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Life Cycle Assessment of Waste Water Treatment by Zero Liquid Discharge System

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Abstract: *Freshwater scarcity has become a significant obstacle to economic progress, human health, and environmental conservation due to increased water demands around the world. Use of industrial water is a crucial issue. Driving force behind freshwater usage, which makes a significant contribution of disposing of waste water .In recent years, solutions for reducing industrial wastewater disposal have been proposed, with a new technology known as Zero Liquid Discharge (ZLD) attracting worldwide interest. ZLD's ambitious wastewater treatment goal is to eliminate any liquid waste leaving the plant, primarily power plants, in order to produce clean product water for industrial reuse. Wastewater reuse could effectively save freshwater, relieve freshwater withdrawal pressure, and reduce the environmental risk of industrial wastewater discharge. However, environmental concerns such as chemical use and energy consumption cast doubt on the environmental performance of ZLD technologies. ZLD could achieve water recovery and reuse within industrial systems, lowering environmental risks and repurposing a large amount of wastewater. However, it is also associated with intensive energy and material use to achieve the ambitious goal of zero discharge, which has been deemed in most cases not feasible or cost-effective. In recent years, technological research on various ZLD systems, such as low-salt-rejection reverse osmosis, Osmotically Assisted Reverse Osmosis, and forward osmosis, has been conducted due to increased water scarcity and stricter regulations around the world. Other ZLD technologies, such as Bipolar Membrane Electrodialysis and Membrane Distillation, are mostly bench scale right now. Despite increased research in technical fields, the debate over ZLD technology continues. A ZLD treatment system employs cutting-edge technological water treatment processes that are both environmentally friendly and highly dependable. For difficult-to-treat wastewaters or situations where water scarcity necessitates water recovery (recycle/reuse), Zero Liquid Discharge (ZLD) technologies can assist you in meeting environmental compliance, Reduce your carbon footprint by converting liquid waste into disposable dry solids and recovering approximately 95% of your liquid waste for reuse. The ZLD treatment process can be used as advanced waste water treatment constituents to produce by-products that are more easily biodegradable while lowering overall toxicity, pH, COD, TDS, SS, and BOD parameters. The goal of a Zero Liquid Discharge (ZLD) system is to reduce the volume of liquid waste that must be treated while also producing a clean stream that can be used elsewhere in the plant's processes. ZLD is capable of reducing all types of waste water and making it reusable and recyclable for additional applications. According to the study results, the 99% TDS, 100% COD and BOD, and 98% SS and TSS reduced (removed) make it Zero liquid discharge. The ZLD plant produced high-quality water that was suitable for recycling on site, resulting in reduced water consumption.*

Keywords: Waste Water Treatment

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