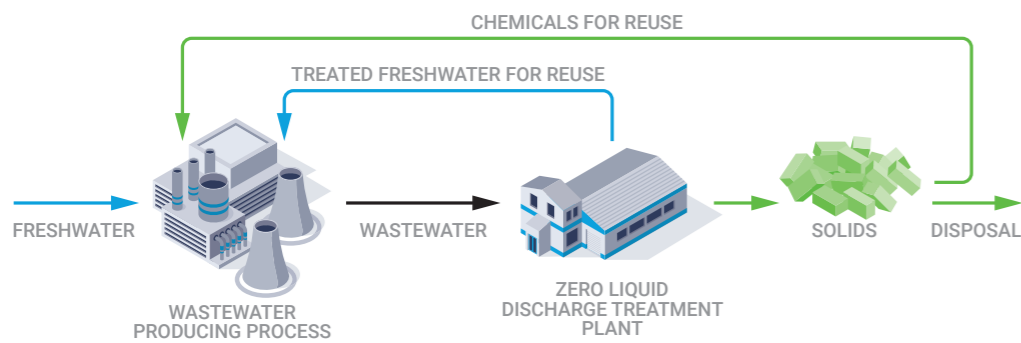


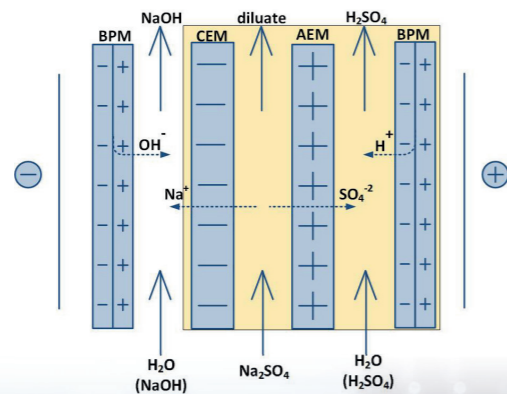
ADDITIONAL VALUE: LOCAL PRODUCTION OF ACID/CAUSTIC FROM LOCAL WASTEWATER



Optionally, for existing systems, MEGA can also offer a combination of pressure and electro-chemical technologies for the production of acid/caustic from local wastewater. This supplemental technology not only reduces the cost of acquiring new chemicals but also decreases waste CO₂ emissions. Additionally, it can lessen the load on the crystallizer in existing ZLD applications. The chemicals can be used for local pH changes, regeneration chemical for ion-exchange columns, CIP chemicals etc.

HOW DOES IT WORK?

The process combines pressure and electro-chemical membrane processes. It utilizes pressure membranes to separate monovalent from divalent ions in order to obtain pure solution for electrochemical process which splits H₂O into H⁺ and OH⁻ ions and recombines with existing ions in water. This way acid and caustic is produced only using electricity.



HIGHLIGHTS

- Local production of chemicals from wastewater
- Reduction of CO₂ and wastewater
- Reduction of load to crystallizer
- Environmentally friendly technology

WE ARE SCIENTISTS,
MANUFACTURERS & VISIONARIES

ELECTROLYTIC SEPARATOR FOR PCB FABRICATION WASTEWATER

- 99%+ water recovery
- 6 months – 3 years ROI
- Replacement for high-cost evaporation and distillation



Authorized partner



www.mega.cz/water



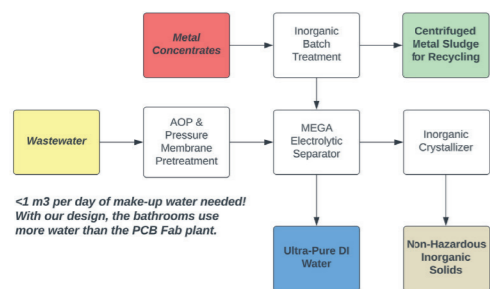


THE MEGA ELECTROLYTIC SEPARATOR FOR PCB FAB

THE RULE OF THUMB: THE LAST 5% OF WATER CONCENTRATION COSTS AS MUCH AS THE ENTIRE 95% OF PRIOR TREATMENT! MEGA'S ELECTROLYTIC SEPARATOR IS HERE TO REVOLUTIONIZE THIS EQUATION!

