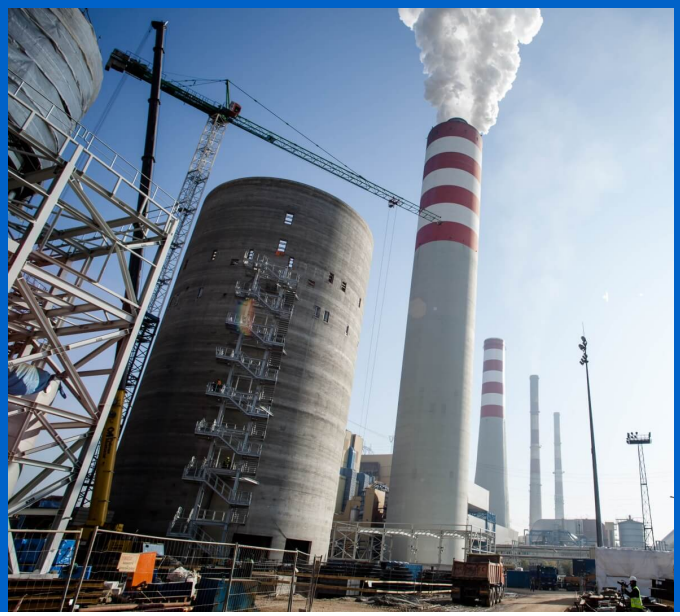
References

# Construction of raw water pipelines for the power plant



**Uponor involvement**

- Weholite pipes DN1000 SN8 (ca. 70m) and manholes DN1800, pressure pipes: PE100 PN7.5 SDR22 d.800x36.4mm – 405m and PE100 PN10 SDR17 d.800x47.4mm – 236m

## Construction of raw water pipelines for the power plant

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**Project Facts:**

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| Location | Completion |
| Kozienice, Poland | 2016 |
| Building Type | Product systems |
| Industrial | Tailor made constructions, Industrial pipes |
| Project Type | |
| New building | |

**Partners**

Investor:
ENEA SA
Head designer:
ENERGOPROJEKT - WARSZAWA SA
Contractor:
Consortium of Mitsubishi Hitachi
Power Systems Europe GmbH
(MHPSE) and Polimex-Mostostal S.A

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Enea Group is a leading producer, distributor and seller of electric power and heat. The party responsible for power generation within the Group is ENEA Wytwarzanie S.A., which operates Elektrownia Kozienice, a fossil-fuel power station with 10 high-duty power units and a cumulative generating capacity of 2,919 MW, representing a market share of around 8%. The power generation and location of the Kozienice power plant make it a key part of the National Power System.

New power unit in Kozienice power plant

Enea Group's latest and biggest investment is the 11th power unit of Elektrownia Kozienice, with a capacity of 1,075 MW (gross). This power unit will be the most modern coal-fuelled unit of its type. Based on its advanced and innovative technologies, the unit will operate within supercritical parameters, enabling it to generate the same amount of energy with much lower coal consumption. This will markedly reduce the amount of pollution emitted into the atmosphere while keeping the cost of energy generation relatively low. The new power unit will be entirely independent, supported by its own infrastructure. Thanks to its closed water circulation system, power generated by the new unit will not depend on issues such as the temperature of the River Vistula's water. Construction of the new unit began at the end of 2013. The completion of the work and the commissioning of the power unit are scheduled for the second half of 2017. The project's implementation has proceeded according to schedule so far.

Uponor Infra delivers raw water system elements

Uponor Infra was chosen to deliver the pipework for a raw water pipeline, which is an important part of the power unit. For the related water treatment plant, Uponor Infra will supply two raw water intakes from an existing channel, a pressure pipeline connecting the raw water pumping station to the water treatment plant and a gravity pipeline providing the raw water pumping station with mechanically pre-treated water from the cold water intake.

The two raw water intakes, which were constructed using PE100 DN 1000 SDR 17 pressure pipes, will provide the 500 MW power-unit pump station with cooling water from the River Vistula. A pressure pipeline connecting the raw water pumping station with the water treatment plant was constructed using PE100 DN800 SDR22 pipes laid in a trench. For the pipeline, PE100 DN800 SDR 17 pipes were installed – using the horizontal drilling method (HDD) – under the bed of the discharge canal. A gravity pipeline feeding mechanically pre-treated water from the cold-water intake to the raw water pumping station was constructed using the Weholite DN1000 SN8 pipe, with Weho DN1800 manholes added for maintenance purposes.

