



Power & Water

Purification through Innovation



CASE STUDY

Wastewater Treatment

Phosphorus Removal - UKWIR Chemical
Investigations Programme



Client: Southern Water

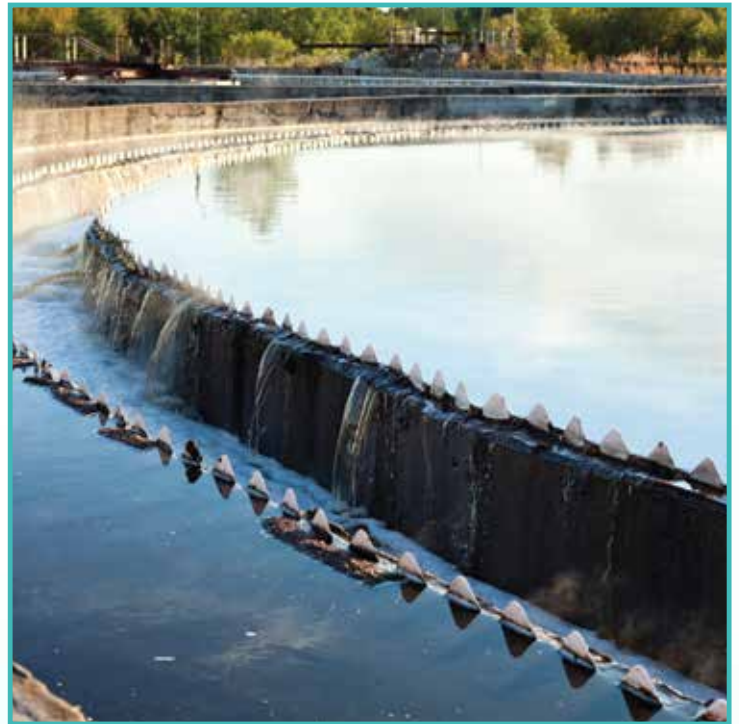
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Background

Phosphorus (P) is a natural but limited element that is used by all living organisms and is essential to food security due to its effect as a growth promoter, but excessive levels of P overstimulate the growth of algae in our lakes and rivers and leads to a gradual depletion of oxygen, which can ultimately render the waterway lifeless (eutrophication).

Traditional sources of P (Rock Phosphate) are depleting, but sewage, including farmyard manures, is a rich and renewable source, but its re-use as a fertiliser is commonly the cause of excessive P-loads being released into our water courses, increasing the problems associated with water treatment.

Historically, P has been removed by 'adsorption', where metal salts in the form of liquid chemicals are used, but the disadvantages of this (H&S issues with transport, handling, storage, overdosing etc) are legion, so new, more effective treatment measures are constantly being sought in order to consistently achieve discharge targets.



Solution

Soneco®, Power & Water's (P&W) patented treatment process is an economic and technically optimised alternative to liquid-chemical dosing. It ingeniously combines 'Electrolysis' with 'Ultrasound', ensuring safe and efficient water treatment by electro-generating pH-neutral reactive reagents (metals) and metering them directly into the process stream.

The efficacy of Soneco as a method of phosphorous removal has been rigorously evaluated and validated over a 12-month period by UKWIR, Southern Water Plc. They compared the Soneco iron electrodes with ferric salt dosing as part of the wider 'National Phosphorous Programme', and concluded that Soneco was the more environmental friendly and cost-effective process.

"A pleasure to work with this innovative company. Results have been consistent and reliable with a definite potential on small wastewater sites where the ideal solution for P removal has not yet been found. This process certainly provides an answer to be considered and P&W have been very receptive to our demand".

Cécile Stanford

*Process Capacity Engineer – Integrated Planning,
Southern Water.*



Results

“Following the good results observed at East Meon WTW for P removal using the Soneco technology, the project was extended by Southern Water.”

Southern Water Report for R&D: Soneco® (UKWIR, PRN: 639287) Based on 40 influent and 38 effluent samples.

Key conclusions from this extended study are:

- Soneco efficiently and reliably treated the flow rate to achieve consistent Total Phosphorus removal to levels below 0.5mg/l-1, Soneco also achieved Ortho P results as low as 0.03mg/l-1 during the trial.
- Soneco produces an effluent with a highly de-watered ferric sludge which can be recirculated to the head of the works, adding to the treatment potential and providing a ‘double treatment’ from the single process.
- Soneco achieved consistent P removal of 98% Total P and 99.7% Soluble Reactive P.



Benefits

The application of Ultrasound is what makes Soneco stand out from the competition in P removal. It improves treatment efficiency through the generation of oxidative radicals and by the increase in nucleation sites, ensuring better coagulation and flocculation.

Ultrasound acts as a cleaning-in-place (CIP) tool for the electrodes, keeping the surfaces clean by cavitation, thereby maintaining an evenly reactive treatment surface.

The benefits of using Soneco for P removal include:

Reliability - Soneco provides consistent P removal, even during storm or high-load conditions.

Cost effective - Soneco has proven to be highly cost effective as a method of P removal, especially at smaller works.

Eco-friendly: Soneco, in comparison with other methods, has a greatly reduced environmental impact & improved carbon footprint

Reduced H&S hazards: Soneco has no H&S risks.

Simple and holistic approach: Soneco has a small physical foot print, is easily integrated or retro-fitted to existing over-loaded or under-performing works, and sludge volumes are up to 50% lower than with other methods.



Next Steps

Following Southern Water's successful validation of Soneco for P removal and progressing until AMP7, P&W and Southern Water are now working on the fully engineered solution.

Soneco has the potential to create a paradigm-shift in P removal processes and wastewater treatment technology.

Going forward, Soneco will make a significant contribution to the National Environmental Programme (NEP) during the remainder of AMP6, AMP7 and beyond.

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“Power & Water is a UK water technology company specialising in sono-electro chemistry. We aim to deliver Circular Economy solutions allowing recovery of waste products, and to produce clean, safe water for drinking, re-use or discharge back into the environment.”



The company knowledge and expertise is founded on more than 35 years' experience in the Water and Environmental industries. Our in-house expertise includes engineering, power electronics, software and MEICA.

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