest plants that utilises lake water. Weholite Marine pipes – designed for underwater installation – ensure that the new plant's intake pipe, measuring almost two kilometres in length, and outfall pipe, itself slightly less than one kilometre long, will be installed rapidly, easily and safely in Lake Kallavesi.

The Savilahti district cooling plant, under construction about 2km from the centre of Kuopio, is a major investment for the local energy company Kuopion Energia, with a price-tag of around EUR 14 million. The plant will have a cooling power of 30MW, most of which will be used by the Kuopio University Hospital. Another major customer will be Technopolis Kuopio, which provides companies with premises and services.

The plant will serve almost the entire Savilahti region, which is seeing vigorous development. This is a spearhead project implemented under an alliance model by the City of Kuopio to develop Savilahti with housing, education and jobs. The number of residents is set to rise by as much as 8,000 and jobs by 7,000.

"The building stock in the area will double. This is great news for our own project, increasing the number of customers who may join our district cooling network," says **Petri Turtiainen**, Development Manager at Kuopion Energia.

Energy-efficient free cooling

The Savilahti plant will use the cold waters of Lake Kallavesi for cooling all year round.

The water will be drawn from the deeps of Neulalahti from a depth of 32 metres, where the temperature remains below eight degrees even in the summer. When the plant is operating at full capacity, it will draw a thousand litres of water per second, 5.5 million cubic metres per year.

"Most of the cooling will be done with free cooling, that is, using cold lake water. Thanks to this, production will be very energy efficient. We'll also acquire heat pumps for the plant – surplus heat from properties in the district cooling network will be utilised as district heat."

District cooling reduces the environmental load and electricity consumption substantially compared with traditional cooling solutions. It's also a silent solution with no need to mount ugly condensing units on building facades or to run water cooling machines.

Through the grey clay

Uponor Infra 360° Project Services is responsible for the delivery of plant's intake and outfall pipes as well as their installation on land and in water.

"Our technical support has been closely involved in the project and has also made a

few changes to the original plans to ensure optimal functionality. For example, the intake and outfall heads of the pipes are customised to ensure that they will be very easy to maintain. Intake and outfall pipe flow has been optimised in both the land and water sections. We also expanded the diameter of the intake chamber from the original plans to ensure optimal flow," says **Tom Karnela**, Sales Manager at Uponor.

"Demanding projects like this are firmly in the wheelhouse of Uponor Infra 360° Project Services. That said, Project Services are excellent at smaller projects, too."

Construction work in Savilahti was kicked off in autumn 2018.

"Currently, earthworks and the construction of the district cooling plant are under way. Underwater installation work will continue in the spring once the ice melts away," says Turtiainen.

The soft, clayey soil has posed challenges in the project. Savilahti – which means "clay bay" in Finnish – has lived up to its name.

"In particular, the area where the pumping station is being built is almost nothing but clay. This had led to some delays."

Underwater installations on ice

Uponor started its work in August by building a 300-metre rail track at the site on which the pipes will be welded and ballasted before submersion. Uponor's partner in underwater installation and pipe route dredging is Insinööritoimisto Sukellus-Kotka Oy, which specialises in underwater construction.

A total of 2.7km of Weholite Marine pipe with an inside diameter of DN/ID1,200mm, serving as intake and outfall pipes, will be submerged into Lake Kallavesi. The land section, about 160m, will be built using Weholite pipe with an inside diameter of DN/ID1,000mm.

"The great strength of Weholite Marine is that it is easy to ballast and submerge. The pipes will be ballasted by making use of their double-wall structure, which means that pipe-mounted concrete weights aren't necessary," says **Veli-Matti Hakala**, Supervisor at Uponor.

The plugged, air-filled pipes float on the lake surface until they are submerged in a controlled manner by pumping water into them. The strong pipe material ensures that the submerged pipes can be welded into long lines of hundreds of metres.

The 22-metre pipe sections delivered to Savilahti will be welded on site to form 308-metre lines. Pipe submersion was started in November.

UPONOR INFRA 360° PROJECT SERVICES

- » guarantee you the most suitable, ready-to-use comprehensive solutions for even the most demanding of projects.
- » From Project Services, you can commission design, calculation and technical support, a range of tailored solutions and special products, installation services, and project management.
- » You can decide whether you would like an individually designed product or a turnkey solution, complete with installation.

"We welded six lines, and had enough time to submerge two of them before the waters iced over. We intended to submerge all the completed lines, but the early coming of ice slowed down work in December so much that we decided it was best to wait until spring. Welded and ballasted pipes are now anchored in the water, waiting for the ice to clear."

Petri Turtiainen says that a major reason for the choice of Weholite is its cost-effectiveness. "It was also important to get a reliable, experienced supplier on board this project."