MEGA'S SOLUTION FOR PCB MANUFACTURING WASTEWATER RECYCLING

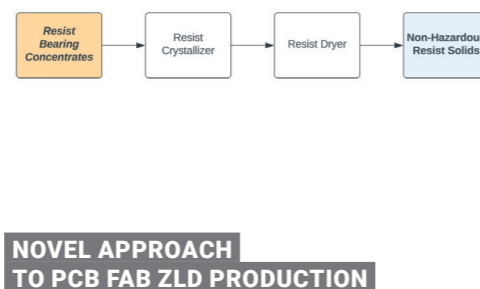
MEGA, the leader in electro-chemical separation technologies, together with Smart Factory Design – a long-term specialist in PCB manufacturing processes—has developed a tailor-made process for enabling cost effective closed loop wastewater recycling in PCB manufacturing. We are introducing the PCB Fab Electrolytic Separator, a unique electro-chemical process concept developed specifically to address the wastewater composition of PCB manufacturing operations, with low operating cost, no proprietary



chemicals, and 100% recycling of wastewater as ultra-pure DI water.

COST-EFFECTIVE ZLD SYSTEM

The PCB Fab Electrolytic Separator system serves as a replacement for high-cost evaporation and distillation systems in the PCB Fab ZLD process. In Zero Liquid Discharge (ZLD) wastewater treatment, the role of evaporation is to concentrate dissolved solids to concentrations high enough for final treatment by a crystallizer, transforming liquid waste into solids. The feed to the evaporator is usually pre-treated by a membrane system to pre-concentrate the wastewater to reduce evaporation volume.



NOVEL APPROACH TO PCB FAB ZLD PRODUCTION

HIGHLIGHTS

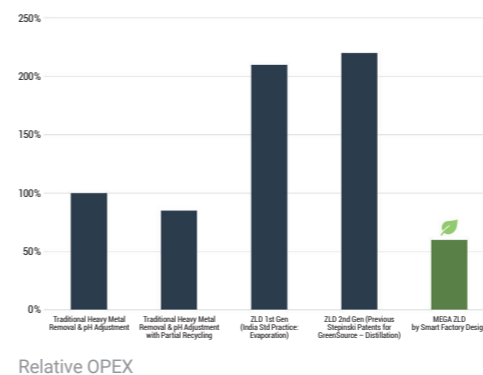
- 99%+ water recovery
- 6 months – 3 years ROI

