ZERO BRINE

INFOSHEET

Pilot plant field visit – Tuesday 8 October 2019 – Poland

BOLESŁAW ŚMIAŁY COAL MINE IN ŁAZISKA GÓRNE, SILESIA

Recovering resources from wastewater in the mining industry

Saline waste waters are a concern of many industries. The coal mining industry is particularly affected: every year Poland discharges around 4 million tons of sodium chloride into rivers, coming mainly from coal mines. This causes environmental damage and economic strains due to pollution fees. ZERO BRINE is turning this problematic issue into a source of income by recovering valuable resources such as water, salts, and minerals for reuse in other industries, creating potential jobs and societal improvements. The pilot plant is operated and overseen by the Silesian University of Technology (SUT) that is located nearby in the small city of Gliwice. Media, industry, academia, governmental institutions are invited to see the technology and to learn about the latest results and benefits for the environment, society and business, thus advancing the triple bottom-line of sustainability.

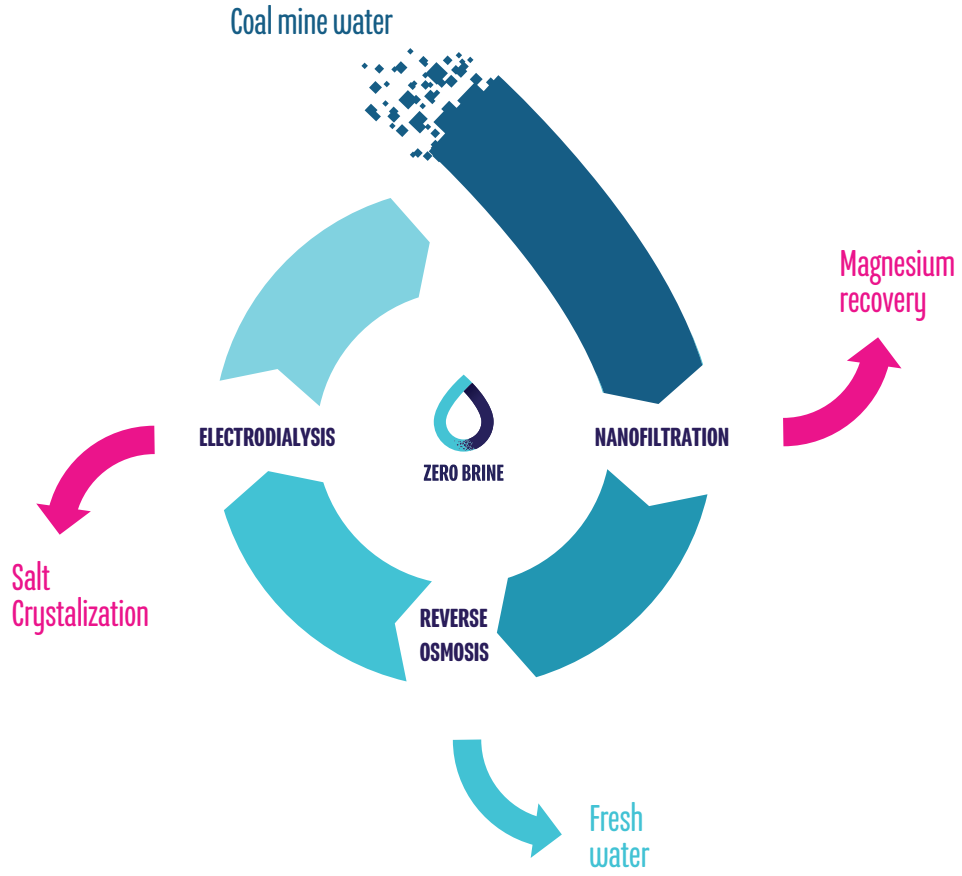
Background information

Located at the Bolesław Śmiały coal mine in Łaziska Górne, Silesia, Poland, the ZERO BRINE pilot plant is capable of treating **400 liters of raw coal mine water per hour.** On top of recovering resources, the aim is to **decrease the energy consumption by 50%** compared to the energy consumption of a reverse osmosis-vapor compression system which represents the current best practice. The tested ZERO BRINE technology is **replicable and scalable to other industries.** Since coal mine water is similar to sea water, ZERO BRINE provides an innovative technology for desalination of sea water as well. Results show that compared with existing wastewater treatment technologies, the ZERO BRINE solution provides:

- **Higher salt and magnesium recovery.**
- **50% lower energy consumption.**
- **Faster processing time than existing technologies.**

How does this process work?

Complex saline-impaired effluents – also simply called **brine** – is treated using an integrated system consisting of nanofiltration (NF), reverse osmosis (RO) and electro-dialysis (ED). As a first step, wastewater is treated by NF membranes that split the waste stream into sodium chloride-rich permeate and ions-rich retentate, which can be used for precipitate magnesium hydroxide – a critical raw material officially listed by the European Commission as having high commercial value. (Currently, Europe imports over 95% of its magnesium from China.) The NF permeate is then treated by RO, producing highly demineralized water – an essential commodity that can be used at the site. The saline retentate is treated by ED, producing highly concentrated brine which can be used for evaporated salt production. Lastly, the ED dilute is recycled back either to NF or RO.



About ZERO BRINE

Coordinated by TU Delft, **ZERO BRINE** advances circular economy business model solutions to reduce industrial saline wastewater streams by recovering and reusing the minerals and water from the brine in other industries, thus 'closing the loop' and improving the environmental impacts of production.

ZERO BRINE includes 22 partners from research institutes, SMEs, construction companies, and end-users from 10 countries. **ZERO BRINE** integrates innovative technologies to recover water and minerals of sufficient purity and quality for good market value.

Including a demonstration project near Rotterdam Port, Netherlands, and 3 other pilot projects in Spain, Poland and Turkey, **ZERO BRINE** is a 4-year Innovation Action (IA) project that provides massive potential to replicate and deploy circular economy solutions in the field of industrial

The ZERO BRINE project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 730390.