"Cooperation has been excellent. It's been truly a pleasure to work with Uponor's team – the chemistry works and it's been easy to discuss everything," says Turtiainen.

Dredging and clearing

When the intake pipe is completed, its end will be at a depth of 32 metres in the Neulalahti

deeps, 1,700 metres from shore. Close to the shore, the outfall pipe runs alongside the intake pipe, but in deeper waters the lines diverge so that the 950-metre outfall pipe does not interfere with the intake pipe.

The soft clayey bottom of the lake has been a challenge in the project. About 400 metres of the bottom had to be dredged.

"The behaviour of the clayey bottom surprised us. When we dredged an area, it was sometimes filled with clay again the next morning."

Another wrinkle in the project was that the Defence Forces had disposed of decommissioned explosives by sinking them into the lake.

"In other words, we had to clear up explosives, too, before starting up underwater installation. The oldest munitions dated back to the late 19th century."

"All that we have left to do in our own contract is to weld and ballast three lines, after which we can submerge them. I believe that we'll complete the contract well before summer," says Hakala.

The Savilahti district cooling plant is scheduled to go into full-scale production in spring 2020.

"When the process plant is completed this year, we'll be able to carry out testing and calibration before the plant goes on stream next year," says Petri Turtiainen. ■



A DURABLE STRUCTURE FOR A WIDE VARIETY OF APPLICATIONS

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. Replacing square concrete structures with Wehopanel solutions does away with the need for complex steel reinforcements, time-consuming mould and demolition work, and weather-sensitive concrete casting.

Uponor Infra has manufactured round Weholite tanks since the early 1990s. Back then, the tank ends were made from compression-moulded polyethylene sheets. "As pipe sizes grew, we needed stronger structures for the tank ends – for this purpose, we developed Wehopanel," says **Tapio Alanen**, Sales and Marketing Manager at Uponor Infra's Technology unit.

"With these panels, we can build all the necessary square structures on site. The range of applications has expanded continuously. In addition to tank ends, we soon started using Wehopanels as support and base structures and foundation slabs – and to build square tanks and pumping station buildings, for instance. They are an excellent replacement for concrete in footing and foundations in groundwater areas subject to hydrostatic uplift."

The benefits of Wehopanel were rapidly harnessed in power plant water intake heads and pumping station structures, too.

"The pipes used for these applications are so big that you need a sufficiently large-scale structure to connect them."

The use of panels in different applications was speeded up by the development of the Wehopanel WPW16 machine at Uponor's Vaasa plant.

"Weholite pipes are made from square pipe profile. The Wehopanel WPW16 also produces Wehopanel structures from the same profile. The machine can produce panels with dimensions of either 4m x 4m or 2m x 8m."

Alanen says that Wehopanel WPW16 machines have recently been delivered not just to Uponor's own factories, but also to Weholite licensees in the UK, Japan, Canada, Turkey and France. A machine that will be delivered to Tanzania is under construction.



With Wehopanels, all the necessary square structures can be built on site.



Many applications

Wehopanel structures can be dimensioned and equipped for a wide variety of applications.

"Weholite licensees, such as Asset International in the UK, have developed applications for use in water management in flood areas, for instance. Good examples of the applications that have been delivered also include a water balance tank to Yorkshire Water, emergency overflow tanks to Cornwall, and a pumping station with back-up storage to Anglian Water."

Wehopanels are also excellent for renovation. For instance, they can be used to renovate old pumping station structures and basins: new internal structures are made from Wehopanel. This yields both cost- and time-savings, as building new concrete structures is often expensive and time-consuming.

Wehopanels are light and easy to make buoyant, which means they can be used in piers, pontoons and large marine structures.

Good applications also include noise barrier plinths or roughened duckboards, as the material is rot-proof.

"When used in tanks, Wehopanels are durable and absolutely leak-proof and hygienic."

Speed and lightness are great advantages

"The great benefits of Wehopanel include easy and fast installation. They are light to handle, which significantly speeds up installation and commissioning. For instance, you can save plenty of time and effort compared to building square concrete structures, as Wehopanel does away with the need for complex steel reinforcements, mould and demolition work, and weather-sensitive concrete casting, which can often cause scheduling problems".

Wehopanel is also a highly cost-effective alternative to other materials thanks to its durability and low maintenance costs.

Wehopanels are delivered from Uponor's factory at the same time as the pipes to be installed.

"The developer thus does not have to coordinate and schedule the deliveries separately. It's easy to deliver the tanks and structures as sheets for assembly and welding on site. If site conditions permit, the structure or tank can also be delivered ready to install." ■

INCREASED OUTPUT AND IMPROVED QUALITY

Uponor Infra Technology has supplied a butt welding machine to Vadis-centre LCC's factory close to Moscow, which manufactures pre-insulated pipe systems. This welding table boosted productivity and enhanced quality.