Replacement for high-cost evaporation and distillation

The ROI is generated by the direct operational savings

Efficiently concentrate salts to levels suitable for the crystallizer

Simultaneously generate ultra-pure DI water



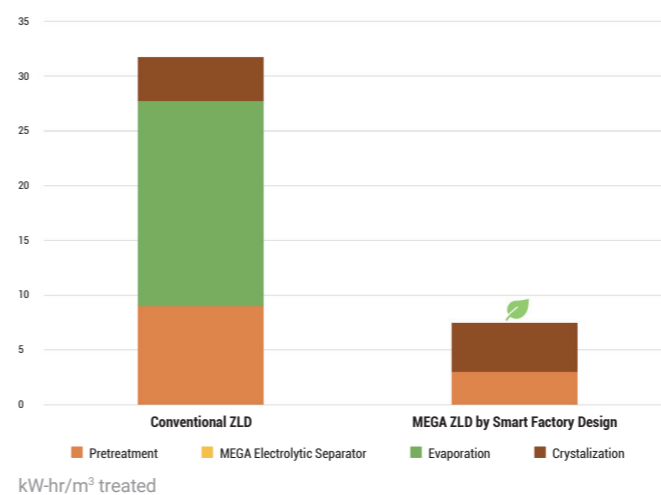
Relative OPEX

REPLACE THE MOST EXPENSIVE PART OF TRADITIONAL ZLD

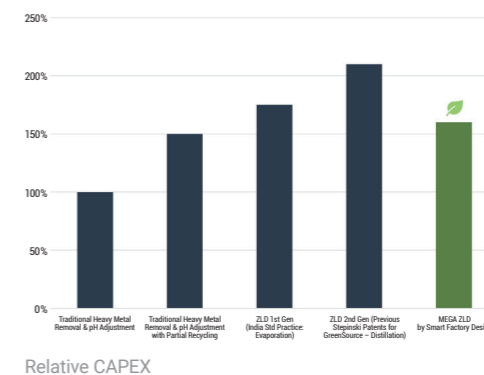
Evaporation is a thermal process that is traditionally expensive to build and operate and constitutes the vast majority of capital and operating cost for ZLD systems. One can even say that the cost hurdles associated with evaporation have been the main barrier to wide-spread adoption of closed loop technology for the PCB Fab market. The heating requirements alone can range from as high as 450 kWh/m³ of evaporated water to 150 kWh/m³ in the most efficient systems. It is generally considered the second most expensive system in the entire realm of global water treatment technology across all industries, surpassed only by freezing.

CONCENTRATE WASTE WATER & PRODUCE DI WATER AT THE SAME TIME

The new PCB fab separator introduces a novel approach to the concentration step, eliminating the need for evaporation by efficiently concentrating salts to levels suitable for the crystallizer, while simultaneously generating ultra-pure DI water. This innovative method

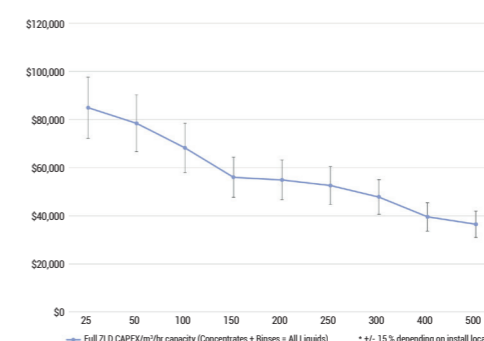


kWh/m³ treated



Relative CAPEX

completely bypasses traditional evaporation processes, offering a more efficient and cost-effective solution.



MEGA ZLD by Smart Factory Design Average CAPEX per m³/hr system capacity

- The design has strong economies of scale and systems >100 m³/hr in volume have CAPEX ROIs of 6 months up to 3 years when replacing an existing system.
- The ROI is generated by the direct operational savings from the new system, coupled with the free DI water generation, and elimination of full-time labor requirements.

OPERATING PARAMETERS

Power consumption 2–10 kWh/m³

Long membrane life-time 5–10 years

Tailor-made for PCB industry

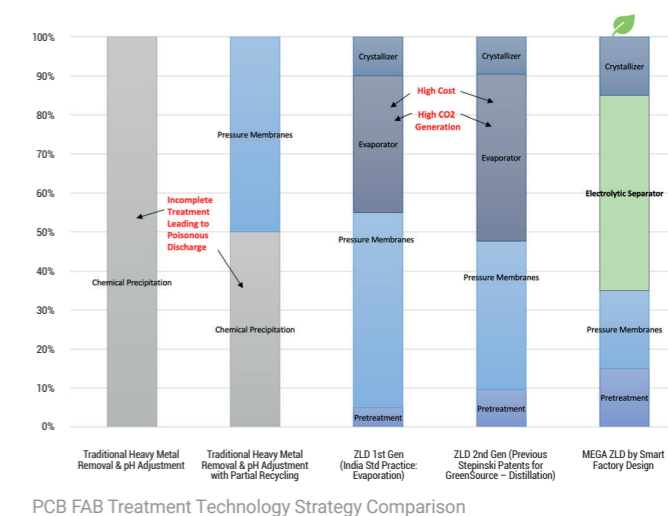
Quality components

99%+ water recovery technology

Ultra-low chemical demand, with only generic chemicals used (HCl, NaOH)

Low pressure – silent operation

Ambient temperature operation



PCB FAB Treatment Technology Strategy Comparison