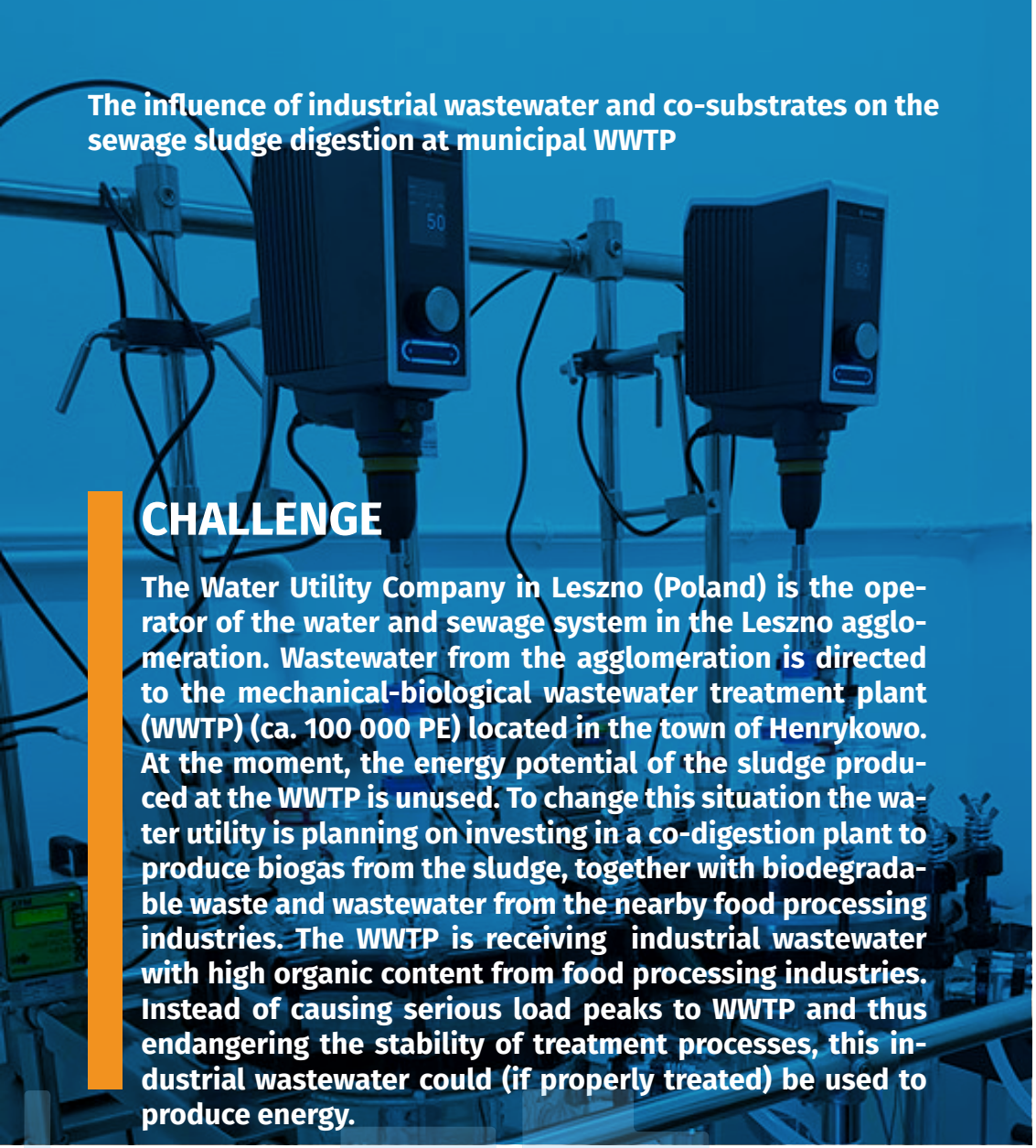
The influence of industrial wastewater and co-substrates on the sewage sludge digestion at municipal WWTP



CHALLENGE

The Water Utility Company in Leszno (Poland) is the operator of the water and sewage system in the Leszno agglomeration. Wastewater from the agglomeration is directed to the mechanical-biological wastewater treatment plant (WWTP) (ca. 100 000 PE) located in the town of Henrykowo. At the moment, the energy potential of the sludge produced at the WWTP is unused. To change this situation the water utility is planning on investing in a co-digestion plant to produce biogas from the sludge, together with biodegradable waste and wastewater from the nearby food processing industries. The WWTP is receiving industrial wastewater with high organic content from food processing industries. Instead of causing serious load peaks to WWTP and thus endangering the stability of treatment processes, this industrial wastewater could (if properly treated) be used to produce energy.

For more info: Project BEST- Better Efficiency for Industrial Sewage Treatment www.bestbalticproject.eu

SOLUTION:

In order to define the optimal quality and amount of substrates used in the co-digestion, the water utility invested in a pilot-scale digestion installation. The pilot installation aims to provide the possibility of further independent testing of co-substrates for the digestion process. The acquisition of such an installation is related to the planned investment to expand WWTP with a sludge processing unit, including digestion process. The plant operator, upon performing the microscale digestion process in laboratory conditions, will be able to reflect on the process taking place in the full scale digestion chambers and forecast the actual digestion conditions. The presence of such an installation will allow the optimization of the digestion process by testing its interference resistance, determining the susceptibility and efficiency of the process for individual substrates, preliminary forecasting of the biogas and methane production, and preventing process inhibition as a result of early detection of adverse changes. This will allow the start of the selection of substrates from the industry which is expected to improve the quality and stability of the wastewater flowing into the treatment plant, since before this, wastes were often discharged to the sewerage network, whereby causing big load peaks.

With properly conducted pre-treatment processes in industrial plants, the waste generated there can be a source of valuable substrates enabling the increase of biogas production by the WWTP. The key issue is to capture highly concentrated wastewater and wastes at the source and deliver them in the most concentrated form to the WWTP, where they can be directly supplied into the digestion process, bypassing the wastewater treatment processes.

BEST Better Efficiency for Industrial Sewage Treatment

EUROPEAN UNION EUROPEAN REGIONAL DEVELOPMENT FUND

Interreg Baltic Sea Region

EU STRATEGY FOR THE BALTIC SEA REGION FLAGSHIP

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THE PILOT

The main elements of the pilot installation are two glass bioreactors with a working capacity of 15L each. Both bioreactors are equipped with stirrers which have a blade and propeller made of inox steel.
The portable BIOGAS 5000 analyser allows the monitoring of the biogas composition. The applied basic version of the analyser measures three gas components: CH_4, CO_2 and O_2.
Another important element of installation is a waterproof pH meter. This is a very accurate laboratory-field instrument. It has the ability to measure pH, redox and temperature.

The installation is also equipped with VFA /ALK measuring kit allowing measurement of:

- pH,
- Temperature,
- Volatile fatty acid content (VFA),
- Alkalinity (ALK),
- Determination of the VFA /ALK ratio

Additionally, there is one-chamber laboratory refrigerator and waste and sludge homogenizer.

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BENEFITS OF CO-DIGESTION

- Potential increase in biogas production.
- Appropriate use of biodegradable industrial waste resources.
- Waste recovery in the form of energy or heat.
- Properly conducted pre-treatment processes on the industrial plant premises secures the wastewater treatment line against overloading. The waste generated in the industry premises can then be a source of valuable substrates.

COSTS:

- Investment costs - 38 260 EUR, out of which 18 600 EUR was co-financed by ERDF (85%);
- Estimated operating costs – 560 EUR/year

The pilot was built in the BEST project and it was co-funded by European Regional Development Fund's Interreg Baltic Sea Region programme.

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