Pressure pipeline with the help of HDD

The first section of the 405-metre-long PE100 PN7.5 SDR22 d.800x36.4 mm pressure pipeline has already been laid in an open trench. The second section had to be assembled using no-dig technology, HDD, enabling the installation of a 236-metre-long pipeline made of PE100 PN10 SDR17 d. 800x47.4 mm pipes crossing the discharge canal of the Elektrownia Kozienice power plant.

“The initial idea was to submerge the pipe freely in the canal when the water level of the Vistula was low” said Zbigniew Góralczyk of ENERGOPROJEKT – WARSZAWA SA, the Chief Designer for the project. “However, that would have required the use of specialised equipment – an excavator on a floating platform, barges to remove spoil and provide backfill, and extensive earthworks, which would have increased the overall cost.” That is why the decision was made to change the construction method. As a result, PE-HD pipes were used instead of GRP pipes. Combined with the installation of a pipeline made of polyethylene pipes, the proposed HDD technology proved to be the optimum solution.

Drilling began in June 2015 with the preparation of pilot holes under the canal. When the pilot hole drilled with a tricone bit was ready, it was broached with a reamer. The maximum depth of the drilling was 26.1 m. Next, polyethylene pipes, previously butt-welded to create a 236-metre-long section, were installed in the hole. The pipes were produced in the Uponor Infra plant in Kleszczów and delivered to the construction site in longer than usual, 15-metre-long segments, minimising the number of joints. The installation work proceeded without interruption and took around 10 hours. A pressure test demonstrated that the work had been completed successfully. The general contractor, Polimex Mostostal SA, pointed out that the drilling was carried out in a difficult environment with existing and operating infrastructure and limited space. Despite this, the construction work was successfully completed due to the decision to change the technology used from GRP to PE-HD. Zbigniew Góralczyk concluded that the PE-HD technology was fast and easy to install, was reliable and was the perfect fit for the conditions. The system’s advantages, i.e. the ease of adjusting the piping fittings and the uniformity and durability of the connections, were also proven during the installation of the land section.

Weholite for gravity pipeline

Weholite pipes and manholes were used to build the gravity pipeline. Their low weight compared to other traditional materials, such as steel, concrete or cast iron, made them easy to transport and install in the power plant’s challenging terrain. “Assembly of the gravity pipeline was very difficult due to the very deep trench with supported walls 10-metres high,” said Paweł Pill, the Project Manager from Uponor Infra who was responsible for providing technical support. “The length of the Weholite pipes had to be precisely matched with the free access area between the trench wall supports. Installing a manhole of DN 1,800mm 90 deg. proved particularly complex and had to be carried out in two stages. First, a 4-metre-high base was installed. Then – after the required compaction procedure – the top section of the manhole was extrusion welded by an Uponor Infra service team.” The Weholite system proved to be the ideal solution to the challenges presented by the Kozienice project. The general contractor appreciated the Weholite technology’s high quality, the support provided by the Uponor Infra technical department and the flexible terms of the service.

Reliable PE-HD technology

The construction of a power unit is an extremely complex process, requiring perfect teamwork from all of the parties involved, all the way from the design work to delivery logistics, the scheduling of the work of the contractors and subcontractors, and the attention paid to the quality of the supplied components. When performing work in an environment with existing infrastructure and an operating power plant, each drawback, delay in supplies and failure during assembly has an effect on the schedule and therefore the potential financial benefits of the investment. This makes cooperation with experienced partners and reliable producers, and the use of proven methods and technologies, important. In the case described in this article, high-quality, durable and reliable pipes were used, and their assembly went smoothly. In other words, the PE-HD solution passed every test.

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Address

Uponor UK
The Pavilion, Blackmoor Lane,
Watford, WD18 8GA

Phone 01923 381212
E-Mail
customerservice.uk.bfs@georgfischer.com
W www.uponor.com