

Sustainable approaches in the design of Water and Wastewater Treatment: Abstracts and Bios

Talk 1: Richard Chamley, Senior Process Engineer @ Arup

Richard is a senior process engineer at Arup. Richard has experience working with water and wastewater, throughout Britain as well as globally. This experience ranges from wastewater plant feasibility studies to concrete degradation of water treatment works. Richard brings a wealth of experience from his time in Hong Kong and is keen to use this knowledge to generating hydrogen from wastewater.

Generation of Hydrogen from Wastewater

Arup are carrying out a demonstrator project for a UK water company looking at using curtailed wind from turbines on a wastewater treatment plant to generate hydrogen and oxygen to support on site activities. A large proportion of wind turbines currently experience curtailed output as there is no network demand at night while the turbines are spinning. A possible positive use for this spare energy is to use it to generate hydrogen. The project looks at using wastewater from the sewage works to supply the feed water for the electrolyser and with the hydrogen and oxygen used on site at the works.

Talk 2: Josh Williams, Project Scientist & Keeley-Ann Kerr, Energy Analyst @ Dwr Cymru Welsh Water

Joshua Williams is a Project Scientist for Dŵr Cymru Welsh Water. He joined Welsh Water as a graduate in 2017, and since joining has worked within Process Science, Wastewater Assets and more recently within the Energy Team and Research and Innovation Team working on the Process Emissions PR24 plan and Ofwat Innovation trials into low temperature anaerobic digestion. Joshua has a master's in Sustainable Water Resource Management from Lancaster University and is currently completing a part-time masters in Water & Wastewater engineering at Cranfield University.

Keeley-Ann Kerr is an Energy Analyst for Dŵr Cymru Welsh Water. She joined Welsh Water as a graduate in 2018, and since joining has spent most of her time with the Energy Team. She has a Master's in Climate Change, so minimising the company's greenhouse gas emissions is extremely important to her. For the past year and a half Keeley-Ann has been working on Welsh Water's Net Zero work package 4 'Process Emissions'. Keeley-Ann will look at what Process Emissions are and how data will be vital in the race to achieve Net Zero.

Nitrous Oxide Emissions

Process emissions from wastewater treatment comprise mainly of nitrous oxide and methane. These represent up to 60% of a sites total emissions, and with Nitrous oxide having a global warming potential 298 times that of carbon dioxide it poses a significant challenge when looking to achieve Net Zero. Dŵr Cymru Welsh Water has spent the last two years implementing a monitoring campaign utilising differing technologies to quantify actual emissions from 4 wastewater treatment works, what factors influence emissions and the mitigation strategies and learnings required in PR24 and beyond to reach Net Zero emissions by 2040.

Talk 3: Ian Hullin, Renewable Generation Energy Analyst @ Dwr Cymru Welsh Water

Ian has worked at Welsh Water for 5 years, working currently as the Renewable Generation Energy Analyst leading the way on optimising Welsh Waters 130 GWh / year renewable energy portfolio.

Diversification of Biogas Valorisation in Wastewater Treatment

A look at the transition from current embedded technologies that utilise sewage biogas to generate green energy towards future technologies in the quest for energy and carbon neutrality, particularly the implementation of a steam methane reformer to produce Hydrogen from sewage waste at Cardiff WwTW.

Talk 4: Siân Jones, Process Engineering Manager @ Power&Water

Siân joined Power&Water in 2019 after more than a decade working as a consultant in the water industry. In her previous roles she has gathered much experience developing solutions, working on design and build projects, with environmental permitting and legislation, and supporting businesses with their environmental management, which she has brought to Power&Water. In her role as the manager of the growing Process Engineering team Siân supports the Sales, Design and Delivery teams in developing solutions for our Clients. She also guides the work of our laboratory facilities, where the Soneco® process is continually developed, with existing solution offerings being refined and new solutions developed.

Electrochemical technology, Soneco®

Power & Water pioneers modular, safe and sustainable electrochemical technologies for a variety of water treatment applications. Their patented Soneco® system includes a unique ultrasonic CIP that prevents passivation. P&W's electrocoagulation process has been developed to take the place of liquid chemicals in water treatment, including phosphorus removal, solids removal and organic load reduction. Demonstrating how the process offers real futureproof solutions across aquaculture, construction, municipal, mining and agri markets will be shown. This includes results from a very positive trial at Bo'ness Wastewater Treatment works. Concluding with insight into the future of electrochemical advanced oxidation, the uses, and the benefits it offers.

Talk 5: Cameron Langford, Process Engineer @ Mott MacDonald

Cameron is a Process Engineer within the potable and wastewater industries at Mott MacDonald Bentley (MMB). He has a master's degree in Chemical Engineering from Newcastle University, registered associate member of the IChemE. Since 2020, his role has included covering - process design, commissioning and hazard study facilitation. He is also a MMBC Water & Wastewater Treatment Practice ECP lead.

Electrocoagulation P removal for NWG

At small constrained wastewater treatment sites conventional liquid coagulant and alkalinity dosing plant is carbon, space and capital intensive. Moreover, increasing demand from the WINEP programme of works is putting strain on coagulant supply chain making chemical delivery timeframes harder to predict. NWG alongside MMB and other framework partners have taken an interest in utilising innovative electrocoagulation in place of liquid chemical systems including associated civils and safety considerations required at 'small', rural wastewater treatment sites. Following DWF revision at Slaley STW, MMB are considering a lower P condition (than forecasted) and a new ammonia condition requiring alkalinity dosing. Electrocoagulation has removed alkalinity dosing and a portion of health & safety and site infrastructure upgrades from the project scope. In addition, solids production is expected to be reduced (vs liquid dosing). These benefits lead to providing a more sustainable solution by building less and making best use of available resources.