



Power & Water

Purification through Innovation



CASE STUDY

Aquaculture Wastewater Treatment



Creating 'Value from Waste' in sustainable aquaculture



Introduction

Our taste for fish is increasing, but demand is outstripping supply, with over-fishing causing a massive depletion of wild fish in our oceans and rivers, so alternative sustainable sources are needed.

Aquaculture (fish farming) has been lauded as the answer to this escalating, global demand for fish, and has been identified by the EU's Blue Growth Strategy as a potential economic promoter, making aquaculture the new driver of the 'Blue Economy', with forecasts suggesting a global aquaculture market value of \$209Bn by 2021.

Fish that are contained in tanks can be closely monitored and easily managed for sustainable production, so fish farming offers great hope for the future, with all the promise of a Blue Revolution just waiting to happen.

Background

Unfortunately, Aquaculture has become associated with pollution, not revolution. The containment of fish in low-changing waters, such as aquaculture ponds, means that unsafe quantities of waste materials build up; fish faeces, uneaten food, pathogens, chemicals and nutrients exist in such quantities as to adversely affect the water quality in the ponds, causing algal blooms which remove oxygen from the water and cause eutrophication and, ultimately, the death of fish and plant life, but the 'open' nature of some farms means that any contamination also places the wider environment, seas and wetlands, at risk: an environmental nightmare.

A high-throughput of clean water is essential to sustain the health of the fishery, so low-changing waters require treatment in order to maintain the water quality, but existing treatments for fish farms are liquid-chemical intensive, and while this produces water that looks reasonably clear, it retains sufficient quantities of residual dissolved phosphates and ammonia that prevents its re-use, which means that expensive water has to be bought-in.



The Welsh Government states the importance of implementing recirculatory systems to reduce clean-water intake and requires that the risks associated with toxic chemical dosing are reduced or removed, so a method for treating the pond water – that doesn't use heavy metals or chemicals such as pH correctors or flocculants - is required if we are to meet the world demand for fish without harming the environment.

Solution

The solution is P&W's Soneco® system's unique combination of power ultrasound and electrolysis, a stand-alone product that can also be integrated into an underachieving process train to dramatically enhance the removal of contaminants from waste streams such as those from aquaculture ponds.

This innovative process removes clay particles, phosphates, organics, ammonia and particulates and produces a superior quality final-effluent water which is ideal for recycling and re-use; the process does not introduce chemical flocculants or metals such as iron or aluminium into the mix, so keeping fish stocks healthy and helping rural enterprises meet increasingly stringent legislative environmental targets.

The Soneco system has been successfully installed at a Norwegian Recirculation Aquaculture System (RAS) fishery where it effectively removes the contaminants from the waste stream, producing clean, recyclable water and a contaminant-free sludge which can then be further processed to form a dry material that is easy to handle and store, allowing the owners to turn contaminated fish sludge into a usable fertiliser, and so turning an expensive waste product into a valuable commodity.

The Norwegian system uses P&W's optional online remote-operation function which allows the system to be managed off-site via a computer link; this minimises down-time with less requirement for engineers to visit the site and makes it ideal for remote locations. These low-voltage, low-carbon systems have the added advantage of being run from renewable energy sources if required.

Results

The results from the installation at Erko Settefisk have surpassed the expectations of the aquaculture facility, with over 95% reduction in COD, TDS and Phosphates, and 81% reduction in ammonia; their CEO stated that:-

"We are absolutely pleased... I have been working in the aquaculture industry since 1995 and have tried several cleaning solutions...this is the first facility I have had that achieves the results we were promised".

Their published results show how effectively the Soneco system has performed, enhancing the treatment potential to a level where the resultant sludge can be reused as a fertiliser, turning a waste product into a commodity: -

"This is a resource which cannot normally be used as fertiliser in food production due to heavy metals and chemical polymers for sludge purification and is regarded as a waste. We turn it into approved fertilisers without the use of chemicals and without creating hazardous by-products."

Conclusion

Soneco, Power & Water's sustainable solution for waste water and sludge processing, offers fish farmers the solution to their water recycling, sludge recovery and re-use issues, greatly reducing their waste and therefore the cost of discharge and disposal, but with the enormous added benefit of reducing or removing the need to buy-in expensive water, allowing re-cycling of the treated wastewater within their ponds and selling-on the treated sludge as a fertiliser.

This takes us a step further towards the potential for RAS, the ability to provide a controlled environment for fish farms, helping to meet 'circular economy' targets and tougher legislative controls, so maybe aquaculture can meet the global demand for fish without ruining the environment. Our partners, **Bioretur AS** took part in, and won the UK Aquaculture Sustainability Award and have already signed contracts with the top 3 salmon producers in the world: - **Mowi, Grieg Seafood and Lerøy.**



Photo showing installation of the award-winning FRS® Fish Sludge Recovery System operating at Erko Settefisk



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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 are 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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