Vadis-centre LLC's factory is located close to Balashikha, about 25 kilometres from Moscow, the capital of Russia. The company started manufacturing pre-insulated pipe systems for the distribution of heat and hot water in the late 1990s.

"Even back then, our main concept was to be a company that is unique in its business and makes highly effective use of new technologies and innovative equipment," says **Aleksandr Goncov**, Deputy CEO.

A couple of years ago, due to growth in the range of products and the diameters of pipes produced by the company, it had to choose which machine to acquire for the butt welding of PE pipe sections.

"In 2017, we acquainted ourselves with Uponor's PL 800 DH at the international INTERPLASTICA exhibition in Moscow. After that, we also had a look at machines made by several other manufacturers, but we soon concluded that Uponor's machine was the best choice for us. An important reason why we chose Uponor was that the machine is capable of double welding."

The PL 800 DH butt welding machine supplied by Uponor Infra Technology was deployed at the factory in spring 2018. Uponor Infra participated in the commissioning of the machine and instructed the factory staff how to use it.

"The most important task during commissioning is to see to it that the machine is handed over safely and appropriately from the manufacturer to the customer. This ensures high machine performance and high-



Uponor Infra participated in the commissioning of the machine and instructed how to use it.

quality operations," says **Tapio Alanen**, Sales and Marketing Manager at Uponor Infra Technology.

"We got the machine up and running brilliantly thanks to the highly professional employees of Vadis-centre. Machine testing was performed with pipes of many different sizes. All in all, commissioning took two days."

"Now that the machine has been in use for a year, we can state that our experts didn't make

a mistake when they chose this manufacturer and machine. After we deployed the PL 800 DH, our productivity has increased and the quality of our products has improved. This is also evident in the sales volume," says the pleased **Aleksandr Goncov**.

Rapid and smooth processing

The PL 800 DH welding machine is used for the production of insulated pipe sections. It



the jacket pipe including the steel carrier pipe," says Tapio Alanen.

The PL 800 DH welding machine has been designed for pipe dimensions of 355–800mm. Uponor Infra also manufactures PL 315 DH welding machines for pipe dimensions of 90–315mm, PL 1200 DH for dimensions of 900–1200mm and PL 1600 DH for dimensions of 900–1600mm.

Uponor Infra has very long experience as a developer and manufacturer of butt welding machines. The company's factory in Vaasa developed the first butt welding machine in the 1950s and patented it in numerous countries.

"We already delivered welding machines to our Eastern neighbour during the Soviet era," says Tapio Alanen. ■

UPONOR INFRA TECHNOLOGY

- » Uponor Infra Technology provides performance-enhancing technologies and implements turn-key production line projects to serve the needs of the plastic pipe industries. Uponor Infra Technology supplies equipment and technical solutions to customers worldwide.
- » Based on the know-how in pipe production technologies and machinery manufacturing that it has gained since the 1960s, Uponor Infra Technology's advantage lies in its comprehensive understanding of the technologies, materials, customer needs and markets and in its ability to implement large turnkey projects.
- » Uponor Infra Technology's products include, for instance, plant scope production lines for manufacturing of plastic pipes, Weholite structured wall pipes including licensing, pre-insulated straight and flexible pipes for district heating and cooling as well as coating equipment for joint area of pipes for the oil industry.

PL 800 DH 400 V 3 Ph. 50 Hz welding table (standard)

- » Pneumatic connections
- » Fittings: Segmented bends
- » Welding range: DN 355–800
- » Basic machine consisting of a central prismatic clamp and two clamps on movable trolleys for double welding
- » Reducing inserts: 355, 400, 450, 500, 560, 630, 710mm
- » Two separate hydraulic circuits to be controlled via one common panel
- » Lifting system for heating elements and reductions
- » Split type heating elements per customer's specifications

DN of element	ID Diameter (mm)	Steel pipe/PE pipe (mm)
480	250	355/219
540	365	400-500/273-325
670	510	560-630/426
780	590	710/530
950	700	800/630



Uponor

Uponor Infra Water Monitoring Services

If you can detect it you can control it!

Uponor Water Monitoring Services is a service concept for monitoring potable water in municipal networks. Two complementary systems measure water quality and flows in real time to detect anomalies in water quality, detect leakages and prevent pipe bursts. The sensors can be installed without any disruptions of the water service and have wireless communication for easy integration.

Continuous monitoring is fundamental to gain control and insight into the operation of the distribution network. It can enable:

- ✓ Reduced leakages and pipe bursts
- ✓ Net capacity up – costs down
- ✓ Faster detection and location of deviations
- ✓ Secured water quality
- ✓ More efficient use of energy and resources

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to learn more about our comprehensive service concept

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